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**LETTER OF INTEREST**  
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<b>Title - Sujet</b> FIXED SITE INSPECTION SYSTEMS	
<b>Solicitation No. - N° de l'invitation</b> 47064-138783/C	<b>Date</b> 2015-04-16
<b>Client Reference No. - N° de référence du client</b> 1000298783	<b>GETS Ref. No. - N° de réf. de SEAG</b> PW-\$\$PV-883-67140
<b>File No. - N° de dossier</b> pv883.47064-138783	<b>CCC No./N° CCC - FMS No./N° VME</b>
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> <b>on - le 2015-04-30</b>	
<b>Time Zone</b> <b>Fuseau horaire</b> Eastern Daylight Saving Time EDT	
<b>F.O.B. - F.A.B.</b> <b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input checked="" type="checkbox"/> <b>Other-Autre:</b> <input type="checkbox"/>	
<b>Address Enquiries to: - Adresser toutes questions à:</b> Saunders, Lynda	<b>Buyer Id - Id de l'acheteur</b> pv883
<b>Telephone No. - N° de téléphone</b> (819) 956-6851 ( )	<b>FAX No. - N° de FAX</b> (819) 956-3814
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b> CANADA BORDER SERVICES AGENCY 79 BENTLEY AVE OTTAWA Ontario K1A0L8 Canada	

**Instructions: See Herein**

**Instructions: Voir aux présentes**

<b>Delivery Required - Livraison exigée</b> See Herein	<b>Delivery Offered - Livraison proposée</b>
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<b>Telephone No. - N° de téléphone</b> <b>Facsimile No. - N° de télécopieur</b>	
<b>Name and title of person authorized to sign on behalf of Vendor/Firm</b> <b>(type or print)</b> <b>Nom et titre de la personne autorisée à signer au nom du fournisseur/</b> <b>de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b>	
<b>Signature</b>	<b>Date</b>

## **REQUEST FOR INFORMATION (RFI)**

### **FIXED SITE - LARGE-SCALE IMAGING (FS-LSI) FACILITY**

This RFI is a follow-on to the previous RFI issued under 47064-138783/B published 2014-06-09.

#### **PREFACE**

Canadian Border Services Agency has a requirement for a Fixed-Site Large-Scale Imaging (FS-LSI) Facility to be installed within the CBSA commercial compound at the Pacific Highway Port-of-Entry (PoE). The FS-LSI Facility is to enable non-intrusive inspection of large target objects (marine containers, transport trucks, passenger vehicles, etc.) using high-energy X-rays.

#### **CONTENTS OF THIS RFI**

This RFI contains a draft request for proposal (RFP). This document remains a work in progress and respondents should not assume that new clauses or requirements will not be added to any RFP that is ultimately published by Canada. Nor should respondents assume that none of the clauses or requirements will be deleted or revised. Comments regarding any aspect of the draft document are welcome.

#### **REQUESTED INFORMATION**

Through this Request for Information (RFI), the Government of Canada is seeking industry feedback on the feasibility of providing complete bid submissions and delivering a FS-LSI Facility in accordance with the statement of work and contractual terms and conditions detailed in the RFP. Respondents are requested to provide their comments, concerns and, where applicable, alternative recommendations regarding how the requirements could be satisfied. Respondents are also invited to provide comments regarding the content, format and/or organization of any draft documents included in this RFI. Respondents should explain any assumptions they make in their responses.

To enable this assessment, interested suppliers (having experience delivering same or similar FS-LSI Facility) and (or) potential partners thereto, are asked to provide answers to the following questions:

1. Does the RFP provide you with adequate information regarding the site location and (or) site conditions, in order to prepare a complete bid
2. Does the RFP provide you with adequate information regarding the design and construction requirements, in order to submit and revise documentation for approval as required? If not, what additional information would be required?
3. Does the RFP include any terms, conditions, or mandatory requirement which, from your experience, may prove to be unattainable or cost prohibitive? If so, please describe in detail, citing previous experience if possible.
4. Does the RFP provide you with adequate information regarding the principal requirement, in order to deliver the required maintenance service for the FS-LSI Facility? If not, what additional information would be required?

- 
5. Does the RFP provide you with adequate information to understand the evaluation procedures and basis of selection? If not, what additional information would be required?
  6. Does the planned location and footprint on the site provide adequate space for a FS-LSI Facility capable of inspecting 82' long targets?

#### **NOTE TO POTENTIAL RESPONDENTS**

This is not a bid solicitation. This RFI will not result in the award of any contract. As a result, potential suppliers of any goods or services described in this RFI should not reserve stock or facilities, nor allocate resources, as a result of any information contained in this RFI. Nor will this RFI result in the creation of any source list. Therefore, whether or not any potential supplier responds to this RFI will not preclude that supplier from participating in any future procurement. Also, the procurement of any of the goods and services described in this RFI will not necessarily follow this RFI. This RFI is simply intended to solicit feedback from industry with respect to the matters described in this RFI.

#### **RESPONSE COSTS**

Canada will not reimburse any respondent for expenses incurred in responding to this RFI.

#### **NATURE AND FORMAT OF RESPONSES REQUESTED**

**Use of Responses:** Responses will not be formally evaluated. However, the responses received may be used by Canada to develop or modify procurement strategies or any draft documents contained in this RFI. Canada will review all responses received by the RFI closing date. Canada may, in its discretion, review responses received after the RFI closing date.

**Review Team:** A review team composed of representatives of Canada will review the responses. Canada reserves the right to hire any independent consultant, or use any Government resources that it considers necessary to review any response. Not all members of the review team will necessarily review all responses.

**Confidentiality:** Respondents should mark any portions of their response that they consider proprietary or confidential. Canada will handle the responses in accordance with the Access to Information Act.

**Follow-up Activity:** Canada may, at its discretion, meet with respondents who indicate in their responses that they wish to participate in a follow-up meeting. Such follow-up activity, if conducted, may include, but is not limited to, individual meetings and/or conferences. Canada may, in its discretion, contact any respondents to follow up with additional questions or for clarification of any aspect of a response.

## **FORMAT OF RESPONSES**

**Cover Page:** If the response includes multiple volumes, respondents are requested to indicate on the front cover page of each volume the title of the response, the solicitation number, the volume number and the full legal name of the respondent.

**Title Page:** The first page of each volume of the response, after the cover page, should be the title page, which should contain:

- the title of the respondent's response and the volume number;
- the name and address of the respondent;
- the name, address and telephone number of the respondent's contact;
- the date; and
- the RFI number.

**Numbering System:** Respondents are requested to prepare their response using a numbering system corresponding to the one in this RFI. All references to descriptive material, technical manuals and brochures included as part of the response should be referenced accordingly.

**Number of Copies:** Respondents are requested to submit one softcopy, in PDF format, of their response.

## **ENQUIRIES**

Because this is not a bid solicitation, Canada will not necessarily respond to enquiries in writing or by circulating answers to all potential suppliers. However, respondents with questions regarding this Request for Information may direct their enquiries to:

### **Lynda Saunders**

Public Works and Government Services Canada  
Acquisitions Branch  
Commercial Consumer Products Directorate  
11 Laurier Street, 6A2, Phase III  
Place du Portage, Gatineau, Quebec, K1A 0S5

Telephone: (819) 956-6851

Facsimile: (819) 956-3814

E-mail address: [lynda.c.saunders@tpsgc-pwgsc.gc.ca](mailto:lynda.c.saunders@tpsgc-pwgsc.gc.ca)

## **SUBMISSION OF RESPONSES**

**Time and Place for Submission of Responses:** Respondents should send responses electronically via e-mail to the Contracting Authority's address identified herein by the date specified on the front page of the RFI.

**Responsibility for Timely Delivery:** Each respondent is solely responsible for ensuring its response is delivered on time to the correct location.



Solicitation No. - N° de l'invitation

47064-138783/C

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

pv883

Client Ref. No. - N° de réf. du client

1000298783

File No. - N° du dossier

pv88347064-138783

CCC No./N° CCC - FMS No/ N° VME

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**Identification of Response:** Each respondent should ensure that its name and return address, the solicitation number and the closing date appear legibly on the outside of the response.

**CLOSING DATE**

Responses to this Request for Information will be accepted at any time until 2:00 PM, April 30, 2015.

# **REQUEST FOR PROPOSALS**

## **FIXED SITE - LARGE-SCALE IMAGING (FS-LSI) FACILITY**

CANADIAN PORT-OF-ENTRY  
PACIFIC HIGHWAY  
Surrey, BC

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## REQUEST FOR PROPOSALS: FS-LSI FACILITY

### PART 1 - GENERAL INFORMATION

#### 1.1 Security Requirements

- 1.1.1 Before award of a contract, the following conditions must be met:
- (a) the Bidder must hold a valid organization security clearance as indicated in Part 6 - Resulting Contract Clauses;
  - (b) the Bidder's proposed individuals requiring access to classified or protected information, assets or sensitive work site(s) must meet the security requirements as indicated in Part 6 - Resulting Contract Clauses;
  - (c) the Bidder must provide the name of all individuals who will require access to classified or protected information, assets or sensitive work sites;
- 1.1.2 Bidders are reminded to obtain the required security clearance promptly. Any delay in the award of a contract to allow the successful bidder to obtain the required clearance will be at the entire discretion of the Contracting Authority.
- 1.1.3 For additional information on security requirements, bidders should refer to the [Industrial Security Program \(ISP\)](http://ssi-iss.tpsgc-pwgsc.gc.ca/index-eng.html) of Public Works and Government Services Canada (<http://ssi-iss.tpsgc-pwgsc.gc.ca/index-eng.html>) website.

#### 1.2 Statement of Requirement

The Canada Border Services Agency has a requirement for a Fixed-Site - Large-Scale Imaging (FS-LSI) Facility to be installed within the CBSA commercial compound at the Pacific Highway Port-of-Entry (PoE). The FS-LSI Facility is to enable the safe, non-intrusive inspection of large target objects (marine containers, transport trucks, passenger vehicles, etc.) using high-energy X-rays.

The FS-LSI Facility will be procured as a turn-key solution; the successful bidder will be responsible for satisfying all requirements defined in **ANNEX A**.

### 1.3 Optional Requirements

The following options for procurement are included:

- 1.3.1 An option to purchase "LSI Train-the-Trainer" training after contract award.
- 1.3.2 An option to purchase additional extended warranty and all service maintenance for the FS-LSI Facility, as detailed in **ANNEX A**, for five (5) additional one (1) year periods after expiry of the initial 2 year all-inclusive warranty.
- 1.3.3 An option to purchase a single, perpetual, enterprise software license after contract award.

### 1.4 Debriefings

Bidders may request a debriefing on the results of the bid solicitation process. Bidders should make the request to the Contracting Authority within 15 working days from receipt of the results of the bid solicitation process. The debriefing may be in writing, by telephone or in person.

### 1.5 National Security Exception

The national security exceptions provided for in the trade agreements have been invoked; therefore, this procurement is excluded from all of the obligations of all the trade agreements.

## PART 2 - BIDDER INSTRUCTIONS

### 2.1 Standard Instructions, Clauses and Conditions

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the [Standard Acquisition Clauses and Conditions Manual](https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual) (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of the bid solicitation and accept the clauses and conditions of the resulting contract.

**The 2003 (2014-09-25) Standard Instructions - Goods or Services - Competitive Requirements**, are incorporated by reference into and form part of the bid solicitation.

**Subsection 5.4 of 2003, Standard Instructions - Goods or Services - Competitive Requirements**, is amended as follows:

Delete: 60 days

Insert: 180 days

#### 2.1.1 SACC Manual Clauses

**B1000T (2014-06-26), Condition of Material – Bid**, are incorporated by reference into and form part of the bid solicitation.

**R2710T (2014-09-25), General Instructions – Construction Services – Bid Security Requirements**, are incorporated by reference into and form part of the bid solicitation.

Delete all subsections under R2710T with the exception of the following:

**GI05 (2014-09-25) Capital Development and Redevelopment Charges**

**GI08 (2014-06-26) Bid Security Requirements**

**GI14 (2013-04-25) Compliance with Applicable Laws**

**GI15 (2007-05-25) Approval of Alternative Materials**

### 2.2 Submission of Bids

Bids must be submitted only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit by the date, time and place indicated on page 1 of the bid solicitation.

Due to the nature of the bid solicitation, bids transmitted by facsimile to PWGSC will not be accepted.

### 2.3 Enquiries - Bid Solicitation

All enquiries must be submitted in writing to the Contracting Authority no later than ten (10) calendar days before the bid closing date. Enquiries received after that time may not be answered.

Bidders should reference as accurately as possible the numbered item of the bid solicitation to which the enquiry relates. Care should be taken by bidders to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary" will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the question(s) or may request that the Bidder do so, so that the proprietary nature of the question(s) is eliminated, and the enquiry can be answered to all bidders. Enquiries not submitted in a form that can be distributed to all bidders may not be answered by Canada.

## **2.4 Applicable Laws**

Any resulting contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in British Columbia, Canada.

## **2.5 Optional Site Visit**

It is recommended that the Bidder or a representative of the Bidder visit the work site. Arrangements have been made for the site visit to be held at 28-176th Street Surrey BC on (Enter date). The site visit will begin at 10:00 a.m. Pacific Standard Time (PST).

Bidders are requested to communicate with the Contracting Authority no later than (Enter date) confirm attendance and provide the name(s) of the person(s) who will attend. Bidders may be requested to sign an attendance sheet. Bidders who do not attend or do not send a representative will not be given an alternative appointment but they will not be precluded from submitting a bid. Any clarifications or changes to the bid solicitation resulting from the site visit will be included as an amendment to the bid solicitation.

## PART 3 - BID PREPARATION INSTRUCTIONS

### 3.1 Bid Preparation Instructions

Canada requests that bidders provide their bid in separately bound sections as follows:

- Section I: Technical Bid (3 hard copies) and 3 soft copies on flash drive or portable hard-drive. All soft copies of documents must be in searchable .pdf format.
- Section II: Financial Bid (1 hard copy) and 2 soft copies on flash drive or portable hard-drive.
- Section III: Certifications (1 hard copy) and 1 soft copy on flash drive or portable hard-drive.

If there is a discrepancy between the wording of the soft copy and the hard copy, the wording of the hard copy will have priority over the wording of the soft copy.

Prices must appear in the financial bid only. No prices must be indicated in any other section of the bid.

Canada requests that bidders follow the format instructions described below in the preparation of their bid:

- use 8.5 x 11 inch (216 mm x 279 mm) paper;
- use a numbering system that corresponds to the bid solicitation.

In April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process [Policy on Green Procurement](http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html) (<http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html>). To assist Canada in reaching its objectives, bidders should:

- use 8.5 x 11 inch (216 mm x 279 mm) paper containing fiber certified as originating from a sustainably-managed forest and containing minimum 30% recycled content; and
- use an environmentally-preferable format including black and white printing instead of colour printing, printing double sided/duplex, using staples or clips instead of color, duotangs or binders.

### 3.2 Section I: Technical Bid

In their technical bid, bidders should explain and demonstrate how they propose to meet the requirements and how they will carry out the Work. Bidders must demonstrate their capability by completing in full ATTACHMENT 1 to PART 4 of the RFP – FS-LSI Technical Submission Document.

The technical bid should address clearly and in sufficient depth the points that are subject to the evaluation criteria against which the bid will be evaluated. Simply repeating the statement contained in the bid solicitation is not sufficient. In order to facilitate the evaluation of the bid, Canada requests that bidders address all requested informational requirements in the form and format defined in the DID.

Failure to provide any of the information requested in DID document, or failure to provide data requested to substantiating any claim may result in the Technical Bid being deemed non-compliant.

### 3.3 Section II: Financial Bid

#### 3.3.1 Fixed Site –Large Scale Imaging (FS-LSI) Facility

- (a) Bidders must quote a firm all-inclusive lot price for a FS-LSI Facility, including all training and a two (2) year warranty and all service maintenance for the FS-LSI Facility, as detailed in **ANNEX A**.

The quoted price must be for DDP Delivered Duty Paid (Pacific Highway, BC) Incoterms 2000, in the spaces provided at **ATTACHMENT 2 to PART 4 of the RFP - Calculation of Total Price**, Article A i). Customs duties are included and Applicable Taxes extra.

#### 3.3.2 Optional Requirement, on an “as and when requested” basis

- (a) LSI “Train-the-Trainer” Training (Option to Purchase)  
Bidders must quote a firm unit price, per participant, all inclusive of all costs associated with the Training, in accordance with the details provided under **ANNEX A**, including instructor(s) travel and living expenses and all training materials, DDP Delivered Duty Paid, (Pacific Highway, BC) Incoterms 2000 in the spaces provided at **ATTACHMENT 2 to PART 4 of the RFP - Calculation of Total Price**, Article B i). Customs duties are included and applicable Taxes extra.
- (b) Additional Years of Warranty and Service Maintenance (Option to Purchase)  
Bidders must quote firm all-inclusive yearly prices, DDP Delivery Duty Paid (Pacific Highway, BC), Incoterms 2000 for the extension by one (1) year of all warranty and service maintenance for the FS-LSI Facility as required in **ANNEX A**, to commence after expiry of the initial two (2) year warranty for the FS-LSI Facility purchased under 3.3.1(a) above, in the spaces provided at **ATTACHMENT 2 to PART 4 of the RFP - Calculation of Total Price**, Article B ii). Customs duties are included and Applicable Taxes extra.
- (c) Single Perpetual Enterprise Software License (Option to Purchase)  
Bidders must quote a firm all-inclusive lot price, for a single, perpetual enterprise software license (for installation anywhere within the Agency and used by up to 100 people), DDP Delivery Duty Paid (Pacific Highway, BC), Incoterms 2000, in the spaces provided at **ATTACHMENT 2 to PART 4 of the RFP - Calculation of Total Price**, Article B iii). Customs duties are included and Applicable Taxes extra.

If a bidder fails to quote a firm lot price for the above optional requirements, the bidder will be considered non-compliant and no further consideration will be given.

#### 3.3.3 Exchange Rate Fluctuation

C3011T (2013-11-16), Exchange Rate Fluctuation

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### 3.4 Section III: Certifications

Bidders must submit the certifications required under Part 5.

### 3.5 Section IV: Other Information

#### 3.5.1 General Information

##### (a) General Manager (Primary Point-of-Contact)

The Bidder must provide the contact information for representative responsible for the proposed FS-LSI Facility delivery:

Name: .....  
Title: .....  
Telephone Number: .....  
Mobile Number: .....  
Email Address: .....  
Primary Office Location: .....  
Company Headquarters' Location: .....

##### (b) Products Offered

The Bidder must provide the following general information pertaining to the Fixed-Site Large-Scale Imaging (FS-LSI) product being offered:

Name of Manufacturer: .....  
Make and Model Number: .....  
Location of Manufacture: .....  
Number of Same Units Sold and Delivered Prior to March 31, 2015: .....

#### 3.5.2 Maintenance Information

##### (a) Preventative Maintenance Schedule

Bidders are requested to provide an outline the projected preventative maintenance visits and activities to be undertaken by a qualified service technician during the initial warranty period.

##### (b) Critical Components List

Bidders are requested to provide a list of critical components and the following associated information:

- their failure impact
- projected maintenance resolution time
- the location of spare or sourced replacement parts

##### (c) Spare parts and consumables<sup>1</sup>

---

<sup>1</sup> Price information is for informational purposes only.



Bidders are requested to provide the following:

- Recommended spare parts list with pricing;
- Recommended consumables list with pricing;
- Explanation as to what intervals the parts need to be changed;
- Explanation as to whether the replacement components require installation by a qualified service technician; and
- A list of replacement parts which are not covered under the extended Warranty and Maintenance Service Agreement.

(d) Manufacturing and Service Delivery Locations

Bidders are requested to state:

- the primary location(s) to manage the service of the unit
- the point of manufacturing and assembly of major FS-LSI subsystems:

(e) Technical Service Model

Bidders are requested to describe:

- the proposed service model/maintenance strategy
- partnerships/subcontracted maintenance to be performed by other equipment manufacturers
- the proposed logistics for management or sourcing of spare/replacement parts
- problem ticket initiation response procedures

3.5.3 Training

REFERENCE: **ANNEX A** Section 1.0

Bidders are requested to provide proposed training outlines, which should include a listing of all in-class and hands-on modules; along with a description of the media and instructional aides to be used (e.g., printed materials, presentation software, interactive training software, etc.) in the delivery of the following courses:

- LSI Operator Training
- LSI Train-the-Trainer Training
- LSI Advanced User Training
- LSI Equipment Maintenance Familiarization Training
- LSI Building Maintenance Familiarization Training

Bidders must specifically detail the media and instructional aids used (printed materials, presentation software, interactive training software, etc.).

Appended as: .....

3.5.4 Preliminary Project Scheduling

Bidders are requested to provide a proposed project schedule, in a Gantt Chart format. The project schedule should include:

- Critical path activities
- All events listed in Section 6.8.7 Breakdown of Milestones/Progress Payments.

3.5.5 Video Surveillance Equipment

REFERENCE: **ANNEX A** Section 11.0

Bidders are requested to provide conceptual details regarding the video surveillance equipment necessary to support the proposed FS-LSI Facility.

Number and type(s) of cameras to cover the interior of the FS-LS Imaging Enclosure:

.....  
.....

Number and type(s) of cameras to cover the FS-LSI Facility Surrounding Parking Area:

.....  
.....

Number and type(s) of cameras to cover the FS-LSI Facility entry and exits:

.....  
.....

Number and type(s) of cameras to cover the FS-LSI Driver Waiting room:

.....  
.....

#### 3.5.6 Imaging Performance

Bidders are requested to provide a completed a full copy all results from testing based upon the *American National Standards Institute (ANSI N42.46) - Determination of the Imaging Performance of X-Ray and Gamma-Ray Systems for Cargo and Vehicle Security Screening*; as recorded on a same or similar system of the type being proposed in response to this RFP.

Appended as: .....

## PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION

### 4.1 Evaluation Procedures

Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical and financial evaluation criteria.

An evaluation team composed of representatives of Canada will evaluate the bids.

#### 4.1.1 Technical Evaluation

##### (a) Step 1 – Mandatory Requirements

Bids will first be evaluated based on ATTACHMENT 1 of PART 4 of the RFP, the FS-LSI Technical Submission Document

If the bidder fails to provide any of the requested information or substantiating data in the FS-LSI Technical Submission Document, the bid will be deemed non-compliant and not be further evaluated.

If the information provided in the FS-LSI Technical Submission Document shows that the proposed system could not meet any of the mandatory requirements listed in **ANNEX A** it will be deemed non-compliant and not be further evaluated.

##### (b) Step 2 – Point Rated Technical Criteria and Ranking

Bids meeting the **MANDATORY** requirements of 4.1.1 (a) above will be assigned technical points based on the bidder's submission of the Technical Evaluation Matrix, attached as APPENDIX 1 to PART 4 of the RFP .

All compliant bids will be ranked based on the technical score assigned.

##### (c) Step 3 - Demonstration – Data Validation Test (DVT)

For the top three (3) compliant bids, Bidders must perform a Data Validation Test (DVT) with a system of the type proposed for purchase by the Government of Canada to validate performance claims and system compliance with the requirements. Bidders must conduct the Data Validation Test at a mutually agreed upon date/time/location (system must be made available within fifteen (15) calendar days after notification of compliant bid), only one DVT will be performed per compliant system; CBSA personnel must be able to observe and direct the testing.

Test results from the DVT will be used to confirm compliance and point allocation to the evaluation criteria based on the Technical Evaluation Matrix, attached as APPENDIX 1 to PART 4 of the RFP . In the event of any discrepancy between the purported performance and technical scoring assigned under step 2 and the performance demonstrated during the DVT; the technical scoring will be adjusted to reflect the demonstrated performance accordingly.

Failure to demonstrate compliance with any of the assessed mandatory

requirements will result in the Bidder's proposal being declared non-responsive.

CBSA will provide the DVT Test Plan to compliant bidders upon selection.

CBSA will be responsible for all travel and living expenses for CBSA and PWGSC personnel attending the Testing. The Bidder will be responsible for all costs to furnish test equipment, test fixtures, radiation survey instruments required to demonstrate systems compliance. The Bidder will be responsible for all travel and living expenses for its personnel attending/performing the Testing.

#### 4.1.2 Financial Evaluation

The price of the bid will be evaluated as follows:

- (a) Prices will be evaluated in Canadian currency including any applicable Canadian customs duties and excise taxes and Applicable Taxes are extra. For evaluation purposes, bids received in a foreign currency will be converted to Canadian currency using the appropriate rate of exchange using the rate quoted by the Bank of Canada as being in effect on date of bid closing.
- (b) prices will be evaluated on DDP Delivered Duty Paid (British Columbia, Canada) Incoterms 2000 for bid evaluation purposes only.
- (c) prices will be evaluated based on total aggregated bid price determined as detailed in **ATTACHMENT 2 to PART 4 of the RFP** entitled "Calculation of Total Price".
- (d) To establish the pricing score, each responsive bid will be prorated against the lowest evaluated price (including optional quantities) and the ratio of 40%.

### 4.2 Basis of Selection

#### 4.2.1 Highest Combined Rating of Technical Merit and Price

To be declared responsive, a bid must:

- (a) comply with all the requirements of the bid solicitation
- (b) meet all mandatory criteria

- 4.2.2 Bids not meeting either (a) or (b) will be declared non-responsive.
- 4.2.3 The selection will be based on the highest responsive combined rating of technical merit and price. The ratio will be 60% for the technical merit and 40% for the price.
- 4.2.4 To establish the technical merit score, the overall technical score for each responsive bid will be determined as defined in the APPENDIX 1 to PART 4 of the RFP . For each responsive bid, the technical merit score and the pricing score will be added to determine its combined rating.
- 4.2.5 Neither the responsive bid obtaining the highest technical score nor the one with the lowest evaluated price will necessarily be accepted. The responsive bid with the highest combined rating of technical merit and price will be recommended for award of a contract.
- 4.2.6 In the event that two or more fully responsive proposals have resulted in the same total score (including Technical and Financial), the tie will be broken by comparing the Technical Scores and contract awarded to the Bidder whose proposal has the highest Technical Score.

The table below illustrates an example where all three bids are responsive and the selection of the contractor is determined by the highest overall combined ranking based on a weighting of 60% technical and 40% price, respectively. The total available points equals 30 and the lowest evaluated price is \$50,000 (50\*).

Basis of Selection - Highest Combined Rating Technical Merit (60%) and Price (40%)

		Bidder 1	Bidder 2	Bidder 3
Overall Technical Score		27/30	25/30	22/30
Bid Evaluated Price		\$70,000.00	\$55,000.00	\$50,000.00
Calculations	Technical Merit Score	$27/30 \times 60 = 54.0$	$25/30 \times 60 = 50.0$	$22/30 \times 60 = 44.0$
	Pricing Score	$*50/70 \times 40 = 28.6$	$*50/55 \times 40 = 36.4$	$*50/50 \times 40 = 40.0$
Combined Rating		82.6	86.4	84.0
Overall Rating		3	1	2

## ATTACHMENT 1 to PART 4 of the RFP

### FS-LSI Technical Submission Document

#### SECTION A - INSTRUCTIONS

##### A.1 Submissions Requirements

This Technical Submission Document must be completed in full at the time of Bid Submission

##### A.2 Format and Sectioning

The formatting and layout of this report should comply with the directives provided in the Request for Proposals (RFP) PART 4 – Evaluation Procedures and Basis of Selection.

Large data files do not need to be printed for inclusion in the hard copy; however, they must be easily accessed in the electronic version of the Technical Bid without the need for specialized software.

##### A.3 Content and Referencing

The Bidder must provide all information requested and this DID.

**\*\*\* Failure to provide any of the requested information, or failure to provide data requested to substantiate any claim may result in the Technical Bid being deemed non-compliant. \*\*\***

All requested information must be presented in the respective sections of this report, or referenced and appended thereto.

All appended figures, tables, and supporting data must be properly referenced in the DID Report.

#### SECTION B - PRINCIPLE INFORMATION

##### B.1 FS-LSI Facility Concept Drawings

REFERENCE: **ANNEX A** Section 1.0, Section , Section 12.0

The Bidder must append scaled engineering design drawings<sup>2</sup> of the proposed *FS-LSI Facility*, showing at a minimum:

- B.1.1 All physical buildings, rooms and corridors
- B.1.2 All windows, doorways, entrances and exits
- B.1.3 Proposed traffic routing
- B.1.4 Layout of the *FS-LSI Control Room*, including:
  - Operator workstations
  - Washroom and janitorial facilities
  - Driver Waiting Area
  - Server room/area

---

<sup>2</sup> Concept drawings need not include finishing details (e.g., paint coloring, exterior cladding, etc.).

**B.1.5** Layout of the *FS-LS Imaging Enclosure*, including:

- Location(s) of scanning equipment
- Location(s) of shielding materials
- Locations of Emergency Stops
- Locations of Radiation Monitoring Equipment

**B.2 Customer References**

REFERENCE: **ANNEX A** Section 1.0

The Bidder must provide two non-Canadian References for Governmental clients using the same or similar systems that can attest to the Maintenance Service History and Availability of the system provided.

Information to be corroborated with references to ascertain the Maintenance Service History may include, but is not necessarily limited to:

- B.2.1 the date and time of ticket(s) generation
- B.2.2 the level of operational impact (e.g., inoperable, limited use, no impact)
- B.2.3 the faulty component or software identified
- B.2.4 the corrective action(s) taken
- B.2.5 the date and time when the ticket was closed
- B.2.6 the Mean Time to Repair
- B.2.7 the Meant Time Between Failures
- B.2.8 the Mean Availability
- B.2.9 the Mean Functionality

**Reference 1:**

Name : .....  
Title: .....  
Phone: .....  
Email: .....  
Address: .....  
.....  
.....  
Number of Units Sold to Date: .....  
Unit Model(s): .....  
Deployment Date: .....  
Deployment Location:.....  
Current Location: .....

**Reference 2:**

Solicitation No. - N° de l'invitation  
Client Ref. No. - N° de réf. du client

Amd. No. - N° de la modif.  
File No. - N° du dossier

Buyer ID - Id de l'acheteur  
CCC No./N° CCC - FMS No./N° VME

Name : .....  
Title: .....  
Phone: .....  
Email: .....  
Address: .....  
.....  
.....  
Number of Units Sold to Date: .....  
Unit Model(s): .....  
Deployment Date: .....  
Deployment Location:.....  
Current Location: .....  
Additional details appended as: .....

## SECTION C - OPERATIONAL REQUIREMENTS

### C.1 Number of Operators

REFERENCE: **ANNEX A** Section 9.0

The Bidder must detail the high-level responsibilities of the FS-LSI Operators along with any added capabilities provided by employing additional personnel.

Operator 1: .....

.....

Operator 2: .....

.....

Additional Personnel: .....

.....

.....

Additional details appended as: .....

### C.2 Imaging Rate

REFERENCE: **ANNEX A** Section 9.0



Solicitation No. - N° de l'invitation  
Client Ref. No. - N° de réf. du client

Amd. No. - N° de la modif.  
File No. - N° du dossier

Buyer ID - Id de l'acheteur  
CCC No./N° CCC - FMS No./N° VME

Maximum number of full-length imaging passes per hour: .....

The Bidder must provide a step-by-step time sequence of events for the entire imaging process (from initial target staging to release decision and vehicle departure)

Time	Action	Operator(s) Involvement
0:00		

Additional details appended as: .....

### C.3 Communication Systems (Intercom and Public Address)

REFERENCE: **ANNEX A** Section 9.0

The Bidder must describe the proposed intercom and public address systems to be used for local communications.

.....

.....

.....

.....

.....

.....

Additional details appended as: .....

#### C.4 Scanning Speeds

REFERENCE: **ANNEX A** Section 9.0

The Bidder must provide the following details pertaining to the functional limits for scanning.

##### Scanning Speeds

Low Speed [m/s]	
Normal Speed [m/s]	
High Speed [m/s]	
Other Speed(s) [m/s]	

#### C.5 Maximum Target Dimensions

REFERENCE: **ANNEX A** Section 9.0

Length [m]	
Width [m]	
Height [m]	
Image cut-off (height above floor) [m]	

Maximum number of objects imaged in a single pass: .....

Additional details appended as: .....

## C.6 Operating Conditions

REFERENCE: **ANNEX A** Section 9.0

The Bidder must provide the following information relating to the limits of operating conditions.

Minimum environmental temperature in which the system can operate properly: .....°C

Maximum environmental temperature in which the system can operate properly: .....°C

Maximum relative humidity in which the system can operate properly: .....%

List any other environmental effects which could hinder normal operations: .....

.....

Additional details appended as: .....

## C.7 Traffic Control Lights

REFERENCE: **ANNEX A** Section 9.0

The Bidder must describe the traffic control lights/mechanisms for target object management in/out of the FS-LSI Facility.

.....

.....

Additional details appended as: .....

## C.8 Imaging Tools

REFERENCE: **ANNEX A** Section 9.0

The Bidder must describe the standard software tools available to the FS-LSI Operator to assist in analyzing and annotating the resultant radiographic image.

Tool	Capability Description

Additional details appended as: .....

### C.9 Optical Character Recognition (OCR)

REFERENCE: **ANNEX A** Section 9.0

The Bidder must append details of the proposed FS-LSI Facility's OCR sub-system, specifically:

OCR system manufacturer: .....

OCR camera types: .....

.....

.....

OCR camera locations: .....

.....

.....

Projected OCR accuracy of system (in %): .....

Additional Details Appended as: .....

### C.10 Passive Radiation Detection

REFERENCE: **ANNEX A** Section 9.0

The Bidder must append details of the FS-LSI Facility's passive radiation detection system, specifically detailing:

Number of each passive radiation detection module: .....

.....

Types of radiation detection modules: .....

.....

Locations of radiation detection modules: .....

.....

How the FS-LSI Facility differentiates between radiation emissions from the target object and those from the radiographic source: .....

.....

.....

.....

Note: Additional Information Requested in G.3 – Passive Radiation Detection Test Results.

Additional Details Appended as: .....

---

### C.11 Remote Image Analysis and Verdict via CBSA's IGW

REFERENCE: **ANNEX A** Section 14.22

The Bidder should describe any *FS-LSI Facility* capabilities (if available) for Remote Image Analysis and Verdict through CBSA's through the CBSA's Instrumentation Gateway (IGW) and Virtual Private Network (VPN).

.....

.....

.....

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The Bidder should fill in APPENDIX 1 to PART 4 of the RFP with the *FS-LSI Facility* capabilities reflective of the proposed for purchase by the Government of Canada.

Additional information appended as: .....

### C.12 Real-Time Image Display

REFERENCE: **ANNEX A** Section 14.22

The Bidder should describe any *FS-LSI Facility* capabilities (if available) for Real-Time Image Display.

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The Bidder should fill in APPENDIX 1 to PART 4 of the RFP with the *FS-LSI Facility* capabilities reflective of the proposed for purchase by the Government of Canada.

Additional information appended as: .....

### C.13 Low Vehicle Scanning

REFERENCE: **ANNEX A** Section 14.22

The Bidder should describe any *FS-LSI Facility* capabilities (if available) for scanning vehicles as low as 15 cm from the floor (as measured along the centre-line of the inspection volume) to the top of the scanned object without exhibiting image cut-off.

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The Bidder should fill in APPENDIX 1 to PART 4 of the RFP with the *FS-LSI Facility* capabilities reflective of the proposed for purchase by the Government of Canada.

Additional information appended as: .....

#### C.14 Dual View Imaging System

REFERENCE: **ANNEX A** Section 15.0

The Bidder should describe any FS-LSI Facility capabilities (if available) for simultaneous image generation from at least two orthogonal angles.

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The Bidder should fill in APPENDIX 1 to PART 4 of the RFP with the *FS-LSI Facility* capabilities reflective of the proposed for purchase by the Government of Canada.

Additional information appended as: .....

#### C.15 Camera Underside Viewing of Target Objects

REFERENCE: **ANNEX A** Section 15.0

The Bidder should describe any FS-LSI Facility capabilities (if available) for capturing/displaying digital image of the underside of the conveyance

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The Bidder should fill in APPENDIX 1 to PART 4 of the RFP with the *FS-LSI Facility* capabilities reflective of the proposed for purchase by the Government of Canada.

Additional information appended as: .....

## SECTION D - DESIGN AND CONFIGURATION INFORMATION

### D.1 Uninterruptible Power Supplies (UPS)

REFERENCE: **ANNEX A** Section 10.0

The Bidder must list all subsystems provided protected by Uninterruptible Power Supply (UPS) in case of power loss.

UPS Make/Model	Subsystem(s) Covered	Duration of Protection	Fail-Safe Steps Initiated During Power Loss

Appended as: .....

### D.2 Projected FS-LSI Facility Power Requirements

REFERENCE: **ANNEX A** Section 18.0, Section 19.0

The Bidder must outline the projected operating power requirements for the operation of the FS-LSI Facility, specifically:

The projected hourly power required for normal imaging operations: .....

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The projected power required for building support systems (e.g., heating/air conditioning/ventilation (HVAC), lighting, etc.): .....

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List the peak power drawn during imaging operations: .....

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Appended as: .....

### D.3 Protection from Dirt and Water

REFERENCE: **ANNEX A** Section 10.0

The Bidder must detail the Ingress Protection (IP) or equivalent water and dust protection rating for major subsystems in the FS-LS Imaging Enclosure.

FS-LSI Subsystems (within Imaging Enclosure)	IP Rating or Equivalent Protection
Source Assembly	
Detector Assembly	
Communications Lines	
Power Lines	
Cameras and Radiological Safety Systems	
Other Electrical Subsystems:	

Appended as: .....

## SECTION E - VIDEO SURVEILLANCE INFORMATION

### E.1 Video Management Software

REFERENCE: **ANNEX A** Section 11.0

The Bidder must describe the following principle elements of the proposed FS-LSI Facility's Video Surveillance system:

Video Management Software (VMS) (make/model): .....

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Video Surveillance Backup Power Source: .....

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Video Surveillance Archiving System: .....

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Additional details appended as: .....

## SECTION F - RADIATION SAFETY REQUIREMENTS

### F.1 Radiation Emitting Device Certification

REFERENCE: **ANNEX A** Section 12.0

The Bidder must append either:

- F.1.1 A completed draft of the Canadian Nuclear Safety Commission (CNSC) - Application form for Certification of Radiation Devices or Class II Prescribed Equipment [http://nuclearsafety.gc.ca/eng/pdfs/Published-RD-GD/RDGD-254-Certification-of-Radiation-Devices-or-Class-II-Prescribed-Equipment-Form\\_e.pdf](http://nuclearsafety.gc.ca/eng/pdfs/Published-RD-GD/RDGD-254-Certification-of-Radiation-Devices-or-Class-II-Prescribed-Equipment-Form_e.pdf)

- F.1.2 A copy of the CNSC Certification of Radiation Devices for the FS-LSI Source

Appended as: .....

### F.2 Radiation Device General Information

REFERENCE: **ANNEX A** Section 12.0

The Bidder must provide the following information on the radiation emitting device:

- a. Source Type: .....
- b. Source Original Manufacture: .....
- c. Source Model: .....
- d. Source Nominal Emission Energies: .....
- e. Source Pulse Rate (in pulses per second (pps)) : .....
- f. Source pulse width/duration: .....
- g. Source Nominal Scanning Dose Rate ( $\mu\text{Sv/hr}$ ) : .....

Additional details appended as: .....

### F.3 Radiation Control and Shielding General Information

REFERENCE: **ANNEX A** Section 12.0

The Bidder must provide a properly scaled-drawing of all shielding elements integrated into the FS-LS Imaging Equipment, showing material type(s) and dimensions.

Appended as: .....

### F.4 Radiological Survey Data

REFERENCE: **ANNEX A** Section 12.0

The Bidder must present graphically, along with providing all raw data from, a radiological survey conducted on a same or similar FS-LSI Facility already installed.

If radiation survey data is not available, the Bidder must provide Monte Carlo simulation of the projected effective dose rates in SI units (e.g.,  $\mu\text{Sv/h}$ ); inside and around the FS-LSI Facility during scanning of a standard commercial road conveyance. At a minimum these simulated projections must detail:

- F.4.1 The projected dose rates inside the FS-LS Imaging Enclosure
- F.4.2 The projected dose rates immediately outside the FS-LS Imaging Enclosure
- F.4.3 The projected dose rates in the FS-LSI Control Room

Appended as: .....

### F.5 Projected Radiation Safety Zone

REFERENCE: **ANNEX A** Section 12.0

The Bidder must provide a top view engineering drawing of the proposed FS-LSI Facility outlining the projected boundary of the Radiation Safety Zone (demarcated at  $5 \mu\text{Sv/h}$ ).

Appended as: .....

## F.6 Radiological Safety Interlocks

REFERENCE: **ANNEX A** Section 12.0

The Bidder must detail all subsystems tied into the Radiological Safety Interlocks, which, once opened, will cause the immediate cessation of radiation emission. These are to include all physical switches (e.g., Emergency Stops) and measurement systems (e.g., radiation monitoring systems).

Interlock	Description	Indication/Threshold

Additional details appended as: .....

## F.7 Emergency Stops

REFERENCE: **ANNEX A** Section 12.0

The Bidder must provide a description of the function of the emergency stop buttons and devices and identify their locations in the proposed FS-LSI Facility.

Location	Type	Functional Description

Additional details appended as: .....

## F.8 Radiation Monitoring Devices

REFERENCE: **ANNEX A** Section 12.0

The Bidder must provide a description of the design and functions of all area radiation monitors incorporated into the facility and identify their locations in the proposed FS-LSI Facility.

Location	Model/Type

Additional details appended as: .....

## F.9 Radiation Warning Lights

REFERENCE: **ANNEX A** Section 12.0

The Bidder must provide a description of the functionality of the radiation warning lights and identify their locations in the proposed FS-LSI Facility.

Location	Type	Functional Description

Additional details appended as: .....

## F.10 Pre-Irradiation Alarms

REFERENCE: **ANNEX A** Section 12.0

The Bidder must provide a description of the functionality of the pre-radiation alarms and identify their locations in the proposed FS-LSI Facility.

Location	Type	Functional Description

Additional details appended as: .....

## F.11 FS-LS Imaging Enclosure - Clearance Verification System

REFERENCE: **ANNEX A** Section 12.0

The Bidder must provide a description of the Clearance Verification System, including a description of the componentry, data decision logic and inclusion in the Radiological Safety Interlocks.

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Additional details appended as: .....



## F.12 Varying Intensity Radiation Source

REFERENCE: **ANNEX A** Section 15.0

The Bidder should describe any *FS-LSI Facility* capabilities (if available) for automatically varying the radiation intensity during scanning and detail the measured differences on imaging performance.

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The Bidder should fill in APPENDIX 1 to PART 4 of the RFP with the *FS-LSI Facility* capabilities reflective of the proposed for purchase by the Government of Canada.

Additional information appended as: .....

## SECTION G - INSPECTION PERFORMANCE REQUIREMENTS

### G.1 Imaging Performance Test Results

REFERENCE: **ANNEX A** Section 12.24

The Bidder must fill in APPENDIX 1 to PART 4 of the RFP with image quality test results obtained on a system of the type proposed for purchase by the Government of Canada. All testing should be done in accordance with the American National Standards Institute (ANSI) Determination of the Imaging Performance of X-Ray and Gamma-Ray Systems for Cargo and Vehicle Security Screening (ANSI N42.46).

Make/Model Tested: .....

Date of Testing: .....

Location of Testing: .....

Additional details appended as: .....

### G.2 – Material Discrimination Test Results

REFERENCE: **ANNEX A** Section 12.24

The Bidder must fill in APPENDIX 1 to PART 4 of the RFP with material discrimination test results obtained on a system of the type proposed for purchase by the Government of Canada.

Make/Model Tested: .....

Date of Testing: .....

Location of Testing: .....

Additional details appended as: .....

### G.3 – Passive Radiation Detection Test Results

REFERENCE: **ANNEX A** Section 12.24

The Bidder must provide passive radiation detection test results obtained on a system of the type proposed for purchase by the Government of Canada.

Source	Nominal Activity <sup>3</sup> [Ci = Curie, kBq = kilobecquerel]	Minimum Net Counts [cps = counts per second]	
<sup>241</sup> Am	47 µCi (1.74 MBq)	10 cps	
<sup>57</sup> Co	5 µCi (185 kBq)	50 cps	
<sup>133</sup> Ba	14 µCi (518 kBq)	100 cps	
<sup>137</sup> Cs	16 µCi (592 kBq)	72 cps	
<sup>60</sup> Co	7 µCi (259 kBq)	145 cps	
<sup>252</sup> Cf	10 <sup>4</sup> n/s ± 20%	2.0 cps	

### G.4 Material Discrimination – High-Z (Attenuating Materials)

REFERENCE: **ANNEX A** Section 15.0

The Bidder should describe any FS-LSI Facility capabilities (if available) for material discrimination of high-Z materials.

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<sup>3</sup> Source activities must be within +/- 20% of nominal activities; and should be NIST traceable.

The Bidder should fill in APPENDIX 1 to PART 4 of the RFP with the *FS-LSI Facility* capabilities reflective of the proposed for purchase by the Government of Canada.

Additional information appended as: .....

## SECTION H - DATA MANAGEMENT REQUIREMENTS

### H.1 System Network Configuration

REFERENCE: **ANNEX A** Section 13.14

The Bidder must provide detailed information on the computers and network configurations, identifying:

- schematic showing the networking of FS-LSI computer systems
- data storage media housing CBSA information-of-interest
- data structure housing CBSA information-of-interest
- network management and security protocols used by the system

Appended as: .....

### H.2 Sample Output files

REFERENCE: **ANNEX A** Section 13.14

The Bidder must provide a sample output file/dataset of all nominal scanning data captured and associated with the FS-LSI inspection process, including but not limited to:

- H.2.1 Images (proprietary format and TIFF)
- H.2.2 Operator notes and input fields
- H.2.3 Camera images
- H.2.4 Radiation detection data (if available)

Appended as: .....

### H.3 Export As FITS Images

REFERENCE: **ANNEX A** Section 14.22

The Bidder should describe any *FS-LSI Facility* capabilities (if available) for exporting images in the Flexible Image Transport System (FITS) format.

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Solicitation No. - N° de l'invitation  
Client Ref. No. - N° de réf. du client

Amd. No. - N° de la modif.  
File No. - N° du dossier

Buyer ID - Id de l'acheteur  
CCC No./N° CCC - FMS No./N° VME

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The Bidder should fill in APPENDIX 1 to PART 4 of the RFP with the *FS-LSI Facility* capabilities reflective of the proposed for purchase by the Government of Canada.

Additional information appended as: .....

#### H.4 Loading Manifest Information

REFERENCE: **ANNEX A** Section 15.0

The Bidder should describe any FS-LSI Facility capabilities (if available) for loading electronic manifest information from a remote directory and associating it with the generated image dataset.

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The Bidder should fill in APPENDIX 1 to PART 4 of the RFP with the *FS-LSI Facility* capabilities reflective of the proposed for purchase by the Government of Canada.

Additional information appended as: .....

#### SECTION I - APPENDIX

The Bidder may submit any additional technical information they deem to be pertinent to this DID; such as, but is not limited to: test results, 3rd party reports, configuration options, or other raw data. Note that all information specifically requested in previous sections must be presented completely therein. This section must be formatted in the same manner as the rest of the DID and must be properly referenced in the Table of Contents.

Additional details appended as: .....

APPENDIX 1 to PART 4 of the RFP

ATTRIBUTE	Min pts	Max pts	Equation	Measurement Limits	Instrument Result	Points Allocated
<b>Penetration</b>						
Horizontal						
<b>Spatial Resolution</b>						
Vertical						
Horizontal						
<b>Contrast Sensitivity</b>						
@ 10 %						
@ 50 %						
@ 80 %						
<b>Wire Detection</b>						
Vertical						
Horizontal						
<b>Material Discrimination</b>						
Organic (OER)						
Intermediate (IOER)						
Inorganic - (InOER)						
Remote Image Analysis and Verdict through IGW						
Real Time Image Display						
Export of Scientific Image Data						
Low Vehicle Scanning						

Varying Dose Radiation Source										
High-Z Material Detection										
Dual View Imaging Capability										
Camera Underside Viewing of Target										
Loading Manifest Information										
<b><u>Totals</u></b>										0

## ATTACHMENT 2 to PART 4 of the RFP

### 4.3 Calculation of Price

For evaluation purposes only, the total price shall be established as follows:

#### 4.3.1 Initial Purchase

Fixed Site –Large Scale Imaging (FS-LSI) Facility (as per 3.3.1(a)) above)

A firm, all-inclusive lot price of: **LINE 1** = \$ \_\_\_\_\_

#### 4.3.2 Optional Requirements, on an “as and when requested” basis

(a) LSI Train-the-Trainer Training (Option to Purchase) (as per 3.3.2(a) above)

A firm, all inclusive unit price, per participant of: **LINE 2** = \$ \_\_\_\_\_

(b) Additional Years of Warranty and Service Maintenance (as per Article 3.3.2(b)) above)

##### Option Year 1

One (1) year extension of the Warranty and Service Maintenance to commence after expiry of the initial (2) year coverage period.

Option Year 1: a firm, all-inclusive yearly price of: **LINE 3** = \$ \_\_\_\_\_

##### Option Year 2

One (1) year extension of the Warranty and Service Maintenance to commence after expiry of the Option Year 1 coverage period.

Option Year 2: a firm, all-inclusive yearly price of: **LINE 4** = \$ \_\_\_\_\_

##### Option Year 3

One (1) year extension of the Warranty and Service Maintenance to commence after expiry of the Option Year 2 coverage period.

Option Year 3: a firm, all-inclusive yearly price of: **LINE 5** = \$ \_\_\_\_\_

##### Option Year 4

One (1) year extension of the Warranty and Service Maintenance to commence after expiry of the Option Year 3 coverage period.

Option Year 4: a firm, all-inclusive yearly price of: **LINE 6** = \$ \_\_\_\_\_

##### Option Year 5

One (1) year extension of the Warranty and Service Maintenance to commence after expiry of the Option Year 4 coverage period.

Option Year 5: a firm, all-inclusive yearly price of: **LINE 7** = \$ \_\_\_\_\_

(c) Single Perpetual Enterprise Software License (Option to Purchase) (as per 3.3.2(c)) above)

A firm, all-inclusive lot price of:

**LINE 8** = \$ \_\_\_\_\_

4.3.3 Price Calculations

INITIAL PURCHASE	( <b>LINE 1</b> )	\$ _____
SUB-TOTAL FOR ALL OPTIONS	( <b>Sum LINES 2 -8</b> )	\$ _____
TOTAL BID PRICE	( <b>Total LINES 1 - 8</b> )	\$ _____

(excluding Applicable Taxes)



## PART 5 - CERTIFICATIONS

Bidders must provide the required certifications and associated information to be awarded a contract.

The certifications provided by bidders to Canada are subject to verification by Canada at all times. Canada will declare a bid non-responsive, or will declare a contractor in default in carrying out any of its obligations under the Contract, if any certification made by the Bidder is found to be untrue whether made knowingly or unknowingly, during the bid evaluation period or during the contract period.

The Contracting Authority will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply and to cooperate with any request or requirement imposed by the Contracting Authority may render the bid non-responsive or constitute a default under the Contract.

### 5.1 Certifications Preceding Contract Award

The certifications listed below should be completed and submitted with the bid, but may be submitted afterwards. If any of these required certifications is not completed and submitted as requested, the Contracting Authority will inform the Bidder of a time frame within which to provide the information. Failure to comply with the request of the Contracting Authority and to provide the certifications within the time frame provided will render the bid non-responsive.

#### 5.1.1 Integrity Provisions - Associated Information

By submitting a bid, the Bidder certifies that the Bidder and its Affiliates are in compliance with the provisions as stated in Section 01 Integrity Provisions - Bid of Standard Instructions [2003](#). The associated information required within the Integrity Provisions will assist Canada in confirming that the certifications are true.

#### 5.1.2 Federal Contractors Program for Employment Equity - Bid Certification

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "[FCP Limited Eligibility to Bid](#)" list ([http://www.labour.gc.ca/eng/standards\\_equity/eq/emp/fcp/list/inelig.shtml](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml)) available from [Employment and Social Development Canada \(ESDC\) - Labour's](#) website.

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](#)" list at the time of contract award.

Canada will also have the right to terminate the Contract for default if a Contractor, or any member of the Contractor if the Contractor is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](#)" list during the period of the Contract.

The Bidder must provide the Contracting Authority with a completed Attachment 1 to Part 5 of the RFP - [Federal Contractors Program for Employment Equity - Certification](#), before contract award. If the Bidder is a Joint Venture, the Bidder must provide the Contracting Authority with a completed annex Federal Contractors Program for Employment Equity - Certification, for each member of the Joint Venture.

### 5.2 Certifications Required with the Bid

Bidders must submit the following duly completed certifications as part of their bid.

### 5.2.1 Licensing Requirements

Bidder team members and Key Personnel providing the work must be, or be eligible to be licensed, certified or otherwise authorized to provide the necessary professional services to the full extent that may be required by provincial or territorial law in the Province or Territory in which the project is located.

By virtue of submission of a bid, the Bidder certifies that the Bidder's proposed Team and Key Personnel are in compliance with the requirements of paragraph 1 above. The Bidder acknowledges that Canada reserves the right to verify any information in this regard and that false or erroneous certification may result in the bid being declared non-responsive.

### 5.2.2 Insurance Requirements

The Bidder must provide a letter from an insurance broker or an insurance company licensed to operate in Canada stating that the Bidder, if awarded a contract as a result of the bid solicitation, can be insured in accordance with the Insurance Requirements specified in Annex D

If the information is not provided in the bid, the Contracting Authority will so inform the Bidder and provide the Bidder with a time frame within which to meet the requirement. Failure to comply with the request of the Contracting Authority and meet the requirement within that time period will render the bid non-responsive.

By virtue of submission of a bid, the Bidder certifies that the Bidder and the other members of the Bidder's Team, as may be applicable, are capable of obtaining, and will obtain and maintain insurance in accordance with the requirements as set out in the bid documents.

### 5.2.3 Workers Compensation Certification- Letter of Good Standing

The Bidder and(or) sub-contractor(s) must have an account in good standing with the applicable provincial or territorial Workers' Compensation Board.

The Bidder must provide, within seven (7) days following a request from the Contracting Authority, a certificate or letter from the applicable Workers' Compensation Board confirming the Bidder's and(or) sub-contractor(s) good standing account. Failure to comply with the request may result in the bid being declared non-responsive.

### 5.3 Financial Capability

5.3.1 The Bidder must have the financial capability to fulfill this requirement. To determine the Bidder's financial capability, the Contracting Authority may, by written notice to the Bidder, require the submission of some or all of the financial information detailed below during the evaluation of bids. The Bidder must provide the following information to the Contracting Authority within fifteen (15) working days of the request or as specified by the Contracting Authority in the notice:

- (a) Audited financial statements, if available, or the unaudited financial statements (prepared by the Bidder's outside accounting firm, if available, or prepared in-house if no external statements have been prepared) for the Bidder's last three fiscal years, or for the years that the Bidder has been in business if this is less than three years (including, as a minimum, the Balance Sheet, the Statement of Retained Earnings, the Income Statement and any notes to the statements).
- (b) If the date of the financial statements in (a) above is more than five months before the date of the request for information by the Contracting Authority, the Bidder must also provide, unless this is prohibited by legislation for public companies, the last quarterly financial statements (consisting of a Balance Sheet and a year-to-date Income Statement), as of two months before the date on which the Contracting Authority requests this information.
- (c) If the Bidder has not been in business for at least one full fiscal year, the following must be provided:
  - (i) the opening Balance Sheet on commencement of business (in the case of a corporation, the date of incorporation); and
  - (ii) the last quarterly financial statements (consisting of a Balance Sheet and a year-to-date Income Statement) as of two months before the date on which the Contracting Authority requests this information.
- (d) A certification from the Chief Financial Officer or an authorized signing officer of the Bidder that the financial information provided is complete and accurate.
- (e) A confirmation letter from all of the financial institution(s) that have provided short-term financing to the Bidder outlining the total of lines of credit granted to the Bidder and the amount of credit that remains available and not drawn upon as of one month prior to the date on which the Contracting Authority requests this information.
- (f) A detailed monthly Cash Flow Statement covering all the Bidder's activities (including the requirement) for the first two years of the requirement that is the subject of the bid solicitation, unless this is prohibited by legislation. This statement must detail the Bidder's major sources and amounts of cash and the major items of cash expenditures on a monthly basis, for all the Bidder's activities. All assumptions made should be explained as well as details of how cash shortfalls will be financed.
- (g) A detailed monthly Project Cash Flow Statement covering the first two years of the requirement that is the subject of the bid solicitation, unless this is prohibited by legislation. This statement must detail the Bidder's major sources and amounts of cash and the major items of cash expenditures, for the requirement, on a monthly

basis. All assumptions made should be explained as well as details of how cash shortfalls will be financed.

- 5.3.2 If the Bidder is a joint venture, the financial information required by the Contracting Authority must be provided by each member of the joint venture.
- 5.3.3 If the Bidder is a subsidiary of another company, then any financial information in 1. (a) to (f) above required by the Contracting Authority must be provided by the ultimate parent company. Provision of parent company financial information does not by itself satisfy the requirement for the provision of the financial information of the Bidder, and the financial capability of a parent cannot be substituted for the financial capability of the Bidder itself unless an agreement by the parent company to sign a Parental Guarantee, as drawn up by Public Works and Government Services Canada (PWGSC), is provided with the required information.
- 5.3.4 **Financial Information Already Provided to PWGSC:** The Bidder is not required to resubmit any financial information requested by the Contracting Authority that is already on file at PWGSC with the Contract Cost Analysis, Audit and Policy Directorate of the Policy, Risk, Integrity and Strategic Management Sector, provided that within the above-noted time frame:
- (a) the Bidder identifies to the Contracting Authority in writing the specific information that is on file and the requirement for which this information was provided; and
  - (b) the Bidder authorizes the use of the information for this requirement. It is the Bidder's responsibility to confirm with the Contracting Authority that this information is still on file with PWGSC.
- 5.3.5 **Other Information:** Canada reserves the right to request from the Bidder any other information that Canada requires to conduct a complete financial capability assessment of the Bidder.
- 5.3.6 **Confidentiality:** If the Bidder provides the information required above to Canada in confidence while indicating that the disclosed information is confidential, then Canada will treat the information in a confidential manner as permitted by the Access to Information Act, R.S., 1985, c.c. A-1, Section 20(1) (b) and (c).
- 5.3.7 **Security:** In determining the Bidder's financial capability to fulfill this requirement, Canada may consider any security the Bidder is capable of providing, at the Bidder's sole expense (for example, an irrevocable letter of credit from a registered financial institution drawn in favour of Canada, a performance guarantee from a third party or some other form of security, as determined by Canada).

## ATTACHMENT 1 to PART 5 of the RFP

### FEDERAL CONTRACTORS PROGRAM FOR EMPLOYMENT EQUITY - CERTIFICATION

I, the Bidder, by submitting the present information to the Contracting Authority, certify that the information provided is true as of the date indicated below. The certifications provided to Canada are subject to verification at all times. I understand that Canada will declare a bid non-responsive, or will declare a contractor in default, if a certification is found to be untrue, whether during the bid evaluation period or during the contract period. Canada will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply with any request or requirement imposed by Canada may render the bid non-responsive or constitute a default under the Contract.

For further information on the Federal Contractors Program for Employment Equity visit [Employment and Social Development Canada \(ESDC\)-Labour's](#) website.

Date: \_\_\_\_\_ (YYYY/MM/DD) (If left blank, the date will be deemed to be the bid solicitation closing date.)

Complete both A and B.

A. Check only one of the following:

- ☐ A1. The Bidder certifies having no work force in Canada.
- ☐ A2. The Bidder certifies being a public sector employer.
- ☐ A3. The Bidder certifies being a [federally regulated employer](#) being subject to the [Employment Equity Act](#).
- ☐ A4. The Bidder certifies having a combined work force in Canada of less than 100 employees (combined work force includes: permanent full-time, permanent part-time and temporary employees [temporary employees only includes those who have worked 12 weeks or more during a calendar year and who are not full-time students]).

A5. The Bidder has a combined workforce in Canada of 100 or more employees; and

- ☐ A5.1. The Bidder certifies already having a valid and current [Agreement to Implement Employment Equity](#) (AIEE) in place with ESDC-Labour.

OR

- ☐ A5.2. The Bidder certifies having submitted the [Agreement to Implement Employment Equity](#) (LAB1168) to ESDC-Labour. As this is a condition to contract award, proceed to completing the form Agreement to Implement Employment Equity (LAB1168), duly signing it, and transmit it to ESDC-Labour.

B. Check only one of the following:

☐ B1. The Bidder is not a Joint Venture.

OR

☐ B2. The Bidder is a Joint Venture and each member of the Joint Venture must provide the Contracting Authority with a completed annex Federal Contractors Program for Employment Equity - Certification. (Refer to the Joint Venture section of the Standard Instructions)

DRAFT

## PART 6 - RESULTING CONTRACT CLAUSES

The following clauses and conditions apply to and form part of any contract resulting from the bid solicitation.

### 6.1 Security Requirements for Canadian Suppliers

The following security requirements apply and form part of the Contract.

6.1.1 The Contractor must, at all times during the performance of the Contract, hold a valid Designated Organization Screening (DOS), issued by the Canadian Industrial Security Directorate (CISD), Public Works and Government Services Canada (PWGSC).

6.1.2 The Contractor personnel requiring access to sensitive work site(s) must EACH hold a valid RELIABILITY STATUS, granted or approved by CISD/PWGSC.

Until the security screening of the Contractor personnel required by this Contract has been completed satisfactorily by the CISD, PWGSC, the Contractor personnel **MAY NOT ENTER** sites without an escort.

6.1.3 Subcontracts which contain security requirements are NOT to be awarded without the prior written permission of CISD/PWGSC.

6.1.4 The Contractor must comply with the provisions of the:

(a) Security Requirements Check List and security guide (if applicable), attached at Annex B;

(b) Industrial Security Manual (Latest Edition).

### 6.2 Security Requirements for Foreign Suppliers

The following security requirements apply and form part of the Contract.

- 6.2.1 The Canadian Designated Security Authority (Canadian DSA) for industrial security matters in Canada is the Director, International Industrial Security Directorate (IISD), Public Works and Government Services Canada (PWGSC).

Sensitive information / assets refers to information and assets that have been categorized as CANADA PROTECTED or CLASSIFIED and require appropriate safeguarding in accordance with their level of sensitivity.

- 6.2.2 Further specification respecting the security requirements listed above may be provided in order to ensure compatibility with security measures for access to sensitive information / assets, as part of this Contract.
- 6.2.3 Subcontracts which contain security requirements are NOT to be awarded without the prior written permission of the Canadian DSA.
- 6.2.4 The Foreign recipient Contractor must identify an authorized Contract Security Officer (CSO) to be responsible for the overseeing of the security requirements, as defined in this Contract. This individual will be appointed by the proponent Foreign recipient Contractor's Chief Executive officer or Designated Key Senior Official, defined as an owner, officer, director, executive, and or partner who occupy a position which would enable them to adversely affect the organization's policies or practices in the performance of the contract.
- 6.2.5 Sensitive information/assets, as part of this Contract, shall be released only to the Foreign recipient Contractor personnel, who have a *need-to-know* for the performance of this Contract and who have the equivalent level, of the appropriate Canadian **Personnel Security Clearance** required to access the level of sensitive information/assets, granted by their respective country National Security Authority (NSA)/DSA, in accordance with the National Policies of the Foreign recipient bidder's country.
- 6.2.6 The Foreign recipient Contractor, intending or required to visit a Canadian Government restricted site, or industrial facilities, will submit a Request for Visit form to the Canadian DSA, through their respective country NSA/DSA.
- 6.2.7 The Foreign recipient Contractor shall comply with the provisions of the Bilateral Industrial Security Memorandum of Understanding between the Foreign recipient Contractor's NSA/DSA and the Government of Canada, in relation to sensitive information / assets equivalencies.
- 6.2.8 In the event that a Foreign recipient Contractor is chosen as a supplier for this Contract, subsequent Country-specific Foreign security requirement clauses shall be generated and promulgated by the Canadian DSA, and provided to the Government of Canada Contracting Authority, to ensure compliance with the security provisions, as defined by the Canadian DSA, in relation to equivalencies.

### 6.3 Requirements

- 6.3.1 The Contractor must perform and complete the Work as detailed in **ANNEX A STATEMENT OF WORK FOR A FIXED-SITE LARGE SCALE IMAGING (FS-LSI) FACILITY**.
- 6.3.2 Optional Requirements



- (a) The Contractor grants to Canada the irrevocable option to purchase LSI "Train-the-Trainer" Training as described in Section 6.8.1Basis of Payment under the same terms and conditions and at the prices stated in the Contract.
- (b) The Contractor grants to Canada the irrevocable option to purchase additional years of warranty and service maintenance as described in Section 6.8.1Basis of Payment under the same terms and conditions and at the prices stated in the Contract
- (c) The Contractor grants to Canada the irrevocable option to purchase a single perpetual enterprise software licenses as described in Section 6.8.1Basis of Payment under the same terms and conditions and at the prices stated in the Contract

The options may only be exercised by the Contracting Authority and will be evidenced, for administrative purposes only, through a contract amendment. The Contracting Authority may exercise all options at any time within the 24 months after contract award by sending a written notice to the Contractor.

#### 6.4 Standard Clauses and Conditions

All clauses and conditions identified in the Contract by number, date and title are set out in the [Standard Acquisition Clauses and Conditions Manual](https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual) (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

##### 6.4.1 General Conditions – Goods (Medium Complexity)

**2010A (2014-11-27), General Conditions - Goods (Medium Complexity)**, apply to and form part of the Contract.

Subsection 9 (2014-02-24) Warranty of 2010A, General Conditions - Goods (Medium Complexity), is amended as follows:

**Delete:** Subsection 1 in its entirety.

**Insert:** " Despite inspection and acceptance of the Work by or on behalf of Canada and without restricting any provisions of the Contract or any condition, warranty or provision imposed by law, the Contractor, if requested by Canada to do so, must replace, repair or correct, at its own option and expense any work that becomes defective or fails to conform to the requirements of the Contract, where applicable. The warranty period will be 24 months after delivery and acceptance of the Work or the length of the Contractor's or manufacturer's standard warranty period, whichever is longer. The on-site warranty covers parts, labour and all related expenses. Any Work replaced, repaired or corrected pursuant to this section is subject to all provisions of the contract to the same extent as Work initially performed."

The warranty and any extended warranty must include any-and-all maintenance service as necessary to maintain the safety, operational capabilities and performance of the FS-LSI Facility. Maintenance service includes, but is not limited to: preventive maintenance, diagnostics, corrective maintenance, calibration, repair parts, and verification testing.

#### 6.4.2 General Condition (GC1) - General Provisions - Construction Services

**R2810D (2014-09-25) General Condition (GC) 1 - General Provisions - Construction Services**, apply to and form part of the Contract.

Delete all subsection clauses under R2810D except for the following:

##### **GC1.3 (2008-05-12) Status of the Contractor**

##### **GC1.8 (2014-06-26) Laws, Permits and Taxes**

##### **GC1.11 (2015-02-25) Unsuitable Workers**

#### 6.4.3 General Condition (GC) 3 - Execution and Control of the Work

**R2830D (2014-03-01) General Condition (GC) 3 - Execution and Control of the Work**, apply to and form part of the Contract.

Delete subsections GC3.5, CG3.8, CG3.9 in their entirety.

#### 6.4.4 General Condition (GC) 4 - Protective Measures

**R2840D (2008-05-12) General Condition (GC) 4 - Protective Measures**, apply to and form part of the Contract.

#### 6.4.5 General Condition (GC) 6 - Delays and Changes in the Work

**R2860D (2013-04-25) General Condition (GC) 6 - Delays and Changes in the Work**, apply to and form part of the Contract.

Subsection 1 **GC6.1 (2008-05-12) Changes in the Work**, is amended as follows:

**Delete:** Paragraph 2 in its entirety.

**Delete:** all references to "order(s)"

**Insert:** "...contract amendments..."

#### 6.4.6 General Condition (GC) 10 - Insurance

**R2900D (2008-05-125) General Condition (GC) 10 - Insurance**, apply to and form part of the Contract.

#### 6.4.7 Allowable Costs for Contract Changes Under General Condition (GC) 6.4.1

**R2950D (2015-02-25) Allowable Costs for Contract Changes Under General Condition (GC) 6.4.1**, apply to and form part of the Contract.

#### 6.4.8 Supplemental General Conditions

**4003 (2010-08-16) - Licensed Software and 4004 (2013-04-25) - Maintenance and Support Services for Licensed Software**, apply to and form part of the Contract.

## 6.5 Term of Contract

### 6.5.1 Period of the Contract

The period of the Contract is from date of Contract to \_\_\_\_\_ inclusive (*fill in end date of the period*).

### 6.5.2 Option to Extend the Contract

The Contractor grants to Canada the irrevocable option to extend the term of the Contract by up to five (5) additional one (1) year periods under the same conditions. The Contractor agrees that, during the extended period of the Contract, it will be paid in accordance with the applicable provisions as set out in the Basis of Payment.

Canada may exercise this option at any time by sending a written notice to the Contractor at least ten (10) calendar days before the expiry date of the Contract. The option may only be exercised by the Contracting Authority, and will be evidenced for administrative purposes only, through a contract amendment.

## 6.6 Authorities

### 6.6.1 Contracting Authority

The Contracting Authority for the Contract is:

Name: .....

Title: .....

Public Works and Government Services Canada - Acquisitions Branch - Commercial Consumer  
Products Directorate

11 Laurier Street, 6A2, Phase III Place du Portage

Gatineau, Quebec, K1A 0S5

Telephone: .....-.....-.....

Facsimile: .....-.....-.....

E-mail: .....

The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

### 6.6.2 Project Authority

The Project Authority for the Contract is:

Name: .....

Title: .....

CANADA BORDER SERVICES AGENCY – Infrastructure and Environmental Operations Directorate

Address: .....

Telephone: .....

Facsimile: .....

E-mail: .....

The Procurement Authority is the representative of the department or agency for whom the Work is being carried out under the Contract. The Procurement Authority is responsible for the implementation of tools and processes required for the administration of the Contract. The Contractor may discuss administrative matters identified in the Contract with the Procurement Authority however the Procurement Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of Work can only be made through a contract amendment issued by the Contracting Authority.

#### 6.6.3 Departmental Representative

(To be inserted at time of Contract award)

The Departmental Representative for the Contract is:

Name: .....

Title: .....

Organization: Public Works and Government Services Canada – PACIFIC REGION - Real Property Services Branch Directorates

Address: .....  
.....

Telephone: .....

Facsimile: .....

E-mail: .....

The Departmental Representative is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the FS-LSI Facility Building and Associated Infrastructure Work under the Contract.

Technical matters may be discussed with the Departmental Representative; however the Departmental Representative has no authority to authorize changes to the scope of the Work.

Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

#### 6.6.4 Technical Authority

The Technical Authority for the Contract is:

Name: .....

Title: .....

Organization: CANADA BORDER SERVICES AGENCY – Science and Engineering Directorate

Address: .....  
.....

Telephone: .....

Facsimile: .....

E-mail: .....

The Technical Authority named above is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the FS-LSI Facility Operational and Equipment Work under the Contract. Technical matters may be discussed with the Technical Authority; however the Technical Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

#### 6.6.5 Contractor's Representatives

(to be inserted at time of contract award)

The telephone number of the person responsible for:

##### (a) General Manager (Primary Point-of-Contact)

Name: .....

Title: .....

Organization: .....

Address: .....

Telephone: .....

Facsimile: .....

E-mail: .....

##### (b) Project Manager

Name: .....

Title: .....

Organization: .....

Address: .....

Telephone: .....

Facsimile: .....

E-mail: .....

##### (c) Commissioning Authority

Name: .....

Title: .....

Organization: .....

Address: .....

Telephone: .....

Facsimile: .....

E-mail: .....

The Contractor must engage or designate a Commissioning Authority to act on its behalf and interface with the Departmental Representative in the development of the Commissioning Plan.

(d) Commissioning Agent

Name: .....

Title: .....

Organization: .....

Address: .....

Telephone: .....

Facsimile: .....

E-mail: .....

The Contractor must engage or designate a Commissioning Agent to oversee the implementation/execution of the Commissioning Plan. The Commissioning Agent must be a different person than the Commissioning Authority.

**6.7 Project Schedule - Contract**

The Contractor is requested to schedule the Work in order to achieve the progress and milestones by the target dates defined in section 6.8.7 Breakdown of Milestones/Progress Payments.

**6.8 Payment**

**6.8.1 Basis of Payment**

In consideration of the Work satisfactorily performed in accordance with the Contract, the Contractor will be paid the following firm lot and/or firm unit prices, in accordance with the Schedule of Payments identified under Section 6.8.7 below. All deliverables are DDP Destination (Pacific Highway, BC), Incoterms 2000. Customs duties are included and Applicable Taxes extra.

**6.8.2 Initial Purchase**

Fixed Site –Large Scale Imaging (FS-LSI) Facility (as per 3.3.1(a)) above)

A firm, all-inclusive lot price of: **LINE 1 = \$** \_\_\_\_\_

**6.8.3 Optional Requirements, on an “as and when requested” basis**

(a) LSI Train-the-Trainer Training (Option to Purchase) (as per 3.3.2(a) above)

A firm, all inclusive unit price, per participant of: **LINE 2 = \$** \_\_\_\_\_

(b) Additional Years of the Warranty and Service Maintenance (as per Article 3.3.2(b)) above)

Option Year 1

One (1) year extension of the Warranty and Service Maintenance to commence after expiry of the initial (2) year coverage period.

Option Year 1: a firm, all-inclusive yearly price of: **LINE 3** = \$ \_\_\_\_\_

Option Year 2

One (1) year extension of the Warranty and Service Maintenance to commence after expiry of the Option Year 1 coverage period.

Option Year 2: a firm, all-inclusive yearly price of: **LINE 4** = \$ \_\_\_\_\_

Option Year 3

One (1) year extension of the Warranty and Service Maintenance to commence after expiry of the Option Year 2 coverage period.

Option Year 3: a firm, all-inclusive yearly price of: **LINE 5** = \$ \_\_\_\_\_

Option Year 4

One (1) year extension of the Warranty and Service Maintenance to commence after expiry of the Option Year 3 coverage period.

Option Year 4: a firm, all-inclusive yearly price of: **LINE 6** = \$ \_\_\_\_\_

Option Year 5

One (1) year extension of the Warranty and Service Maintenance to commence after expiry of the Option Year 4 coverage period.

Option Year 5: a firm, all-inclusive yearly price of: **LINE 7** = \$ \_\_\_\_\_

(c) Single Perpetual Enterprise Software License (Option to Purchase) (as per 3.3.2(c)) above)

A firm, all-inclusive lot price of: **LINE 8** = \$ \_\_\_\_\_

6.8.4 Limitation of Price

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work unless they have been approved, in writing, by the Contracting Authority before their incorporation into the Work.

6.8.5 SACC Manual Clauses

**C2000C Taxes - Foreign-based Contractor**

**2007-11-30**

**H1001C Multiple Payments**

**2008-05-12**

### 6.8.6 Payment Types

Two types of payments are possible under this Contract for the FS-LSI Facility and satisfactorily completed in accordance with the **ANNEX A** attached hereto and forming part of this Contract.

#### (a) Milestone Payments

Canada will make milestone payments in accordance with the Schedule of Milestones/Progress detailed in Section 6.8.7 below and the payment provisions of the Contract if all work associated with the milestone and as applicable any deliverable required has been completed and accepted by Canada.

#### (b) Progress Payments

- (i) Canada will make progress payments in accordance with the Schedule of Milestones/ Progress detailed under Section 6.8.7 below and the payment provisions of the Contract, no more than once a month, for cost incurred in the performance of the Work, up to 90% percent of the amount claimed and approved by Canada if:
- (ii) an accurate and complete claim for payment using form [PWGSC-TPSGC 1111](#), Claim for Progress Payment, and any other document required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;
- (iii) the amount claimed is in accordance with the basis of payment;
- (iv) the total amount for all progress payments paid by Canada does not exceed 50% percent of the total amount to be paid under the Contract;
- (v) all certificates appearing on form [PWGSC-TPSGC 1111](#) have been signed by the respective authorized representatives.
- (vi) The balance of the amount payable will be paid in accordance with the payment provisions of the Contract **upon completion and delivery of the item if the Work** has been accepted by Canada and a final claim for the payment is submitted.

OR

The balance of the amount payable will be paid in accordance with the payment provisions of the Contract upon **completion and delivery of all work** required under the Contract if the Work has been accepted by Canada and a final claim for the payment is submitted.

- (vii) Progress payments are interim payments only. Canada may conduct a government audit and interim time and cost verifications and reserves the rights to make adjustments to the Contract from time to time during the performance of the Work. Any overpayment resulting from progress payments or otherwise must be refunded promptly to Canada.



#### 6.8.7 Breakdown of Milestones/Progress Payments

The schedule of milestones/progress s for which payments will be made in accordance with the Contract is as follows:

Payment Type	Deliverables	Payment Limit	Payment Initiation	Target Dates
Milestone	Completion of Construction Documents.	10% of the Initial Purchase Price	Delivery and acceptance of all final Construction Documents as detailed in .	September 30, 2015
Progress	Site preparation, building and infrastructure progress.  50% complete set of As Built Drawings  50% Facility Management Integration  99% complete As Built Drawings  Delivery of inspection equipment.	50% of the Initial Purchase Price	Submission and validation of Claim for Progress Payment form	September 2015 – March 2016
Milestone	Delivery and approval of all LSI Operator Training Materials.	4% of the Initial Purchase Price	Upon final acceptance of the Government approved training materials.	November 2015
Milestone	FS-LSI Building Substantial Completion	5% of the Initial Purchase Price	Upon final completion and acceptance of all FS-LSI building and Infrastructure commissioning documentation and procedures.	March 2016
Milestone	FS-LSI Building Final Completion	10% of the Initial Purchase Price	Upon completion and acceptance of all FS-LSI Facility close-out procedures.	April 2016

Payment Type	Deliverables	Payment Limit	Payment Initiation	Target Dates
Milestone	Site Acceptance Testing	15% of the Initial Purchase Price	Upon successful completion of Site Acceptance Testing, by CBSA Technical Representative.	May 2016
Milestone	Training delivery	1% of the Initial Purchase Price	Following delivery of Contractor provided Training.	June 2016

## 6.9 Invoicing Instructions

### 6.9.1 Invoicing Instructions – Milestone Payments

- (a) The Contractor must submit invoices in accordance with the section entitled "Invoice Submission" of the general conditions 2010A. Invoices cannot be submitted until all work identified in the invoice is completed.

Each invoice must be supported by a copy of the release document and any other documents as specified in the Contract.

- (b) Invoices must be distributed as follows:

- (i) The original and one (1) copy must be forwarded to the following address for certification and payment. \_\_\_\_\_ *(Insert the name of the organization)* \_\_\_\_\_ *(Insert the address of the organization)*
- (ii) One (1) copy must be forwarded to the Contracting Authority identified under the section entitled "Authorities" of the Contract.

### 6.9.2 Invoicing Instructions – Progress Payment Claim

- (a) The Contractor must submit a claim for payment using form [PWGSC-TPSGC 1111](#), attached hereto as Annex B, Claim for Progress Payment.

Each claim must show:

- (i) all information required on form [PWGSC-TPSGC 1111](#);
- (ii) all applicable information detailed under the section entitled "Invoice Submission" of the general conditions;
- (iii) a list of all expenses;
- (iv) the description and value of the milestone claimed as detailed in the Contract.

Each claim must be supported by:

(v) a copy of the invoices, receipts, vouchers for all direct expenses, travel and living expenses.

(vi) a copy of the monthly progress report.

(b) Applicable Taxes must be calculated on the total amount of the claim before the holdback is applied. At the time the holdback is claimed, there will be no Applicable Taxes payable as it was claimed and payable under the previous claims for progress payments.

(c) The Contractor must prepare and certify one original and two (2) copies of the claim on form [PWGSC-TPSGC 1111](#), and forward it to the **Departmental Representative** identified under the section entitled "Authorities" of the Contract for appropriate certification after inspection and acceptance of the Work takes place. The **Departmental Representative** will then forward the original and two (2) copies of the claim to the Contracting Authority for certification and onward submission to the Payment Office for the remaining certification and payment action.

(d) The Contractor must not submit claims until all work identified in the claim is completed, with the exception of invoices for Warranty/Maintenance Services.

#### 6.9.3 Invoicing Instructions – Optional Extension of Warranty and Maintenance Service

(a) Payments for additional warranty and maintenance services will be made following the end of each three months of the Option Year.

(b) The Contractor must submit invoices in accordance with the section entitled "Invoice Submission" of the general conditions 2010A, and attach a copy of the maintenance report described in **ANNEX A**, covering the previous quarter of the Option Year (i.e., last three (3) month period).

(c) Submitted maintenance reports will be reviewed for accuracy and for compliance with the warranty and maintenance service metrics defined in **ANNEX A**.

(d) Failure to meet the warranty and maintenance service metrics defined in **ANNEX A** will result in a reduced payment amount, in accordance with the following:

Quarterly Payment Amount = (\$ Quarterly Pro-Rated Amount) x (MA Score)

Measured Mean Availability (MA)	MA Score
95% - 100%	1.0
90% – 95%	0.9
87.5% - 90%	0.8
85% – 87.5%	0.7
82.5% - 85%	0.6
80 % - 82.5%	0.5

## 6.10 Certifications

### 6.10.1 Compliance

The continuous compliance with the certifications provided by the Contractor in its bid and the ongoing cooperation in providing associated information are conditions of the Contract. Certifications are subject to verification by Canada during the entire period of the Contract. If the Contractor does not comply with any certification, fails to provide the associated information, or if it is determined that any certification made by the Contractor in its bid is untrue, whether made knowingly or unknowingly, Canada has the right, pursuant to the default provision of the Contract, to terminate the Contract for default.

### 6.10.2 Federal Contractors Program for Employment Equity - Default by the Contractor

The Contractor understands and agrees that, when an Agreement to Implement Employment Equity (AIEE) exists between the Contractor and Employment and Social Development Canada (ESDC)-Labour, the AIEE must remain valid during the entire period of the Contract. If the AIEE becomes invalid, the name of the Contractor will be added to the "FCP Limited Eligibility to Bid" list. The imposition of such a sanction by ESDC will constitute the Contractor in default as per the terms of the Contract.

### 6.10.3 Worker's Compensation

The Contractor must maintain its account in good standing with the applicable provincial or territorial Workers' Compensation Board for the duration of the Contract.

## 6.11 Applicable Laws

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in Canada and in the province of British Columbia.

## 6.12 Priority of Documents

If there is a discrepancy between the wording of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

- (a) the Articles of Agreement;
- (b) the Standard Clauses and Conditions listed under Section 6.4
- (c) the Supplemental General Conditions listed under Section 6.4.8
- (d) **ANNEX A STATEMENT OF WORK FOR A FS-LSI FACILITY**
- (e) Annex B, Claim for Progress Payment
- (f) Annex C, Security Requirements Check List;
- (g) Annex D, Insurance Requirements;
- (h) the Contractor's bid dated \_\_\_\_\_ (insert date of bid) (If the bid was clarified or amended, insert at the time of contract award: " , as clarified on \_\_\_\_\_ " **or** " , as

amended on \_\_\_\_\_" and insert date(s) of clarification(s) or amendment(s))

### **6.13 Insurance – Specific Requirements**

The Contractor must comply with the insurance requirements specified in Annex D attached hereto. The Contractor must maintain the required insurance coverage for the duration of the Contract. Compliance with the insurance requirements does not release the Contractor from or reduce its liability under the Contract.

The Contractor is responsible for deciding if additional insurance coverage is necessary to fulfill its obligation under the Contract and to ensure compliance with any applicable law. Any additional insurance coverage is at the Contractor's expense, and for its own benefit and protection.

The Contractor must forward to the Contracting Authority within ten (10) days after the date of award of the Contract, a Certificate of Insurance evidencing the insurance coverage and confirming that the insurance policy complying with the requirements is in force. For Canadian-based Contractors, coverage must be placed with an Insurer licensed to carry out business in Canada, however, for Foreign-based Contractors, coverage must be placed with an Insurer with an A.M. Best Rating no less than "A-". The Contractor must, if requested by the Contracting Authority, forward to Canada a certified true copy of all applicable insurance policies.

### **6.14 SACC Manual Clauses**

**A2000C Foreign Nationals (Canadian Contractor) 2006-06-16**

OR

**A2001C Foreign Nationals (Foreign Contractor) 2006-06-16**

**A9068C Government Site Regulations 2010-01-11**

**B1501C Electrical Equipment 2006-06-16**

**B7500C Excess Goods 2006-06-16**

### **6.15 Shipping Instructions – Delivery at Destination**

6.15.1 Goods must be consigned to the destination specified in the Contract:

DDP Delivered Duty Paid (British Columbia) Incoterms 2000 for shipments from a commercial contractor.

- (a) The Contractor will be responsible for all delivery charges, costs and risks of transport, and customs clearance, including the payment of customs duties and taxes.

# ANNEX A STATEMENT OF WORK FOR A FIXED-SITE LARGE SCALE IMAGING (FS-LSI) FACILITY

## 1.0 PRINCIPAL REQUIREMENTS

### 1.1 Fixed-Site Large-Scale Imaging Facility

The Contractor must provide one (1) Fixed-Site Large Scale Imaging Facility (*FS-LSI Facility*) including all equipment, sensors, relays and infrastructure necessary for the safe, non-intrusive inspection of target objects; including but not limited to:

#### 1.1.1 FS-LS Imaging Enclosure

One (1) FS-LS Imaging Enclosure to ensure security and contain radiation emissions during inspections and to provide environmental protection to associated equipment and subsystems.

#### 1.1.2 FS-LSI Control Room

One (1) FS-LSI Control Room for operators to control imaging equipment, monitor safety and surveillance systems, direct inspection operations, and access the FS-LS Imaging Enclosure.

#### 1.1.3 FS-LSI Staff Unisex Washroom

One (1) FS-LSI unisex washroom (accessible via the Control Room) plus janitorial facilities for CBSA staff to enable sustained inspection operations and maintenance.

#### 1.1.4 FS-LSI Server Room

One (1) FS-LSI server room to house and protect computing and networking equipment.

#### 1.1.5 FS-LSI Driver Waiting Room

One (1) FS-LSI Driver Waiting Room to monitor and ensure driver safety and security during inspection activities and facilitate interactions with officers and the provision of paperwork (via a manifest drop).

#### 1.1.6 Maximum Footprint

The FS-LSI Facility footprint must fit within the designated site footprint of 55 m L x 16 m W.

#### 1.1.7 Life Expectancy

The FS-LSI Facility must be able to perform useful detection tasks in a "high-volume" border protection environment (defined herein as 25,000 scans per year) with proper maintenance, for a minimum of ten (10) years.

#### 1.1.8 LSI Calibration and Test Pieces and Special Tools

1.1.8.1 The Contractor must provide all calibration and test pieces necessary to adjust inspection system parameters and confirm performance levels.

1.1.8.2 All test pieces must be easily re-positioned/aligned with a standard fork-lift.

1.1.8.3 All test pieces must enable angular adjustment to align with the incident

radiographic beam.

- 1.1.8.4 The Contractor must provide any special tools necessary for maintenance of the FS-LSI Facility equipment. All special tools must be marked to identify the equipment or system for which tools are intended.

## 1.2 Training

### 1.2.1 LSI Operator Training

- 1.2.1.1 The Contractor must provide on-site radiation safety and operator training. This training must be offered in English for up to twenty (20) operators (in 4 classes of 5 persons). Operator training must be delivered within 28 days (unless otherwise agreed to with the Technical Authority) of the completion of Final Acceptance.
- 1.2.1.2 The exact date, time and location of the training will be mutually agreed upon between the Contractor and the Technical Authority stated herein.
- 1.2.1.3 The Contractor provided Operator Training Course must not exceed five (5) days in length or 37.5 hours of instruction.
- 1.2.1.4 The Contractor provided Operator Training Course must include classroom and hands-on components and all aspects of the training course must be supervised by an instructor.
- 1.2.1.5 The Contractor must provide on-site technical support by qualified maintenance personnel during the operator training courses. The tech support representative must be prepared to take immediate action in the event of failure or malfunction.

### 1.2.2 LSI Train-the Trainer Training

- 1.2.2.1 The Contractor must provide on-site Train-the Trainer training for up to a maximum of five (5) CBSA personnel who will be trained to deliver the Operator Training course to other CBSA personnel. LSI Train-the-Trainer Training must be delivered within 60 days (unless otherwise agreed to with the Technical Authority) of the completion of Final Acceptance testing.
- 1.2.2.2 The exact date, time and location of the training will be mutually agreed upon between the Contractor and the Technical Authority stated herein.

### 1.2.3 LSI Advanced User Training

- (b) The Contractor must provide LSI Advanced User Training for up to five (5) operators in English. LSI Advanced Users must be trained on the manipulation of system parameters and alarm thresholds, calibration and sensitivity testing, performance diagnostics and data management. LSI Advanced User training must be delivered within 60 days (unless otherwise agreed to with the Technical Authority) of the completion of Final Acceptance testing. All costs associated with the on-site training must be included in the quoted price.

### 1.2.4 LSI Equipment Maintenance Familiarization Training

- (c) On-site radiation safety, basic operator and basic maintenance overview training must be offered in English for up to four (4) operators. Training must focus on component/subsystem/software interconnections and modular components. All costs associated with the on-site training must be included in the quoted price.

### 1.2.5 LSI Building Maintenance Familiarization Training

- 1.2.5.1 Provide training/demonstration sessions for building maintenance personnel on the Environmental Monitoring and Control System (EMCS).
- 1.2.5.2 The Contractor must submit to the Departmental Representative, the Building Maintenance Training Plan at least 30 days prior to Commissioning.

### 1.2.6 Training Materials

- 1.2.6.1 The Contractor must provide all Operator Training Materials in English to CBSA for review and revision at least 90 days (unless otherwise agreed to with the Technical Authority) prior to the delivery of Training.
- 1.2.6.2 The Contractor must provide soft copies of all Operator Training Materials in both French and English to the CBSA for its exclusive and unrestricted use in the development of internal training packages.

## 1.3 Maintenance Service

### 1.3.1 Maintenance Service Experience

- 1.3.1.1 The Contractor and(or) sub-contracted parties must have a minimum of two years (verified) experience in the provision of full maintenance service to other clients, on the same or similar *FS-LSI Facility* and having comparable requirements as required herein.

### 1.3.2 Mean Preventative Maintenance Time (MPMT)

- 1.3.2.1 The Contractor must maintain the *FS-LSI Facility* with a MPMT not to exceed fifty-four (54) hours, measured over a rolling three (3) month time period.
- 1.3.2.2 MPMT is defined as the all-inclusive total clock time for technical personnel to conduct routinely scheduled preventative maintenance and calibration of the *FS-LSI Facility* equipment.

### 1.3.3 Mean Time Between Interruptions (MTBI)

- 1.3.3.1 The Contractor must maintain the *FS-LSI Facility* with a Mean Time Between Interruptions (MTBI) greater than or equal seven hundred (700) hours (straight clock time) or one thousand (1000) scans, measured over a rolling three (3) month time period.
- 1.3.3.2 The MTBF is defined here as the average time between any technical issue and/or any preventative maintenance activities that interrupt or preclude normal operations.

### 1.3.4 Mean Time To Repair Inoperable Condition (MTTRIC)

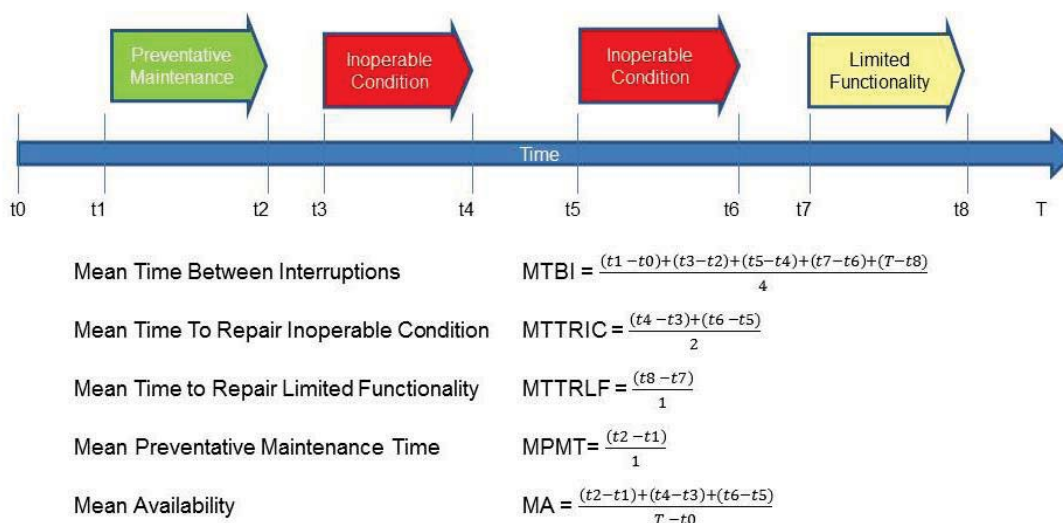
- 1.3.4.1 The Contractor must maintain the *FS-LSI Facility* with a MTTRIC less than or equal to forty-eight ( $\leq 48$ ) hours, measured over a rolling three (3) month time period.
- 1.3.4.2 The MTTRIC is defined here as the average all-inclusive clock time (from initial notification to system-ready status) to resolve any issue(s) preclude normal operations

### 1.3.5 Mean Availability (MA)



- 1.3.5.1 The Contractor should maintain *FS-LSI Facility* with a Mean Availability (A) for scanning operations of least 95% of the time, measured over a rolling three (3) month time period.
- 1.3.5.2 The Contractor must maintain *FS-LSI Facility* with a Mean Availability (A) for scanning operations of least 90% of the time, measured over a rolling nine (9) month time period.
- 1.3.5.3 The MA is defined here as the average percentage of all-inclusive clock time that the FS-LSI Facility is available for use and free of inoperable conditions (see graphical representation of maintenance service metrics in Figure 1).
- 1.3.6 Mean Time To Repair Limited Functionality (MTTRLF)
- 1.3.6.1 The Contractor must maintain the *FS-LSI Facility* with a MTTRLF not to exceed one hundred and twenty (120) hours (5 days), measured over a rolling three (3) month time period.
- 1.3.6.2 The MTTRLF is defined here as the average all-inclusive clock time (from initial notification to system-ready status) to resolve any issue(s) limiting normal operations.

### **Maintenance and Reliability Metrics: Graphical Representation**



**Figure 1 - Graphical and representation of maintenance service metrics.**

- 1.3.7 Maintenance Help Desk - Problem Ticket Issuance
- 1.3.7.1 The Contractor must maintain a 24/7 Help Desk for issuing and managing Problem Tickets and activities, in response to notification by: phone call, email, fax, or website submitted form.
- 1.3.7.2 The Contractor's Help Desk must issue a Problem Ticket within **30 minutes** of initial notification.

### 1.3.8 Maintenance Response Level 1: Technical Phone Support

The Contractor must provide technical phone support, for problem identification and preliminary troubleshooting, within 1 hour of problem ticket issuance.

### 1.3.9 Maintenance Response Level 2: Technical On-Site Visit

The Contractor must dispatch a technician to diagnose and resolve any open tickets within 24 hours of problem ticket issuance, unless other response activities have been approved by CBSA.

### 1.3.10 Maintenance Response Level 3 Response: Technical Working Group

The Contractor must escalate any issues still unresolved following a Service Technician's visit to a Technical Working Group (TWG), to be comprised of members of CBSA's Science and Engineering Directorate and the Contractors Technical Personnel.

### 1.3.11 Problem Ticket Information – Generation

For each problem ticket generated, the Contractor must accurately complete the following informational fields:

- 1.3.11.1 Date and time of problem reporting
- 1.3.11.2 Local point-of-contact
- 1.3.11.3 Operational impact (Inoperable Condition or Limited Functionality)
- 1.3.11.4 Problem description
- 1.3.11.5 Other information

### 1.3.12 Problem Ticket Information – Updates

For each problem ticket update, the Contractor must accurately add the following details:

- 1.3.12.1 Service Technician assigned
- 1.3.12.2 Problem identification (e.g., faulty component, software bug, etc.)
- 1.3.12.3 Estimated Time of Arrival (ETA) of replacement part(s) – if needed
- 1.3.12.4 Estimated Time of Arrival (ETA) of Service Technician – if needed
- 1.3.12.5 Current operational impact (Inoperable Condition or Limited Functionality)
- 1.3.12.6 Projected resolution date and time
- 1.3.12.7 Technical notes (e.g., summary of activities, additional problems, next steps, etc.)

### 1.3.13 Problem Ticket Information – Closing

For each problem ticket closed, the Contractor must accurately update the initial information with the following details:

- 1.3.13.1 Date and time of resolution
- 1.3.13.2 Service Technician(s) engaged
- 1.3.13.3 Service activities completed
- 1.3.13.4 On-site arrival of replacement part(s) (Date and time)
- 1.3.13.5 On-site arrival of Service Technician(s) (Date and time)

- 1.3.13.6 Replacement parts required (name(s) and serial number(s))
- 1.3.13.7 Service hours required (for on-site activities)
- 1.3.13.8 Design/configuration change(s)
- 1.3.13.9 Technical notes (e.g., summary of activities, other problems, probability of recurrence, etc.)

#### 1.3.14 Problem Ticket Information – Updating Frequency

- 1.3.14.1 The Contractor must provide the first update to the Problem Ticket information within **4 hours** of initial ticket issuance.
- 1.3.14.2 The Contractor must provide updates to the Problem Ticket within 2 hours of the completion of any of the following activities:
  - 1.3.14.2.1 Replacement parts have been ordered
  - 1.3.14.2.2 A Service Technician has been dispatched to the site
  - 1.3.14.2.3 The problem has been positively diagnosed
  - 1.3.14.2.4 A Service Technician has completed on-site activities
  - 1.3.14.2.5 There is a change in the Operational Functionality of the system
  - 1.3.14.2.6 The initial problem has been resolved
  - 1.3.14.2.7 Additional problems have been identified
  - 1.3.14.2.8 There is a change in the projected resolution time

#### 1.3.15 Problem Ticket Information – Notifications

The Contractor must provide CBSA with notification whenever a Problem Ticket is issued or updated. The messaging format must be in a standardized format (e.g., .xml) and the configuration must be jointly agreed upon with CBSA to integrate with existing equipment maintenance system.

#### 1.3.16 Problem Ticket Information – Online Access

The Contractor must provide CBSA designated maintenance personnel with online access to the most updated problem ticket status information.

#### 1.3.17 Remote Diagnostics Capability

The FS-LSI Facility must be configured to enable remote troubleshooting and diagnostics; if permissions were to be granted by CBSA.

This requirement in no way should be interpreted that such access will be provided and the Contractor is instructed to consider the FS-LSI Facility as stand-alone system for all maintenance and service levels.

#### 1.3.18 Maintenance Reports

The Contractor must provide Maintenance Reports to demonstrating levels of compliance with required metrics pertaining to availability and service, as well as all raw data on problem tickets open during the defined time period.

#### 1.3.19 Registration with Original Equipment Manufacturers (OEMs)

- 1.3.19.1 The Contractor must register in CBSA's name: any and all FS-LSI computer systems, servers any subsystem or component, who's Original Equipment Manufacturer (OEM) requires such registration in order to provide technical support.
- 1.3.19.2 OEM registrations must be completed no later than 14 days before the scheduled end of the Contractor provided warranty period, unless otherwise requested by CBSA in advance.

#### 1.3.20 Enhancements and Improvements

The Contractor agrees to provide Canada with all available improvements and enhancements to the Licensed Software within (90) days following final acceptance of the FS-LSI Facility.

#### 1.3.21 Software Updates

The Contractor must provide all software updates to the purchaser for a period of ten (10) years following the acceptance, at no additional cost. The "updates" means all patches, OS changes, extensions, or other modifications to the software necessary to maintain or achieve the advertised performance and informational security of the system.

#### 1.3.22 CBSA Approval of Configuration Changes

The Contractor must obtain approval from CBSA designated maintenance personnel approval prior to implementing any changes to FS-LSI Facility hardware or software.

#### 1.3.23 Inventory of LSI Critical Components

The Contractor must maintain an inventory of critical components in Canada to meet the service levels and response requirements detailed herein

#### 1.3.24 Building Maintenance Materials, Spare Parts and Special Tools

- 1.3.24.1 The Contractor must deliver all building spare parts, tools, and maintenance materials, to location on site as directed by Departmental Representative.
- 1.3.24.2 All building maintenance materials must be properly sealed and packaged to prevent damage.
- 1.3.24.3 All building replacement parts must be of the same manufacturer, and quality as items in the Work.
- 1.3.24.4 The Contractor must provide all necessary information for re-ordering custom manufactured products.
- 1.3.24.5 The Contractor must ensure all building supplies list full details on packages, manufacturer and product data including: catalogue numbers, sizes, composition, colour including colour number, texture designations, and room numbers or areas as applicable where item is used.

Solicitation No. - N° de l'invitation  
Client Ref. No. - N° de réf. du client

Amd. No. - N° de la modif.  
File No. - N° du dossier

Buyer ID - Id de l'acheteur  
CCC No./N° CCC - FMS No./N° VME

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## 2.0 GENERAL INSTRUCTIONS

### 2.1 Codes, Standards and Authorities

2.1.1 All design and construction must be in compliance with all applicable codes, standards and authorities having jurisdiction, including current versions of National Building Code of Canada, CSA B651, British Columbia Building Code and Accessible Design for the Built Environment, along with those listed in individual sections herein.

2.1.2 In the event of conflict between these, the most stringent requirements must apply.

### 2.2 Nuclear Regulatory Compliance

The *FS-LSI Facility* must satisfy all applicable requirements of the Canadian Nuclear Safety Commission's (CNSC) Class II Nuclear Facilities and Prescribed Regulations (CIINFPER).

### 2.3 Building Regulatory Requirements

2.3.1 The Contractor must obtain and pay for all Building Permits, Certificates, Licenses and other permit required by regulatory Municipal, Provincial and Federal Authorities to complete the work.

2.3.2 The Contractor must provide inspection authorities with plans and information required for issue of acceptance certificates.

2.3.3 The Contractor must furnish inspection certificates in evidence that the work installed conforms to the requirements of the Authority having jurisdiction.

2.3.4 The Contractor must review approved drawings with Departmental Representative and authorities having jurisdiction to ensure compliance with all applicable codes and bylaws.

### 2.4 Professional Certification

2.4.1 All "Issued for Construction" Documents must be signed and sealed by the appropriate professional discipline responsible for the design. Design professionals must be licensed to practice in the Province of British Columbia.

### 2.5 Contractor's Use of Site

2.5.1 The Contractor must provide fencing all around the perimeter of the Construction Zone identified in Figure 3, Appendix A, for execution of work and storage of material.

2.5.2 The Contractor is responsible for constructing and maintaining temporary site access, including but not limited to providing temporary asphalt paving, concrete barriers, fencing as well as maintaining the temporary access free and clear of snow, dust and potholes.

2.5.3 All other areas within property: restricted to access/egress and completion of work as required, and subject to restrictions as specified herein. The Contractor must co-ordinate with the Departmental Representative, and other users as designated, concerning work within the property to ensure safe working environment and that disruption to existing operations are kept to a minimal.

- 2.5.4 The Contractor must execute work with the least possible interference or disturbance to normal use of premises; and make arrangements with Departmental Representative to facilitate work as stated.
- 2.5.5 Where work involves interrupting, breaking into or connecting to existing mechanical or electrical services: the Contractor must provide the Departmental Representative (1) one week's notice for permission. All shut-downs should occur during low border volume periods, Monday to Thursday 5am to 11am, excluding statutory holidays.
- 2.5.6 The Contractor must plan effectively and work efficiently to limit the number of shut down periods and to restore services as planned; and co-ordinate shut downs with utility providers as needed.
- 2.5.7 The Contractor will not be allowed to connect to CBSA's existing data and communication services for his own use.
- 2.5.8 Four parking stalls will be allocated to the Contractor in the visitor's parking lot. Work truck will be allowed to be located in the Contractor's laydown area. The Contractor must not occupy any other parking areas without the prior written approval of the Departmental Representative.
- 2.5.9 The Contractor's construction crew is not allowed to use washrooms in the existing buildings.
- 2.5.10 The Contractor must remove temporary facilities from site when directed by the Departmental Representative; and make good all damage.
- 2.5.11 The Contractor must protect and maintain completed work until construction has been completed and accepted. Completed work must be protected against damage during installation thru the use of tarpaulins if necessary. Any and all damage to the floor and wall surfaces resulting from carrying out work must be repaired without expense and to the satisfaction of the Departmental Representative.

## **2.6 Contractor's Site Office**

- 2.6.1 The Contractor must supply a trailer for their temporary site office, of sufficient size to accommodate site meetings.
- 2.6.2 The Contractor must provide clear access to the site office in all weather conditions.
- 2.6.3 The Contractor is responsible for power connection and disconnection before and after project completion.

## **2.7 Temporary Power**

- 2.7.1 The Contractor must provide and pay for any temporary power and/or connection during construction. If possible without overloading, the Contractor may use site power, subject approval from Departmental Representative.
- 2.7.2 Temporary electrical power supply must conform to Canadian Electrical Code, governing rules, regulations and ordinances.

- 2.7.3 The Contractor must make good all damage and replace lamps which have been used over period of 3 months.

## **2.8 Temporary Heating & Ventilation**

- 2.8.1 The Contractor must pay for costs of temporary heat and ventilation used during construction, including costs of installation, fuel, operation, maintenance and equipment removal. Use of direct-fired heaters discharging waste products into work areas will not be permitted without prior written approval of the Departmental Representative.
- 2.8.2 The Contractor must maintain strict supervision of operating of temporary heating and ventilating equipment.
- 2.8.3 Protect ducting system by filters inspected daily and replaced weekly or more frequently as necessary.

## **2.9 Hours of Work**

- 2.9.1 The border is operational 24 hours per day, 7 days a week. The Contractor may set his own schedule of work on site, within restrictions specified. The Contractor must submit their proposed hours-of-work, via email, to the Departmental Representative for review and approval.
- 2.9.2 All construction activity requiring access to the interior of existing buildings on site, such as connections for power, data, communications and security, must be executed Monday through Friday between 8pm and 8am. Should there be a need for interruption to existing operational equipment; the Contractor must give one (1) week's written notice to the Departmental Representative. The notice/request must be subject to CBSA approval of date and time, and may require that the intended work be completed during low border volume periods, Monday – Thursday 5am to 11am, excluding Canadian statutory holidays.
- 2.9.3 If disruptions are unavoidable, the Contractor must provide temporary services as directed including portable washroom facilities with running water, for emergency wash-down, as directed.

## **2.10 CBSA Security Directives**

- 2.10.1 The Contractor's Site Superintendent must sign out a Contractor pass for each of their construction crew members working outside of Construction Zone A. Passes must be visible at all times while on CBSA Property; passes must be surrendered to the designated CBSA official at the end of the project. Replacement costs of \$100.00 per pass must be assessed against the Contractor for any passes lost during the course of the project.
- 2.10.2 The Contractor's construction crew members must be in possession of Government issued picture identification at all times while on CBSA property.
- 2.10.3 The Contractor's construction crew members must remain within the designated work areas. Movement within CBSA restricted areas must be approved and may require escort by CBSA staff.
- 2.10.4 The Contractor's construction crew members must not interfere with border inspection processes and must move away from CBSA officials interacting with the travelling public to avoid overhearing potentially sensitive and personal conversations.



2.10.5 The Contractor's construction crew members must be accountable for tools/equipment at all times. Tools are not to be left unattended and/or within reach of the travelling public.

2.10.6 The Contractor's construction crew members must act professionally at all times. No coarse language or rude behaviour will be tolerated.

2.10.7 The Contractor's construction crew members must not interact with the travelling public, unless authorized to do so where required.

2.10.8 The Contractor's construction crew members must obey uniformed CBSA officers when given border crossing operational directives (these may include being instructed to move off site during an armed and dangerous situation, or to stop work because of operational requirements). The Contractor's construction crew members must report to the Departmental Representative when such instructions have been given, as early as is convenient.

2.10.9 The Contractor's construction crew members must not take directions from uniformed officers or PWGSC building maintenance personnel regarding project construction issues.

## **2.11 Sanitary Facilities**

2.11.1 The Contractor must provide and maintain sanitary facilities for work force in accordance with governing regulations and ordinances.

## **2.12 Site Signs & Notices**

2.12.1 The Contractor must provide signs and notices for safety and instruction as needed.

## **2.13 Security Escort**

2.13.1 Security escort is required when accessing secured locations in other buildings on CBSA property. The Contractor's personnel must be within direct line of sight of a security escort at all times.

2.13.2 Approved security escort is Commissionaires BC.

2.13.3 The Contractor must book and pay for Commissionaires directly with Commissionaires BC.

## **2.14 Environmental Protection**

2.14.1 Construction activities must be in accordance with the requirements of the Environmental Effects Assessment (EEA), of which a copy is included in the appendices.

2.14.2 Follow current Federal Halocarbon Regulations as per current Canadian Environmental Protection Act on Refrigeration Systems and Air Conditioning Systems, Refrigerant Products and Recycling.

2.14.3 Construction activities must comply with all federal, provincial and municipal regulations.

## **2.15 Final Cleaning**

2.15.1 On completion of work, remove tools, surplus and waste material and leave work in a clean, optimal operational condition.

2.15.2 In preparation for acceptance of the project on an interim or final certificate of completion, the Contractor must perform final cleaning as identified below.

2.15.2.1 Remove grease, dust, dirt, stains, labels, fingerprints, marks and other foreign materials, from interior and exterior finished surfaces; clean and polish surfaces including glass, mirrors, hardware, wall tile, stainless steel, chrome, baked enamel, plastic laminate, mechanical and electrical fixtures.

2.15.2.2 Replace items with broken pieces, scratches or disfigured.

2.15.2.3 Clean lighting reflectors, lenses, and other lighting surfaces.

2.15.2.4 Vacuum clean and dust building interiors, behind grilles, louvers and screens.

2.15.2.5 Vacuum clean entire ducting system and replace all filters prior to final acceptance.

2.15.2.6 Wax, seal, shampoo or prepare floor finishes as recommended by manufacturer.

2.15.2.7 Inspect finishes, fitments and equipment. Ensure specified workmanship and operation.

2.15.2.8 Broom clean and wash exterior paved surfaces and walks; rake clean other surfaces of grounds.

2.15.2.9 Remove debris and surplus materials from crawl areas, roof areas and other accessible concealed spaces.

2.15.2.10 Clean equipment, washroom and kitchen fixtures to a sanitary condition. Replace filters of mechanical equipment.

2.15.2.11 Pressure-wash paved surfaces. Rake clean other surfaces of grounds.

2.15.2.12 Remove snow and ice from access to building.

## **2.16 Signage**

2.16.1 All signage must conform to Federal Identity Program (FIP) and must be in both official languages of Canada.

2.16.2 The Contractor must install all exterior and interior signage including fastenings, hangers, posts, and concrete footings, etc. as necessary.

2.16.3 The Contractor must provide operational, directional and identification signage in consultation with the Departmental Representative.

## **2.17 Facility Management Integration**

2.17.1 Design Builder shall populate the Asset Validation System Module of Canada's Capital Asset Planning System, Facilities Capital Planning and Management System by VFA, Inc. and the Computerized Maintenance Management System (CMMS) using the software and training materials provided by Canada. Refer to Appendices for sample form.

## **2.18 Other Contracts**

- 2.18.1 If so directed by the Departmental Representative, the Contractor must coordinate activities with any designated third party contracted by Canada to work on the site.

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### **3.0 MANAGEMENT REQUIREMENTS**

#### **3.1 Scheduling**

- 3.1.1 The Contractor must provide a baseline project schedule to the Departmental Representative in advance of the kick-off meeting and provide updates as frequently as required to ensure schedule and progress are accurate to within (2) weeks.
- 3.1.2 The Contractor must provide a one month short term look ahead schedule updated every two weeks, to indicate upcoming scheduled work paying particular attention to issues that will require coordination with the Department Representative.

#### **3.2 Meetings**

- 3.2.1 Upon award of the contract, the Contractor must participate in a kick-off meeting with all involved parties in attendance. The Departmental Representative will chair this initial meeting as well as prepare and distribute minutes following the meeting. The meeting must serve to introduce all key personnel involved, clarify any matters of the contract, distribute forms and other informational materials, and review contract procedures. An agenda for this meeting will be forwarded to the Contractor prior to the meeting.
- 3.2.2 In order to ensure proper coordination of the Work, the Contractor must arrange for and schedule design and construction phase meetings at regular intervals, with all involved parties to attend. The Contractor must chair meetings, prepare and distribute minutes within five (5) business days of the meeting. The agenda for these meetings must be determined by the Contractor in consultation with the Departmental Representative. The Contractor must provide the agenda within a minimum of two (2) business days in advance of meetings.
- 3.2.3 The Contractor must ensure that corresponding disciplines of its design team attend to all Design and Construction Site Meetings.

#### **3.3 Communication**

- 3.3.1 Unless otherwise directed by the Departmental Representative, the Contractor will relay all project communication through the Departmental Representative only.

#### **3.4 Documentation**

- 3.4.1 The Contractor must maintain on a secure electronic server (e.g., File Transfer Protocol (FTP) Server), electronic copies of the following documents:
- 3.4.1.1 Contractor's Proposal
  - 3.4.1.2 Construction Documents
  - 3.4.1.3 Addenda
  - 3.4.1.4 Site Instructions
  - 3.4.1.5 Field Observation Report
  - 3.4.1.6 Material Sample Board
  - 3.4.1.7 Schedule

- 3.4.1.8 Transmittals and Advisories
- 3.4.1.9 Shop Drawings
- 3.4.1.10 Contract Amendments
- 3.4.1.11 Field Test Reports
- 3.4.1.12 Latest Update of Project Schedule
- 3.4.1.13 Manufacturers Installation and Application Instructions
- 3.4.1.14 Up-to-Date Record (As-Built) Drawings
- 3.4.1.15 Commissioning Documents

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## **4.0 DESIGN AND CONSTRUCTION REQUIREMENTS**

### **4.1 Confirmation of Dimensions**

- 4.1.1 The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for construction, installation and co-ordination of the work of all sub-trades.

### **4.2 Design Documents Review and Approval**

- 4.2.1 The Contractor must submit FS-LSI Facility design documents for review by the Departmental Representative.
- 4.2.1.1 The FS-LSI Facility design documents must demonstrate the feasibility of satisfying the associated technical requirements, in accordance with the intent of the procurement contract.
- 4.2.2 The Contractor must participate in a FS-LSI Facility design review meeting(s) with the Departmental Representative.
- 4.2.3 The Contractor must address all comments regarding submitted FS-LSI documents, to the satisfaction of the Departmental Representative.
- 4.2.4 The Contractor must submit for review, revised versions of any FS-LSI Facility documents deemed inadequate by the Departmental Representative.
- 4.2.5 The Contractor must obtain approval to proceed, from the Departmental Representative, prior to Construction Document Review and Approval.

### **4.3 Construction Documents Review and Approval**

- 4.3.1 The Contractor must prepare and submit all FS-LSI Facility Construction Documents, at 50%, 99% and 100% level of completeness, for review by the Departmental Representative.
- 4.3.2 The Contractor must obtain approval to proceed from the Departmental Representative, prior to or initiating any associated construction work.
- 4.3.3 The Contractor must prepare and submit a site access and laydown area plan for approval. Coordinate with the Departmental Representative where required.

### **4.4 Formatting and Specifications**

- 4.4.1 The Contractor must prepare drawings in accordance with the PWGSC National CADD Standard. These can be accessed on the internet at the following URL:  
<http://www.tpsgc-pwgsc.gc.ca/biens-property/cdao-cadd/index-eng.html>
- 4.4.2 The Contractor must prepare specifications in National Master Specifications (NMS) 3-Part format, conforming to the new numbering system of the current Master Format.

4.4.3 The specifications included in this and other sections following are not to be reused as a basis for the construction portion of the Work, but may be expanded upon in the development of the Contractor's construction specifications, and must include all required information as to materials, installation, etc.

4.4.4 For review purposes, the Contractor must provide a PDF copy and eight (8) half size hardcopies and one (1) full size copy of all documents required for submission. Ten (10) business days prior to a scheduled review meeting, the Contractor must distribute copies as directed by the Departmental Representative.

4.4.5 All submissions must include the Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with specifications.

## **4.5 Shop Drawings**

4.5.1 The Contractor must submit to the Departmental Representative a list of all shop drawings to be produced.

4.5.2 The Contractor must submit all shop drawings, original drawings and modified standard drawings, to illustrate details of work.

4.5.3 The Contractor must keep the Departmental Representative apprised of any reviews or revisions pertaining to the shop drawings, and make these available to be accessed electronically thereby.

4.5.4 All electronic drawings must be made available in Revit and(or) AutoCAD format, as well as .pdf format.

4.5.5 The Contractor must update digital drawings as necessary to reflect as-built information.

4.5.6 All Finalized shop drawings must be stamped and signed by respective professionals, architects and engineers, licensed to practice in the province of construction work.

## **4.6 PRODUCT Information and Data**

4.6.1.1 The Contractor must provide product information and data including: manufacturers catalogue sheets, brochures, literature, performance charts, diagrams, and environmental benefits used to illustrate standard manufactured products.

4.6.1.2 The Contractor must submit a list of all product data to be provided to the Departmental Representative.

4.6.1.3 The Contractor must submit electronic copies of each product data to the Departmental Representative.

4.6.1.4 The Contractor must include all relevant information, including make, part, model, series, catalogue number and any other relevant manufacturer's data.

4.6.1.5 Product information and data applicable portions of specifications must be cross-referenced.

4.6.1.6 The Contractor must provide a list of equipment including manufacturer's name,

supplier, local source of supplies and service depot(s); full addresses and telephone numbers must be provided.

- 4.6.1.7 Nameplate information including equipment number, make, size, capacity, model number and serial number.

## 4.7 Material and Equipment

### 4.7.1 Manufacturer's Instructions

- 4.7.1.1 The Contractor unless otherwise specified, must comply with manufacturers latest printed instructions for materials and installation methods.

### 4.7.2 Delivery & Storage

- 4.7.2.1 The Contractor must deliver, store and maintain packaged materials and equipment with the manufacturers' seals and labels intact; materials and equipment must be stored in accordance with the suppliers' instructions.
- 4.7.2.2 The Contractor must prevent damage, adulteration and soiling of material and equipment during delivery, handling and storage. Rejected materials or equipment must be immediately removed from the construction site.
- 4.7.2.3 The Contractor must touch-up damaged factory finished surfaces to match original but must not paint over nameplates.

## 4.8 Site Inspections

- 4.8.1 The Departmental Representative must inspect the Contractor's work periodically. These inspections are solely for the purpose of determining general quality of work, and not for any other purpose. Inspection and directives given to the Contractor with respect to the mechanical work does not relieve Contractor and his agents, servants and employees of their responsibility to erect and install work in all its parts in a safe and workmanlike manner, and in accordance with the approved drawings and specifications, nor impose upon the Departmental Representative any responsibility to supervise or oversee erection or installation of any work.

- 4.8.1.1 The Contractor must provide proper care, attention and maintenance for equipment while it is being used. If in opinion of the Departmental Representative, sufficient care and maintenance is not being given to equipment and systems, the Departmental Representative reserves the right to forbid further use of said equipment and systems.

## 4.9 General Quality of Work

- 4.9.1 The Contractor must perform Work in accordance with standard accepted industry practices for type of work unless specifications stipulate more precise requirements.
- 4.9.2 The Contractor must provide work in a neat and careful manner to retain work plumb, square, and straight.



- 4.9.3 The Contractor must ensure work is properly executed to form close joints and appropriately aligned junctions, edges and surfaces and is free of warp, twist, wind, wave or other irregularities.
- 4.9.4 When required by specifications or by manufacturers' recommendations, the Contractor must have the manufacturer, supplier or accredited agent, inspect the work, which incorporates their products.
- 4.9.5 The Contractor must not permit materials to come into contact with other materials whether in presence of moisture or otherwise if conditions will result in corrosion, stain, discoloration or deterioration of completed Work. Compatible, durable separators where contact is unavoidable must be provided.
- 4.9.6 When any of the conditions indicated in the previous five (5) paragraphs have not been met, the Departmental Representative may require the Contractor to redo the work at no additional cost to the contract.
- 4.9.7 The Contractor must appoint and pay for materials and systems testing.
- 4.9.8 The Contractor must submit one electronic and hardcopy of results and reports of all tests, inspections and examinations to the Departmental Representative.
- 4.9.9 Where tests or inspections by designated Testing Laboratory reveal work not in accordance with requirements, the Contractor must pay all costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.
- 4.9.10 The Departmental Representative may appoint an independent inspection/testing company to carry out inspection and testing of the Work for conformance with any/all Contractual Requirements. Such costs for Inspection and testing will be paid for by the Departmental Representative. Additional inspection and testing by the Departmental Representative resulting from non-conformance discovered by Departmental Representative's testing will be at the Contractor's own expense.
- 4.9.11 The Departmental Representative may inspect and test products during manufacture, fabrication, shop testing, installation, construction and testing phases of the Contract. Inspection and testing may be performed at place of manufacture/fabrication, storage or at the Site as advised by Departmental Representative. The Contractor must ensure that assistance and access to products are provided wherever inspection and testing by Departmental Representative is to be performed.

## **5.0 BUILDING COMMISSIONING REQUIREMENTS**

### **5.1 Overview**

- 5.1.1 Commissioning is a systematic process of verifying that a facility operates in conformity with project requirements and the design intent, in accordance with the contract documents.
- 5.1.2 Commissioning includes extensive documenting and verifying activities related to the design, construction, static verification, functional performance testing, and start-up of building components, sub-systems, and integrated systems.
- 5.1.3 Commissioning addresses technical systems requirements as well as the functional and operational needs of the occupants and owner. These requirements and needs encompass the areas of health and safety, security, comfort and cost-effectiveness of operation and maintenance (O&M).
- 5.1.4 Commissioning enables documentation of any requirements not met, and tracking of deficiencies until resolution.
- 5.1.5 Commissioning is a transition between construction activities and the O&M of a facility.
- 5.1.6 Commissioning also provides the training tools for proper O&M Commissioning documents delivery on the following objectives:
  - 5.1.6.1 To verify that functional and operational requirements have been correctly interpreted and implemented.
  - 5.1.6.2 To minimize O&M costs.
  - 5.1.6.3 To provide comprehensive O&M documentation.
  - 5.1.6.4 To protect the safety and health of occupants.
  - 5.1.6.5 To comply with environmental regulations.
  - 5.1.6.6 To verify and demonstrate that all systems operate consistently at peak efficiencies, under all normal load conditions, and within the specified energy budget.
  - 5.1.6.7 To implement a comprehensive training program.
  - 5.1.6.8 To transfer the completed works to facility operators.

### **5.2 Commissioning Procedures**

- 5.2.1 The Contractor/Commissioning Authority must submit the FS-LSI Facility Commissioning Plan to the Departmental Representative, for review.
- 5.2.2 The Contractor/Commissioning Authority must address all comments regarding the submitted Commissioning Plan, to the satisfaction of the Departmental Representative and re-submit a finalized document.
- 5.2.3 The Contractor/Commissioning Authority must obtain approval to proceed with the finalized Commissioning Plan, from the Departmental Representative, prior to execution.

- 5.2.4 The Contractor/Commissioning Agent must conduct execute the Commissioning Plan as approved by the Departmental Representative.
- 5.2.5 The Contractor/Commissioning Authority must review all Commissioning Records and ensure all aspects of the plan have been addressed as intended.
- 5.2.6 The Contractor/Commissioning Authority must direct any follow up activities to address any outstanding deficiencies or failures identified in the execution of the Commissioning Plan.
- 5.2.7 The Contractor/Commissioning Authority must submit to the Departmental Representative, all Commissioning Documentation for review.
- 5.2.8 The Contractor/Commissioning Authority must address all comments regarding the submitted Commissioning Documentation, to the satisfaction of the Departmental Representative.
- 5.2.9 The Contractor/Commissioning Authority must obtain approval, from the Departmental Representative, before Commissioning will be deemed complete.

### **5.3 Commissioning Documentation**

- 5.3.1 Commissioning Plan must comprise, at a minimum, the following elements:
- 5.3.1.1 A schedule of activities
  - 5.3.1.2 A list of the personnel titles of responsible for executing the plan
  - 5.3.1.3 All forms and checklists for components to be inspected and/or tested
  - 5.3.1.4 All installation records and documentation
  - 5.3.1.5 All static testing, mock-ups, functional verification and performance verification results
  - 5.3.1.6 All infrared scanning, air quality testing, pressure testing, and electric circuit testing results
  - 5.3.1.7 All integrated monitoring and control system testing results
  - 5.3.1.8 All Testing, Adjusting, Balancing (TAB) reports
  - 5.3.1.9 All environmental checks
  - 5.3.1.10 Deficiencies Log

5.3.2 Commissioning Report

Describes the results of implementing the Commissioning Plan, as well as subsequent test or activities taken to rectify deficiencies or comments by the Departmental Representative.

### **5.4 Post-Warranty Review**

- 5.4.1 The Contractor must participate in a post-warranty review of the commissioned FS-LSI Facility.
- 5.4.2 The Contractor must prepare a post-warranty review report for review by the Departmental Representative.

## **6.0 FS-LSI SYSTEM COMMISSIONING REQUIREMENTS**

### **6.1 Site Acceptance Testing (SAT)**

- 6.1.1 The Contractor must conduct a Site Acceptance Testing (SAT) after complete installation of all FS-LSI System.
- 6.1.2 The SAT procedures will be developed by CBSA in consultation with the Contractor.
- 6.1.3 Any discrepancies from the required performance or proposed componentry of the system will be noted and must be addressed to the satisfaction of CBSA prior to final acceptance.
- 6.1.4 The SAT will be used to satisfy regulatory requirements, validate performance claims, and confirm system compliance with the contractual requirements.

### **6.2 Operational Stress Testing (OST)**

- 6.2.1 The Contractor must provide on-site, technical support for the duration of a thirty (30) day period of intensive operational use.

## 7.0 CLOSE-OUT REQUIREMENTS

### 7.1 Close-Out Procedures

#### 7.1.1 Contractor's Inspection

The Contractor must coordinate and perform, in concert with subcontractors, an inspection and check of all work; identify and correct deficiencies, defects, repairs and perform outstanding items as required to complete work in conformance with Contract Documents; confirm delivery and condition of all spare parts, tools, and maintenance materials.

#### 7.1.2 Rectification of Deficiencies

The Contractor must notify the Departmental Representative in writing when deficiencies from Contractor's inspection have been rectified and that work is deemed to be complete and ready for Departmental Representative's Inspection and Acceptance.

#### 7.1.3 Departmental Representative's Inspection

The Contractor must accompany the Departmental Representative during all interim and final inspections of Work. Address defects, faults and outstanding items of work identified by such inspections. When directed by the Departmental Representative, provide a list outstanding work, provide a status update weekly, and provide photographs of completed work when done.

#### 7.1.4 Close-Out Submittals

7.1.4.1 The Contractor must submit all FS-LSI Facility close-out documents to the Departmental Representative, for review and comment.

7.1.4.2 The Contractor must address all comments regarding submitted FS-LSI close-out documents, to the satisfaction of the Departmental Representative.

#### 7.1.5 Facility Management Integration

The Contractor must input all Facility Management Information into Canada's Facilities Capital Planning and Management System by VFA Inc.

### 7.2 Close-Out Submittals

#### 7.2.1 Formatting and Organization

7.2.1.1 The Contractor must provide all close-out document submissions in both electronic (e.g., .pdf) and paper formats.

7.2.1.2 Page size images and page size drawings.

7.2.1.3 Drawings, diagrams and manufacturer's literature must be legible.

7.2.1.4 All manuals must be organized in user-friendly interface.

7.2.1.5 All manuals must include a table of contents.

7.2.1.6 Organize manuals into industry standard maintenance manual tabs with links in index to each descriptive section describing the component or maintenance procedure etc.

7.2.1.7 Organize files into NMS numbering system or other approved descriptive titles.

7.2.1.8 Organize contents into applicable sections of work to parallel project specification

break-down. Mark each section by labelled tabs (navigational buttons).

7.2.1.9 Refer to Mechanical and Electrical Divisions for specific details for Mechanical and Electrical data.

7.2.1.10 The Contractor must deliver drawings in Revit and/or AutoCAD format, and .pdf format;

7.2.1.11 The Contractor must deliver any specifications in word and .pdf.

#### 7.2.2 Project Record Documents

7.2.2.1 The Contractor must maintain one set of the contract drawings and specifications to record actual as-built site conditions.

7.2.2.2 The Contractor must maintain up-to-date, real time as-built drawings and specifications in good condition and make available for inspection by the Departmental Representative at any time during construction.

#### 7.2.3 As-Built Drawings & Specification

7.2.3.1 The Contractor must provide all signed and dated "As-Built Drawings".

7.2.3.2 The Contractor must demonstrate changes tracked from the initial design to final implementation. Record changes in red ink on the prints. Mark only on one set of prints and at completion of project and prior to interim inspection, neatly transfer notations to second set (also by use of red ink). Submit both sets to the Departmental Representative.

7.2.3.3 The Contractor must show all modifications, substitutions and deviations from what is shown on the contract drawings or in specifications.

#### 7.2.4 Building Operations & Maintenance Manual(s)

The Contractor must provide all manuals necessary for the Operation and Maintenance (O&M) of the FS-LSI Facility building and supporting systems. These consist of an organized compilation of operating and maintenance data including detailed technical information, documents and records describing operation and maintenance of individual products or systems as specified in individual sections of the specifications. The Building Operations and Maintenance Manual(s) must include, at a minimum:

7.2.4.1 All shop drawings

7.2.4.2 Copies of all approvals, and certificates issued by Inspection Authorities.

7.2.4.3 Copies of test results and reports.

7.2.4.4 Copies of all Warranty and Guaranty information and certificates.

7.2.4.5 Listing/description of all maintenance materials provided.

7.2.4.6 Listing/description spare parts provided.

7.2.4.7 Listing/description special tools provided.

7.2.4.8 Product Information and Data for all: building materials; equipment; systems; and sub-systems.

7.2.4.9 Parts list.

7.2.4.10 Installation details.

- 
- 7.2.4.11 Operating instructions.
- 7.2.4.12 Maintenance instructions for equipment.
- 7.2.4.13 Maintenance instructions for finishes.
- 7.2.4.14 Halocarbon Inventory to be submitted on spread sheets supplied to Departmental Representative and to include: Name of Owner; Halocarbon Type; Halocarbon Quantity; Unit of Measure; (Halocarbon Quantity); Cooling Capacity Amount; Unit of Measure (Cooling Capacity Amount).
- 7.2.4.15 Equipment and Systems Data: for each item of equipment and for each system, provide a description of the unit or system, and component parts. Give function, control parameters and schematics, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts. Description of actions to be taken in event of equipment failure.
- 7.2.4.16 Panel board circuit directories: provide electrical service characteristics, controls, and communications. Include installed colour coded wiring diagrams.
- 7.2.4.17 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.
- 7.2.4.18 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- 7.2.4.18.1 Servicing and lubrication schedule and list of lubricants required.
- 7.2.4.18.2 Manufacturer's printed operation and maintenance instructions.
- 7.2.4.18.3 Sequence of operation by controls manufacturer.
- 7.2.4.18.4 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- 7.2.4.18.5 Provide installed control diagrams by controls manufacturer.
- 7.2.4.18.6 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.
- 7.2.4.18.7 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- 7.2.4.18.8 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- 7.2.4.18.9 Include test and balancing reports.
- 7.2.4.18.10 Additional requirements as specified in individual specification sections.
- 7.2.4.19 Materials and Finishes Maintenance Data

- 7.2.4.19.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
- 7.2.4.19.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- 7.2.4.19.3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- 7.2.4.19.4 Additional Requirements: as specified in individual specifications sections.

#### 7.2.5 FS-LS Imaging Systems Maintenance Manual(s)

The Contractor must provide all manuals necessary for the maintenance of the FS-LS Imaging equipment and supporting systems. The FS-LS Imaging Systems Maintenance Manual(s) must include, at a minimum:

##### 7.2.5.1 Fault Tree Diagrams

The Contractor must provide all complete fault tree diagram of all warnings, errors failure notifications, etc. that may present themselves at any time while using the system.

##### 7.2.5.2 Error Log Codes and Descriptions

The Contractor must provide a complete and detailed list and description of all error codes and descriptions for the FS-LSI System.

##### 7.2.5.3 Replacement Parts List

The Contractor must provide a detailed list of all mission critical replacement parts, including part/model numbers, original equipment manufacturers, pricing and availability. Mission Critical is defined here as any part whose failure would render the unit inoperable or with limited operability.

##### 7.2.5.4 Software

All individual software packages (including proprietary and Programmable Logic Control software) must be provided to CBSA with License numbers for installation or re-installation on system hardware.

##### 7.2.5.5 Boot Image Ghosted Configuration

A bootable image disk of all final system configurations must be provided for rebuilding computer and server hard drives must be provided to CBSA.



## 8.0 HEALTH AND SAFETY REQUIREMENTS

### 8.1.1 References

#### 8.1.1.1 Government of Canada.

##### 8.1.1.1.1 Canada Labour Code – Part II

##### 8.1.1.1.2 Canada Occupational Health and Safety Regulations.

#### 8.1.1.2 National Building Code of Canada (NBC):

##### 8.1.1.2.1 Part 8, Safety Measures at Construction and Demolition Sites.

#### 8.1.1.3 Canadian Standards Association (CSA):

##### 8.1.1.3.1 CSA S269.1, Falsework for Construction Purposes.

##### 8.1.1.3.2 CSA S269.2, Access Scaffolding for Construction Purposes.

##### 8.1.1.3.3 CSA-S350, Code of Practice for Safety in Demolition of Structures.

#### 8.1.1.4 Fire Protection Engineering Services, HRSDC:

##### 8.1.1.4.1 FCC No. 301, Standard for Construction Operations.

##### 8.1.1.4.2 FCC No. 302, Standard for Welding and Cutting.

#### 8.1.1.5 American National Standards Institute (ANSI):

##### 8.1.1.5.1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

#### 8.1.1.6 Province of British Columbia:

##### 8.1.1.6.1 Workers Compensation Act Part 3 Occupational Health and Safety.

##### 8.1.1.6.2 Occupational Health and Safety Regulation

### 8.1.2 Workers' Compensation Board Coverage

#### 8.1.2.1 The Contractor must comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.

#### 8.1.2.2 The Contractor must maintain Workers' Compensation Board coverage during the term of the Contract.

### 8.1.3 Submittals

#### 8.1.3.1 The Contractor must submit the following to the Departmental Representative:

- 
- 8.1.3.1.1 Health and Safety Plan.
- 8.1.3.1.2 Fire Safety Plan
- 8.1.3.1.3 Copies of reports or directions issued by federal and provincial health and safety inspectors.
- 8.1.3.1.4 Copies of incident and accident reports.
- 8.1.3.1.5 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- 8.1.3.1.6 Emergency Procedures.
- 8.1.3.2 The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within days after receipt of the plan. The Contractor must then revise the plan as appropriate and resubmit it to the Departmental Representative for review upon request.
- 8.1.3.3 Medical surveillance: where prescribed by legislation, regulation or safety program, the Contractor must submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to the Departmental Representative.
- 8.1.3.4 Submission of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It must not:
- 8.1.3.4.1 Be construed to imply approval by the Departmental Representative.
- 8.1.3.4.2 Be interpreted as a warranty of being complete, accurate and legislatively compliant
- 8.1.3.4.3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.
- 8.1.4 Responsibility
- 8.1.4.1 Assume responsibility as the Prime Contractor for work under this contract.
- 8.1.4.2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- 8.1.4.3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
- 8.1.5 Health and Safety Coordinator
- 8.1.5.1 The Health and Safety Coordinator and Certified Industrial Specified Hygienist must:

8.1.5.1.1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.

8.1.5.1.2 Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.

8.1.5.1.3 Be on site during execution of work.

#### 8.1.6 General Conditions

8.1.6.1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

8.1.6.2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.

8.1.6.2.1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

8.1.6.2.2 Secure site at night time [or provide security guard] as deemed necessary to protect site against entry.

#### 8.1.7 Project/Site Conditions

8.1.7.1 Work at site may involve contact with the following hazards:

8.1.7.1.1 Buried power cables

8.1.7.1.2 Vehicular/heavy commercial traffic

8.1.7.1.3 Operations of a Port of Entry

#### 8.1.8 Regulatory Requirements

8.1.8.1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.

8.1.8.2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Must a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

#### 8.1.9 Work Permits

8.1.9.1 Obtain specialty trade permits related to project before start of work.

#### 8.1.10 Filing of Notice

8.1.10.1 The Contractor is to complete and submit a Notice of Project as required by provincial authorities.

8.1.10.2 Provide copies of all notices to the Departmental Representative.

#### 8.1.11 Health and Safety Plan

- 8.1.11.1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.
- 8.1.11.2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
  - 8.1.11.2.1 Contractor's safety policy.
  - 8.1.11.2.2 Identification of applicable compliance obligations.
  - 8.1.11.2.3 Definition of responsibilities for project safety/organization chart for project.
  - 8.1.11.2.4 General safety rules for project.
  - 8.1.11.2.5 Job-specific safe work, procedures.
  - 8.1.11.2.6 Inspection policy and procedures.
  - 8.1.11.2.7 Incident reporting and investigation policy and procedures
  - 8.1.11.2.8 Occupational Health and Safety Committee/Representative procedures.
  - 8.1.11.2.9 Occupational Health and Safety meetings.
  - 8.1.11.2.10 Occupational Health and Safety communications and record keeping procedures.
- 8.1.11.3 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.
- 8.1.11.4 List hazardous materials to be brought on site as required by work.
- 8.1.11.5 Indicate engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
- 8.1.11.6 Identify personal protective equipment (PPE) to be used by workers.
- 8.1.11.7 Identify personnel and alternates responsible for site safety and health.
- 8.1.11.8 Identify personnel training requirements and training plan, including site orientation for new workers.
- 8.1.11.9 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.
- 8.1.11.10 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.
- 8.1.11.11 Departmental Representative's review: the review of Health and Safety Plan by Public Works and Government Services Canada (PWGSC) must not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

## 8.1.12 Emergency Procedures

8.1.12.1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:

8.1.12.1.1 Designated personnel from own company.

8.1.12.1.2 Regulatory agencies applicable to work and as per legislated regulations.

8.1.12.1.3 Local emergency resources.

8.1.12.1.4 Departmental Representative.

8.1.12.2 Include the following provisions in the emergency procedures:

8.1.12.2.1 Notify workers and the first-aid attendant, of the nature and location of the emergency.

8.1.12.2.2 Evacuate all workers safely.

8.1.12.2.3 Check and confirm the safe evacuation of all workers.

8.1.12.2.4 Notify the fire department or other emergency responders.

8.1.12.2.5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.

8.1.12.2.6 Notify Departmental Representative.

8.1.12.3 Provide written rescue/evacuation procedures as required for, but not limited to:

8.1.12.3.1 Work at high angles.

8.1.12.3.2 Work in confined spaces or where there is a risk of entrapment.

8.1.12.3.3 Work with hazardous substances.

8.1.12.3.4 Underground work.

8.1.12.3.5 Work on, over, under and adjacent to water.

8.1.12.3.6 Workplaces where there are persons who require physical assistance to be moved.

8.1.12.4 Design and mark emergency exit routes to provide quick and unimpeded exit.

8.1.12.5 At least once each year, emergency drills must be held to ensure awareness and effectiveness of emergency exit routes and procedures, and a record of the drills must be kept.

8.1.12.6 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

### 8.1.13 Hazardous Products

8.1.13.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.

8.1.13.2 Where use of hazardous and toxic products cannot be avoided:

8.1.13.2.1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents.

8.1.13.2.2 In conjunction with Departmental Representative, schedule to carry out work during "off hours" when tenants have left the building.

8.1.13.2.3 Provide adequate means of ventilation.

### 8.1.14 Asbestos Hazard

8.1.14.1 Modifications to spray- or trowel-applied asbestos surfaces if encountered, can be hazardous to health.

### 8.1.15 PCB Removals

8.1.15.1 Mercury-containing fluorescent tubes and ballasts which contain polychlorinated biphenyls (PCBs) are classified as hazardous waste.

### 8.1.16 Removal of Lead-Containing Paints

8.1.16.1 All paints containing TCLP lead concentrations above 5 ppm are classified as hazardous.

8.1.16.2 Carry out demolition activities involving lead-containing paints in accordance with applicable provincial regulations.

### 8.1.17 Electrical Safety Requirements

8.1.17.1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.

8.1.17.2 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.

8.1.17.3 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

### 8.1.18 Electrical Lockout

8.1.18.1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.

8.1.18.2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental

Representative.

- 8.1.18.3 Keep the documents and lockout tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

8.1.19 Overloading

- 8.1.19.1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

8.1.20 Falsework

- 8.1.20.1 Design and construct falsework in accordance with CSA S269.1.

8.1.21 Scaffolding

- 8.1.21.1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CAN/CSA-S269.2 and B.C. Occupational Health and Safety Regulations.

8.1.22 Confined Spaces

- 8.1.22.1 Carry out work in confined spaces in compliance with provincial regulations and specifically comply with Occupational Health and Safety Regulation, Part 9.

8.1.23 Blasting

- 8.1.23.1 Perform blasting and rock removal operations if required in accordance with authority having jurisdiction.

8.1.24 Powder-Actuated Devices

- 8.1.24.1 Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.

8.1.25 Fire Safety and Hot Work

- 8.1.25.1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.
- 8.1.25.2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

8.1.26 Fire Safety Requirements

- 8.1.26.1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- 8.1.26.2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada

8.1.27 Fire Protection and Alarm System

- 8.1.27.1 Existing fire protection and alarm systems must not be:

8.1.27.1.1 Obstructed.

8.1.27.1.2 Shut off.

8.1.27.1.3 Left inactive at the end of a working day or shift.

8.1.27.2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.

8.1.27.3 Be responsible/liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.

#### 8.1.28 Unforeseen Hazards

8.1.28.1 In the event an unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, the Contractor must immediately stop work and advise the Departmental Representative verbally and in writing.

#### 8.1.29 Posted Documents

8.1.29.1 The Contractor must post legible versions of the following documents on site:

8.1.29.1.1 Health and Safety Plan.

8.1.29.1.2 Sequence of work.

8.1.29.1.3 Emergency procedures.

8.1.29.1.4 Site drawing showing project layout, locations of the first-aid station, evacuation route and mustering station, and the emergency transportation provisions.

8.1.29.1.5 Notice of Project.

8.1.29.1.6 Floor plans or site plans.

8.1.29.1.7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.

8.1.29.1.8 Workplace Hazardous Materials Information System (WHMIS) documents.

8.1.29.1.9 Material Safety Data Sheets (MSDS).

8.1.29.1.10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

8.1.29.2 The Contractor must post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.

8.1.29.3 Postings must be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.



#### 8.1.30 Meetings

- 8.1.30.1 The Contractor must attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.

#### 8.1.31 Correction of Non-Compliance

- 8.1.31.1 The Contractor must immediately address health and safety non-compliance issues identified by the Departmental Representative.
- 8.1.31.2 The Contractor must provide the Departmental Representative with a written report of action taken to correct non-compliance with health and safety issues identified.
- 8.1.31.3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The Contractor will be responsible for any costs arising from such a "stop work order".

## 9.0 OPERATIONAL REQUIREMENTS

### 9.1 Imaging

The *FS-LSI Facility* must be capable of producing radiographic transmission images of the components and contents of target objects within the system's inspection volume.

### 9.2 See Section 12.24 Varying Dose Radiation Source

The FS-LSI Facility should employ a varying dose radiation source to optimize the dose delivered to the target object while maintaining imaging performance.

#### INSPECTION PERFORMANCE REQUIREMENTS

### 9.3 Radiation Source

The FS-LSI Facility radiation source must be electrically generated.

### 9.4 Number of Operators

The *FS-LSI Facility* must enable continuous scanning operations by a maximum of two (2) operators.

### 9.5 Imaging Rate

The *FS-LSI Facility* must be capable of conducting at least 20 full-length scans per hour.

### 9.6 Imaging Speeds

The inspection system must offer the user thru use of a toggle switch, the option to scan targets at a minimum of two (2) different speeds, one of which must be  $\geq 0.4$  m/s.

### 9.7 Inspection Volume

The *FS-LSI Facility* must be capable of safely scanning any target objects larger than  $1 \text{ m}^3$  within an inspection volume of size: [25 m x 2.6 m x 4.6 m] [L x W x H].

### 9.8 Imaging Cut-off Height

The *FS-LSI Facility* must be capable of generating images down to 40 cm above floor/target platform (measured along the centre-line of the inspection volume) to the top of the scanned object without exhibiting image cut-off.

### 9.9 Imaging Multiple Objects

The *FS-LSI Facility* must be capable of safely scanning at least two (2) different objects within the inspection volume in a single pass.

### 9.10 Image Analysis Verdict

The *FS-LSI Facility* must allow for, and store with the original image and dataset, an operator selected verdict of "Suspect/Not-suspect" along with any notes, manipulations and annotations saved upon completion of analysis.

### 9.11 Multi-Analyst Review

The *FS-LSI Facility* must enable images to be queued for single or multi-analyst review and adjudication.

### **9.12 Passive Radiation Detection**

The FS-LSI Facility must be capable of passive detection of gamma and neutron emissions from radiological or nuclear materials contained within the bounds of the target object.

### **9.13 See Section 12.24 Varying Dose Radiation Source**

The FS-LSI Facility should employ a varying dose radiation source to optimize the dose delivered to the target object while maintaining imaging performance.

## **INSPECTION PERFORMANCE REQUIREMENTS**

### **9.14 Generation of Radiological Alarms**

The FS-LSI Facility must generate a radiological alarm in the event the passive radiation detection data exceeds pre-set thresholds. This alarm must not interrupt imaging process.

### **9.15 Display of Radiological Alarms**

The FS-LSI Facility must display any radiological alarm notification with the resulting radiographic image.

### **9.16 Display of Passive Radiation Detection Data**

The FS-LSI Facility must superimpose any passive radiation detection data over the generated radiographic image to facilitate source localization. It should be possible for the FS-LSI Operator to show/hide this information as desired.

### **9.17 Optical Character Recognition (OCR)**

The *FS-LSI Facility* must automatically capture and read standard conveyance identification markings, including: license plates; rail container identification numbers; and marine container identification numbers; and this load information into the scan dataset.

### **9.18 Digital Image Record of Target Objects**

The *FS-LSI Facility* must automatically capture digital images of the inspected object, along with any license plates and container/conveyance identifying marks/numbers, and integrate these into the inspection data.

### **9.19 Traffic Control Lights**

The *FS-LS Imaging Facility* must include traffic lights to guide the driver of the target object into and out of the inspection area when cleared to do so.

### **9.20 Login**

The *FS-LSI Facility* must require a user login and password to be entered prior to initiating new operations, or if the unit has been inactive for a CBSA configurable period of time.

### **9.21 User Tracking**

The *FS-LSI Facility* must store an operator identifier for each scan within the produced dataset.

## 9.22 Inspection Counter

The *FS-LSI Facility* must record and enable the display of the number of scans for the following:

- 9.22.1 a scanning session that can be reset by operators;
- 9.22.2 a scanning day that can be reset by operators;
- 9.22.3 the lifetime that cannot be reset by operators or technical personnel.

## 9.23 General Video Surveillance Requirements

- 9.23.1 The *FS-LSI Facility* must employ a multi-camera (IP-based) video monitoring system to ensure safe and secure inspection activities.
- 9.23.2 The *FS-LSI Facility* video surveillance system must enable viewing and recording of all activity by zone, date and time.
- 9.23.3 The *FS-LSI Facility* surveillance equipment and positioning must satisfy the required performance and coverage areas defined in Section 11.0 VIDEO SURVEILLANCE REQUIREMENTS.

## 9.24 Camera Viewing of Target Objects

- 9.24.1 The *FS-LSI Facility* video surveillance system must enable an operator to select and manipulate pan, tilt, zoom (PTZ) cameras from the *Control Centre* via Joystick control to:
  - 9.24.1.1 conduct visual inspection of areas-of-interest on the exterior of inspected such as conveyance roof, door panels, windows, spare tires, external gas tanks, lashing and securing devices, open-top cargo holds, truck boxes, etc.
  - 9.24.1.2 ensure adequate clearance is given for FS-NII system and target objects
  - 9.24.1.3 read/confirm container or license plate identification numbers

## 9.25 Intercom Communication

The *FS-LSI Facility* must be equipped with an intercom system for communication purposes between key positions (including, but not limited to: *FS-LSI Control Room*, *FS-LS Imaging Enclosure*, *FS-LSI Driver Waiting Area*).

## 9.26 Public Address System

The *FS-LSI Facility* must be equipped with a Public Address (PA) system to communicate with drivers awaiting examination.

## 9.27 Operating Environment

The *FS-LSI Facility* must be capable of continuous operation in a Canadian environment; including ambient temperatures ranging from -20° C to +40° C, and up to 95% Relative Humidity.

## 9.28 Control Centre Temperature Range

The *FS-LSI Control Room* must employ heating and cooling systems capable of maintaining a comfortable work environment, with adjustable temperature settings from 20°C to 24°C.

## 9.29 Scanning Manifest Documents

The *FS-LSI Facility* must be capable of scanning any manifest documents and storing copies of these documents as part of the inspection dataset.

## 9.30 Imaging Tools

- 9.30.1 The *FS-LSI Facility* must enable manipulation of the generated images to better identify and characterize components of the target object and its contents.
- 9.30.2 The image manipulation capability must include a suite of “easy-to-use” tools which can be applied and removed during image analysis process, and should include the following basic functionalities:
  - 9.30.2.1 Calliper Tool: to provide a means for operators to measure the approximate size of details in the scanned image.
  - 9.30.2.2 Zoom Tool: to provide a means for operators to zoom in and out of parts of the scanned image for localized analysis.
  - 9.30.2.3 Contrast and Brightness Tool: to provide a means for operators to modify the contrast and brightness of the scanned image.
  - 9.30.2.4 Histogram Tool: to provide a means for operators to normalize the image (or part thereof) according to the statistical distribution of detected photons.
  - 9.30.2.5 Image Enhancement/Sharpness Tool: to provide a means for operators to modify image sharpness and color scheme to emphasize or discriminate between different elements in the image.
  - 9.30.2.6 Low Absorption Tool: to provide a means for operators to identify areas of an image where the source penetrability has been highly limited.
  - 9.30.2.7 Undo/back Capability: to provide a means for operators to undo individual actions, and also to return to the original image.
  - 9.30.2.8 Image Annotation: to provide a means for operators to highlight and type in comments about specific areas in an image for future reference and review.
  - 9.30.2.9 Image Polarity Reversal: to provide a means for operators to reverse the video polarity (negative video mode).
  - 9.30.2.10 Image Comparison Tool: to permit operators to search for previous images based on key parameters (e.g., truck/conveyance id., license plate, etc.) and compare the retrieved data alongside the scan currently under review.

## 9.31 Remote Image Analysis and Verdict via IGW

The *FS-LSI Facility* should enable image analysis and referral decision from a remote location accessed through the CBSA's Instrumentation Gateway (IGW) and Virtual Private Network (VPN).

## 9.32 Real-Time Image Display

The *FS-LSI Facility* should display scan images on the operator screen as they are generated enabling a preview for the image analyst.

### **9.33 Low vehicle scanning**

The *FS-LSI Facility* should be capable of generating images of target objects as low as 15 cm from the floor (as measured along the centre-line of the inspection volume) to the top of the scanned object without exhibiting image cut-off.

### **9.34 Dual View FS-LS Imaging**

The FS-LSI Facility should enable simultaneous image generation from at least two orthogonal angles.

### **9.35 Camera Underside Viewing of Target Objects**

The FS-LSI Facility video surveillance system should enable an operator to view a digital image of the underside of the conveyance

## 10.0 DESIGN AND CONFIGURATION REQUIREMENTS

### 10.1 Proven Design

The proposed FS-LSI Facility must be based on a proven design (at least two (2) systems deployed and operational) having a Linac emitting high-energy x-ray radiation; having material discrimination capability; and having a physical structure to contain radiation emissions so as not to exceed 5  $\mu\text{Sv/h}$  (peak instantaneous).

### 10.2 Imaging Path

The *FS-LS Imaging Enclosure* must be configured to enable target objects to enter by the South end, be examined, and then exit by the North opposing end.

### 10.3 Imaging Equipment Physical Protection

The *FS-LS Imaging Enclosure* must be configured with guiderails, concrete barriers/bollards, and/or other physical protection to ensure vehicles entering and exiting the scanning volume cannot inadvertently strike the imaging equipment when entering or exiting the facility.

### 10.4 Protection from Dirt and Water

- 10.4.1 All *FS-LSI Facility* components must be adequately protected from the exposure to solid particles and water that may result from projected environmental and/or operating conditions.
- 10.4.2 All pertinent components in the *FS-LS Imaging Enclosure* should have a CSA Type 4 or International Electrical Commission (IEC) Ingress Protection (IP) IP65 rating or better.

### 10.5 CSA Certification

All pertinent *FS-LSI Facility* components must be CSA certified.

### 10.6 Service Mounted Conduit

All communication and electrical connection points should be protected within service mounted conduit, for easy access and maintenance.

### 10.7 Video Surveillance System Conduit

All *FS-LSI Facility* Video Surveillance System cabling must be contained within a metal conduit.

### 10.8 Fail-safe

The *FS-LSI Facility* must include a means for fail-safe shutdown of all system components in the case of a power loss. This functionality must ensure that radiation emission is stopped, that no data is lost, and that the *FS-LSI Facility* may be restarted as normal when power is restored.

### 10.9 Uninterruptible Power

The computer system(s) must be supported by an uninterruptible power supply (UPS) to prevent the loss of data in the event of a break or interruption in the main power source. The UPS must be capable of powering all operator workstations, networking equipment and system servers, so as to enable sufficient time for data retrieval prior to shut down.

## 10.10 Operator Workstations

The *FS-LSI Control Room* must include a minimum of two (2) Operator Workstations configured for system control, image analysis and video surveillance.

## 10.11 Image Analysts Display

10.11.1 Each Operator Workstation must include at least one 4K ultra-high-definition monitor (minimum 3840 x 2160 pixels) for image analysis (minimum size 27", widescreen)

10.11.2 Each Operator Workstation must include at least one high-definition (minimum resolution (1080p) monitor (minimum size 27") for image analysis

10.11.3 Each monitor must enable a wide viewing angle using In-Plane Switching (IPS) technology (or better).

10.11.4 Each monitor should enable pivoting between landscape and portrait modes.

10.11.5 Each monitor should be mounted on an operator adjustable stand to configure the height and angle for optimal viewing.

## 10.12 Video Surveillance Display Board

10.12.1 The *FS-LSI Control Room* must include at least two 4K ultra-high-definition monitors (minimum 3840 x 2160 pixels) (minimum size 27"), dedicated to the display and control of the *FS-LSI Facility* cameras.

10.12.2 The number of monitor(s) of the video display board must be sufficient to accommodate the camera views of the entire FS-LSI Facility, with no more than 16 camera feeds per screen.

10.12.3 Each monitor must enable a wide viewing angle using In-Plane Switching (IPS) technology (or better).

## 10.13 Additional CBSA Workstation

The *FS-LSI Control Room* must include one (1) extra workstation desk-space (without computer or peripherals) for CBSA to setup a standard desktop computer, monitor and phone line.

## 10.14 Identification of Operational Controls

All controls (switches/buttons/levers) must be clearly marked in order to identify their function(s) in both French and English or be universal icons, eliminating the need for written words.

## 10.15 Linguistic Requirements Signage

All signs and instructional markings must be bilingual (French and English) on all operator controls and primary systems and satisfy any applicable Canadian regulatory requirements.

## 10.16 Signs and Markings

All safety signs and instructional markings must satisfy regulatory requirements and have high resistance to mechanical abrasion, cleaning solutions and exposure to Canadian environmental conditions.



### **10.17 Printer**

*FS-LSI Facility* must be supplied with a color laser printer, with a resolution of at least 600 x 600 DPI, a color page print rate of no less than eight (8) pages per minute (PPM), a black and white print rate of at least 12 PPM, and be configured to allow printing from any device connected to the system's network. The printer must be securely attached to its mounting surface.

### **10.18 Adjustment of Radiological Alarm Thresholds**

It must be possible for CBSA Administrators to adjust the radiological alarm thresholds.

### **10.19 Disabling the Passive Radiation Detection System**

It must be possible for CBSA Administrators to disable the use of the passive radiation detection system when imaging if required.

### **10.20 Software Languages**

The system's application software must enable the operator the choice to work in either French or English. It must be possible to toggle easily between languages (i.e., via a language icon on the operator screen) without loss of work.

## 11.0 VIDEO SURVEILLANCE REQUIREMENTS

### 11.1 Video Surveillance Coverage

The *FS-LSI Facility* must provide 100% video surveillance coverage (unobstructed) of the areas defined in Figure 2. The CBSA and security personnel staff rooms are excluded from video surveillance monitoring.

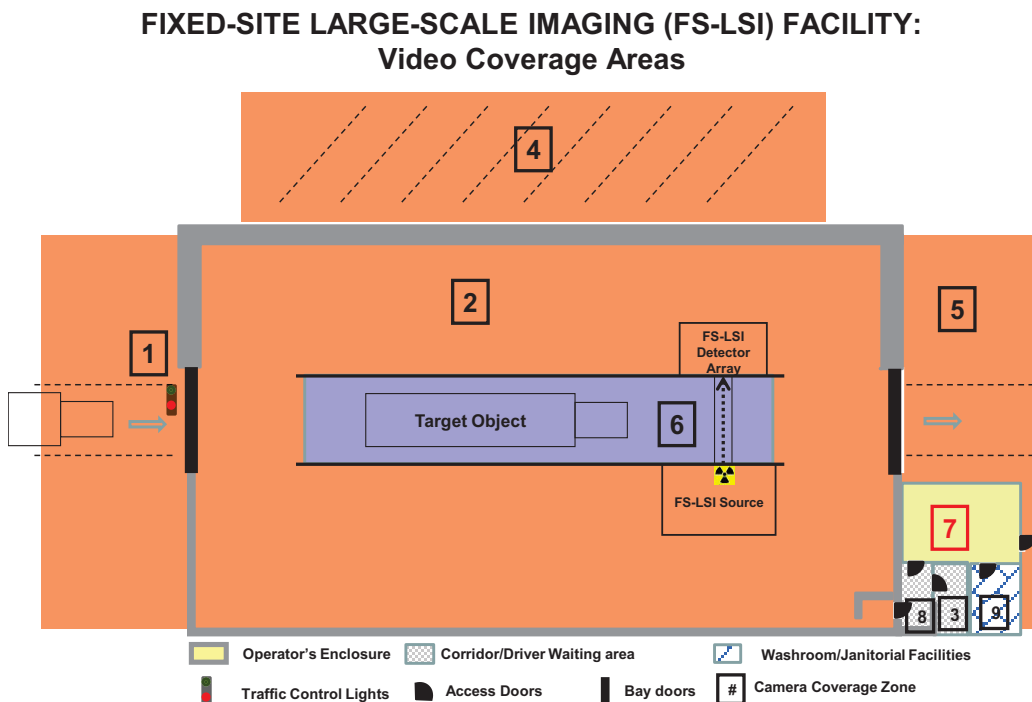


Figure 2 – FS-LSI Video Coverage Areas

### 11.2 Video Surveillance Capabilities

- 11.2.1 The FS-LSI Facility must enable the video Surveillance Capabilities for each coverage area, as listed in Table 1.
- 11.2.2 The FS-LSI Facility must satisfy the minimum video resolution for each of the applicable Surveillance Capabilities, as listed in Table 1.

**Table 1 - FS-LSI Facility video surveillance capture strategy.**

Areas	Operational Requirements	Minimum Resolution and Frame Rate
Zone 1: The <i>FS-LSI Facility</i> entry area	Monitor people and/or conveyances entering/exiting the facility.	65 Pixels Per Linear Meter

		15 Frames per second
Zone 2: The inside of the FS-LS Imaging Enclosure	<p>Verify FS-LS Imaging Enclosure is clear of persons prior to and during inspection.</p> <p>Monitor traveller(s) and conveyance(s) within the FS-LS Imaging Enclosure.</p>	<p>65 Pixels Per Linear Meter</p> <p>15 Frames per second</p>
Zone 3: The FS-LSI Driver Waiting Area	<p>Monitor traveller(s) waiting for the scanning process.</p> <p>Visually compare traveller(s) to presented identity documents.</p>	<p>230 Pixels Per Linear Meter</p> <p>(70 Pixels Per Linear Foot)</p>
Zone 4: The vehicle parking lot/staging area	<p>Monitor activities in the commercial parking lot.</p>	<p>65 Pixels Per Linear Meter</p> <p>15 Frames per second</p>
Zone 5: The FS-LSI Facility exit area	<p>Monitor conveyances exiting the facility.</p>	<p>65 Pixels Per Linear Meter</p> <p>15 Frames per second</p>
Zone 6: The FS-LSI Facility Inspection area	<p>Inspect (visually) the exterior of the target object (e.g., vehicle rooftop, conveyance beds, sides, doors, lower panels, spare tires windows, external tanks)</p> <p>Provide unobstructed view of the entire target object.</p> <p>Confirm license plate/conveyance ID numbers.</p>	<p>230 Pixels Per Linear Meter</p> <p>(70 Pixels Per Linear Foot)</p>
Zone 7 - the FS-LSI Operator's enclosure area	<p>No video coverage required.</p>	N/A
Zone 8: The FS-LSI Facility Hallway area	<p>Monitor/confirm travellers proceeding to the waiting area.</p> <p>Visually compare traveller(s) to presented identity documents.</p> <p>Monitoring of traveller behaviour.</p>	<p>230 Pixels Per Linear Meter</p> <p>(70 Pixels Per Linear Foot)</p>
Zone 9 –	<p>No video coverage required.</p>	N/A

Washroom do not require video coverage.		
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### 11.3 Approval of Video Surveillance Equipment

The Contractor must obtain approval from CBSA (prior to any installation) for the type(s) and coverage of video surveillance equipment and management software to be implemented. Following initial setup of the system, the Contractor will NOT have access to the recordings generated by the installed CCTV security system.

### 11.4 Video Management Software (VMS)

The FS-LSI Facility must use a Video Management Software (VMS) such as: Milestone XProtect Corporate, Genetec Omnicast, Genetec Security Center, or better.

11.4.1 The VSM must offer a client-server model. The server application is in a remote location and provides camera control (live viewing, PTZ controls) and video archiving functions. The client application connects to the server, to allow access of live video from cameras and archived videos.

#### 11.4.2 Open standards

11.4.2.1 The VSM must leverage open standards for video management.

11.4.2.2 The VMS must be ONVIF "profile S" compliant.

11.4.2.3 The VMS must have an available Software Development Kit (SDK).

11.4.2.4 The VMS must support commercial off-the-shelf (COTS) client workstations, servers and customer selected archiving system.

11.4.2.5 The VMS must be compatible with open architecture industry leading camera manufacturers, including but not limited to: Sony, Axis, Panasonic and Bosch.

11.4.2.6 All camera connected to the VMS must be approved and certified by the manufacturer.

11.4.2.7 The VMS must be able to support an application programming interface (API) to allow for integration of third party software, such as video analytics or license plate recognition.

#### 11.4.3 Scalability / future expansion

11.4.3.1 The VMS must be upgradeable without requiring migration to another platform.

11.4.3.2 The VMS must be scalable up to a minimum of 100 cameras and support multiple video storage servers

11.4.3.3 VMS grouping:

- The VMS must be able to join multiple independent systems together, in order to view videos from sources connected to these multiple independent systems.
- The viewing procedure of the remote cameras must be transparent to the user.

#### 11.4.4 Architecture

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- 11.4.4.1 The VMS must be able to organize cameras in logical groups. It must be possible to select one or more groups within the programmed hierarchy and switch directly to that camera groups views.
- 11.4.4.2 It must be possible to use a traditional CCTV keyboard which connects to the control center PC and allows for full virtual matrix control, without the need for PC keyboard and mouse control.
- 11.4.4.3 The server and client application must be Microsoft Windows compatible.
- 11.4.4.4 The VMS must support multicast and unicast transmission.
- 11.4.4.5 The VMS must support multiple streams, from the same camera at different resolution.
- 11.4.4.6 In the event of server failure, the VMS must provide redundancy features; to ensure access to all live data at all times and uninterrupted recording of all cameras.
- 11.4.5 PTZ Controls
- 11.4.5.1 The VMS Pan-tilt-zoom function must accommodate a traditional CCTV keyboard, such that the PC keyboard and mouse are not necessary for normal pan-tilt-zoom control.
- 11.4.5.2 Variable speed and direction pan-tilt-zoom control must be available using the PC mouse, by dragging a directional pointer around the video pane; including zoom in, zoom out, focus near, focus far and multiple speed pan and tilt operations.
- 11.4.6 Video Archiving and Retrieval
- 11.4.6.1 The video management system must support the export and handling of video suitable for evidence
- 11.4.6.2 The VMS must support management, distribution and storage of video surveillance data within a centralized and distributed network environment.
- 11.4.6.3 The VMS must support multiple recording modes and formats:
- 11.4.6.4 Continuous recording, motion recording, pre & post motion recording and scheduled recording. These modes must be available for all compatible cameras.
- 11.4.6.5 The VMS must support video recording in multiple standard compression formats, including but not limited to H.264, being configured at the camera level.
- 11.4.6.6 The VMS must be able to record audio that is synchronized with the video.
- 11.4.6.7 The VMS must support internal and external storage devices including, but not limited to: NAS (network attached storage) SAN (storage area network) solutions.
- 11.4.6.8 The VMS must provide advanced search functions, including but not limited to: time-line search, event search, and motion search.
- 11.4.6.9 The VMS must provide different levels of application access control, at individual and user group levels.
- 11.4.6.10 Reliability
- 11.4.6.11 The VMS must provide a high level of availability for the recording function; with failover features to ensure continuous uninterrupted recording of all cameras, at all times, on the failover server and without loss of data.

- 11.4.6.12 The VMS must provide a high level of availability for the viewing function; with failover features to ensure continual access to all live data, at all times, via the failover server and without service interruption.

#### 11.4.7 Configuration function or tool

- 11.4.7.1 The camera settings including frame rate, resolution and compression must be configurable by the VMS.
- 11.4.7.2 The camera settings including motion detection must be configurable by the VMS.
- 11.4.7.3 The VMS configuration function must be inaccessible for specific user or group that do not having sufficient levels of permissions.
- 11.4.7.4 The VMS must provide a hardware discovery tool that compiles a list of devices connected to the CCTV network and facilitates user connectivity to those devices.

#### 11.4.8 Alarms, Events, Logging, and Management

- 11.4.8.1 There must be an interface to define "Events", including but not limited to: built-in motion detection, third party events, third party video analytics, time of day etc.
- 11.4.8.2 Events must trigger associated alarms.
- 11.4.8.3 The VMS provides user options to log text descriptions of: Event Triggers, Actions, and Alarms.
- 11.4.8.4 Alarms must be associated with user defined actions.
- 11.4.8.5 The VMS must have a log management function that includes the following functionality:
- The VMS must log user actions
  - The VMS must log who did the action and when
  - The VMS must log User logon/logoff action
  - The VMS must log Camera setting modification
  - The VMS must log PTZ move
  - The VMS must log Video export
  - The VMS must log Alarms
  - The VMS must log Disk above a threshold
  - The VMS must log Camera not working
  - The VMS must have a user interface to display and search the log

#### 11.4.9 Live Viewer

- 11.4.9.1 The live viewer client application must display live video from cameras connected to the server located in a remote location.
- 11.4.9.2 The live viewer must have these features:
- Support two languages: English and French.
  - Provide help options to locate a function or feature.
  - Must have the capability of displaying live video at 30 FPS and have an adjustable frame rate.
  - Display live video at different resolutions.
  - Provides configurable live audio functions, including but not limited to audio ON/OFF, audio synchronized with video and adjustable audio volume.

- The operator must have the ability to choose playback layouts including 2x2, 4x4 and various customs layouts.
- The VMS must be able to add a bookmark with notes in order to tag live events.
- Must be able to show different views on multiple monitors (up to 3)

#### 11.4.10 Archive Player

- 11.4.10.1 The VMS must provide multiple playback functions, including but not limited to play, pause, fast forward, rewind, and variable play speed functions.
- 11.4.10.2 The VMS must provide synchronized playback from multiple cameras.
- 11.4.10.3 The archive player must have multiple layouts to playback videos from multiple cameras e.g. It must be possible to play 2, 4, or 16 videos synchronously.
- 11.4.10.4 Live viewer software must have synchronous play back mode.
- 11.4.10.5 It must be possible to disable audio during playback.
- 11.4.10.6 The VMS must be able to export video in a non-proprietary format (such as AVI or ASF) readable on computers without the need to install additional software /codecs.
- 11.4.10.7 The VMS must be able to export video in an original format with watermarking and timestamp.
- 11.4.10.8 The VMS must also be able to export multiple video at the same time.

#### 11.4.11 User (Client) Management

- 11.4.11.1 The VMS must provide the following user authentication features:
- 11.4.11.2 Must have User ID and Password protection for each client connection to the server application.
- 11.4.11.3 Must be able to have automatic password expiry function.
- 11.4.11.4 Must be able to have encryption of stored Passwords.
- 11.4.11.5 Must have multiple administrator and user levels.
- 11.4.11.6 Must be able to define hierarchy and inheritance mechanisms.
- 11.4.11.7 There must be a capability to control who has access to the software and camera features. These related requirements include:
  - The proposed solution must support role-based access control (RBAC) or group-based access control (GBAC), where privileged users can define roles or groups and can assign users to roles or groups.
  - The proposed solution must allow the assignment of granular permissions to users, groups or roles. The granularity of these permissions must include but not be limited to:
    - Archive viewing access of specific cameras
    - Live viewing access of specific cameras
    - Access to the camera configuration
    - Access to server configuration
    - Export of images

- The proposed solution must be capable of enabling/disabling recording and listening of audio.
- External vendors must have no access to any of the infrastructure or components implemented, unless explicitly authorized by the CBSA technology authority.

### **11.5 Recording of Surveillance Video**

The *FS-LSI Facility* must enable the recording/digital retrieval of any video surveillance onto DVD or other digital media, as required and in native format with watermark to support video evidence submission. Only CBSA will have the capability to record and review images.

### **11.6 Archiving of Surveillance Video**

The *FS-LSI Facility* video surveillance system must include an archiving system that provides a minimum of 30 days recording, search & playback and the ability to permanently record and export selected images and/or video clips.

### **11.7 Video Surveillance - Redundant Functionality**

11.7.1 The *FS-LSI Facility* video recording servers must include RAID + Failover Server Technology, in order to maintain functionality in the event of:

- Disk failure: 2 recording disks can fail per server and the system will still be fully functional.
- Recording Server failure: 1 Recording server can fail and the system will still be fully functional.

11.7.2 The *FS-LSI Facility* video management servers must include RAID + Failover Server Technology, in order to maintain functionality in the event of:

- Disk failure: 2 recording disks can fail per server and the system will still be fully functional.
- Recording Server failure: 1 Recording server can fail and the system will still be fully functional.

### **11.8 Video Surveillance - Backup Power**

In case of Power Outages, a battery backup system must be provided that ensures uninterrupted operation for a minimum of 20 minutes of the entire video surveillance system, including all its CCTV subcomponents.

### **11.9 Video Streaming**

*FS-LSI Facility* video cameras must support at least two video streams and support simultaneous streaming of different formats.

### **11.10 Video Compression Formats**

*FS-LSI Facility* video cameras must support multiple compression formats, including but not limited to, MJPEG and H.264.

### **11.11 Video Camera Architecture**



*FS-LSI Facility* video cameras must be IP type and must support ONVIF 'profile S'.

### **11.12 Video Camera Power**

*FS-LSI Facility* video cameras must be powered by standard *Power over Ethernet* (POE) and be compliant with *IEEE 802.3af* or where the camera requires more power, *IEEE 802.3at*.

### **11.13 Video Camera Frame Rate**

*FS-LSI Facility* video camera frame rates must be controllable for each stream. The Camera must support at least 30 frames per second.

### **11.14 Video Camera Audio Capability - Disabled**

*FS-LSI Facility* video cameras which are audio capable must be able to have audio capability disabled from the camera or from the Video Management Software (VMS).

### **11.15 Video Camera Enclosures**

11.15.1 Video cameras in must be contained in housing and securely mounted.

11.15.2 Video camera assemblies must be dustproof and waterproof by being IP66 rated or better with regard to the IP Code or International Protection Marking IEC 60529.

11.15.3 Video camera assemblies must be vandal proof by being rated IK10 or better with regard to the Mechanical impact resistance (IK) rating of the international standard EN/IEC 62262. A custom enclosure may be provided but its use must be specifically noted.

11.15.4 Night time operation is to be supported by exterior lighting to ensure good video quality.

### **11.16 Video Camera Sensor Type**

*FS-LSI Facility* video cameras must be based on CMOS sensor technology.

### **11.17 Video Camera Colour**

All *FS-LSI Facility* video cameras must render images in colour.

### **11.18 Video Camera Night Capability**

All *FS-LSI Facility* video cameras must have a true automatic Day/Night camera capability with a switchable, mechanical IR cut filter.

### **11.19 Video Camera Dynamic Range**

Any *FS-LSI Facility* video cameras installed outdoors must have a Wide Dynamic range capability of at least 130dB.

### **11.20 Video Camera Exposure Settings**

11.20.1 Must have automatic and manual shutter speed and gain controls.

11.20.2 Must allow automatic compensation of the image level with regard to various lighting conditions, such as "Automatic Gain Control" and "Auto Iris".

11.20.3 Camera must be capable of capturing images at a shutter speed from 1/10000s to 1/30s, in both mode night and day mode.

### **11.21 Video Camera White Balance**

*FS-LSI Facility* video cameras must have an automatic white balance control.

### **11.22 Video Camera Focus**

*FS-LSI Facility* video cameras must have remote focus control.

### **11.23 Video Camera Zoom**

*FS-LSI Facility* video cameras must support at least a 2X optical zoom.

### **11.24 Video Surveillance Equipment Cabinet**

11.24.1 The Contractor must supply and install a Video Surveillance Cabinet in the FS-LSI Facility to house all components for the defined Video Surveillance System.

11.24.2 Video Surveillance Cabinet to be steel, ventilated, hinged front and back lockable doors and pre-drilled rack mounting rails for 19" rack mounted equipment. Cabinet depth to be 610 mm minimum. Ground LAN Cabinet using #6 Green Ground Wire.

11.24.3 Provide one folding rack mounted monitor, keypad and mouse for viewing and maintenance of the video management system.

### **11.25 Video Surveillance Site Integration**

11.25.1 The Contractor must supply and install a 6-Strand, 50 micron, flooded Fibre Optic cable from the Video Surveillance Video Surveillance Cabinet in the FS-LS Imaging Facility to the existing Video Surveillance rack in RCR Room in Warehouse Building. Fibre Optic cable is to be installed in underground duct bank and terminated on fibre optic patch panel using 'SC' type connectors at each end.

11.25.2 The Contractor must interface the Video Surveillance equipment in the new FS-LS Imaging Enclosure to the existing Video Surveillance head end equipment in Commercial Building and Warehouse Building via the existing fibre optic link between Commercial Building and Warehouse Building and supply and install all necessary media converters, switches, programming etc. in both Commercial and Warehouse buildings to provide a seamless Video Surveillance network between the two buildings.

## 12.0 RADIATION SAFETY REQUIREMENTS

### 12.1 CNSC Licensable System

12.1.1 It must be possible for CBSA to obtain the following licenses for the proposed FS-LSI Facility: License to Construct; License to Operate for the Purpose of Commissioning, License for Routine Operation, and License to Decommission.

12.1.2 The Contractor must provide the CBSA Technical Authority with all information within two (2) weeks of initial request, in order to support the submission of license applications.

\* Note: License types and preliminary information requirements can be reviewed in the document RD/GD-289 CNSC Licence Application Guide on the CNSC's website at:

<http://www.nuclearsafety.gc.ca/eng/nuclear-substances/licensing-class-II-nuclear-facilities-and-prescribed-equipment/licencing-class-II-nuclear-facilities/index.cfm>.

### 12.2 CNSC Granted License to Service

The Contractor (or original equipment manufacturer) must acquire (before installation) and be willing to maintain a CNSC Class II Prescribed Equipment Servicing License, including all associated costs and responsibilities (e.g., certification of a Radiation Safety Officer), for a period of time no less than 10 years.

### 12.3 Certification of Class II Prescribed Equipment

Prior to Factory Acceptance Testing (FAT), the radiation device must be certified (Class II) by the Canadian Nuclear Safety Commissions (CNSC).

### 12.4 Radiation Safety Zone (RSZ)

The *FS-LSI Facility* must be capable of scanning target objects within a Radiation Safety Zone (RSZ) around which the cumulative radiation exposure<sup>4</sup> must not exceed **5 µSv** during any one hour of imaging, at an inspection rate leading to the maximum possible exposure.

### 12.5 Containment of the RSZ

The FS-LS Imaging Enclosure must be designed and constructed to ensure that the Radiation Safety Zone (RSZ) is contained within the boundary of its outer walls and ceiling.

### 12.6 Dose Rates within the FS-LSI Control Room

At all locations within the FS-LSI Control Room, the cumulative radiation exposure must not exceed **0.5 µSv** during any one hour of imaging, at an inspection rate leading to the maximum possible exposure.

### 12.7 Radiological Safety System

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<sup>4</sup> Irrespective of the location of measurement and the scattering of incident radiation prior to detection (e.g., scattered within walls, ceiling or Skyshine)

12.7.1 The *FS-LSI Facility* must incorporate a Radiological Safety System (RSS) which interlocks sensors and protocols to prevent unnecessary exposure of radiation to humans.

12.7.2 The primary system components which must be integrated within the RSS are:

- 12.7.2.1 All FS-LS Imaging Enclosure door and entrance interlocks
- 12.7.2.2 The *FS-LS Imaging Enclosure* - Last Person Out System
- 12.7.2.3 The RSZ perimeter verification system
- 12.7.2.4 The warning lights/sirens and beam-on indicators
- 12.7.2.5 All Emergency Stops
- 12.7.2.6 The initialization code lock system
- 12.7.2.7 All fixed radiation survey meters, detectors or sensors
- 12.7.2.8 The collimation and/or beam alignment system
- 12.7.2.9 The collision avoidance system
- 12.7.2.10 Source control system data
- 12.7.2.11 Any other system sensors which could indicate a potential for unwarranted radiation exposure to humans

12.7.3 When RSS interlock switches are opened during operation, the *FS-LSI Facility* must to automatically revert to a safe state until reset. If the interlocks are open prior to operation, the RSS must prevent radiation emission until closed.

## **12.8 Doors and Entrances Interlocks**

All *FS-LS Imaging Enclosure* doors or entranceways must be equipped with a device that triggers an emergency stop when any are opened/breached, and prevents the equipment from being used until closed and clearance of the Radiation Safety Zone can be verified.

## **12.9 Clearance Verification/Last Person Out (LPO) System**

The Radiological Safety System must be equipped with a device that prevents the equipment from being used until a person having a clear and unobstructed view of the Radiation Safety Zone activates a device (e.g., presses a button) and all Radiological Safety System loops are closed.

## **12.10 Egress Capability**

All *FS-LS Imaging Enclosure* doors must be designed to prevent any person from being locked inside.

## **12.11 Beam-On Indicators**

All *FS-LSI Facility* entrances must be equipped with a readily visible display that indicates the irradiation state of the equipment.

## **12.12 Pre-Irradiation Alarm**

The *FS-LS Imaging Enclosure* must be equipped with a device that, before the irradiation begins, provides a continuous audible alarm of sufficient duration to enable a person inside the room to operate one of the emergency stop buttons or other emergency stop devices.

### **12.13 Emergency Stop Button - Functionality**

The *FS-LS Imaging Enclosure* must be equipped with emergency stop buttons or other emergency stop devices that, when operated, cause the *FS-LSI Facility* equipment to automatically revert to a safe state until the safety circuit is reset from inside that room and a switch on the control console of the equipment is operated.

### **12.14 Emergency Stop Button - Locations**

12.14.1 The *FS-LSI Facility* emergency stop buttons or other emergency stop devices must be unobstructed, accessible and located at a minimum in each of the following places:

12.14.2 on the operator's control console

12.14.3 near each entrance (including doors) to the *FS-LS Imaging Enclosure*

12.14.4 on both sides of all FS-LSI Equipment

12.14.5 along the lengths of the walls inside the *FS-LS Imaging Enclosure* such that these can be reached without crossing the incident radiation beam

12.14.6 at the Safety Traffic Controller's waiting position

### **12.15 Initialization Code Lock**

The *FS-LSI Facility* must be equipped with a key switch or code-operated device that prevents persons who are not authorized by the licensee from operating the equipment.

### **12.16 Handheld Radiation Survey Meters**

Two handheld radiation survey meters must be provided with each system, to perform routine surveys at the boundaries of the radiation safety zone.

### **12.17 Handheld Radiation Survey Meters Functionality**

12.17.1 The handheld radiation survey meters must be ion chamber style that can be pre-set to power up in the appropriate (default) range and have sufficiently fast response time to accurately measure radiation dose rates (in SI units) reached during the course of a scan.

12.17.2 The handheld radiation survey meters must be Fluke 451B or better.

12.17.3 The handheld radiation survey meters must indicate whether the power level of its batteries is sufficient for its operation.

12.17.4 Operators must not be able to intentionally or inadvertently change the default settings of the handheld radiation survey meters, resulting in a lower sensitivity or confusing display.

12.17.5 It must be possible for CBSA Radiation Safety Officers to adjust any alarming thresholds or parameters of the handheld radiation survey meters, as necessary.

### **12.18 Fixed Radiation Survey Meters**

At a minimum, three (3) fixed, wall mounted radiation survey meters must be included to monitor dose rates at key operational positions during scanning.

### **12.19 Fixed Radiation Survey Meters - Functionality**

12.19.1 All fixed radiation survey meter(s) must be integrated within the radiological safety system.

12.19.2 The meters must have a pre-set to power up in the default range and have response time that allows for accurate radiation measurement (in SI units) during the course of a scan.

12.19.3 The primary source of power for the fixed radiation survey meters must not be batteries.

12.19.4 Operators must not be able to intentionally or inadvertently change the default settings resulting in a lower the sensitivity or confusing display.

### **12.20 Fixed Radiation Survey Meters - Locations**

At a minimum, the fixed radiation survey meters must be securely attached at each of the following locations:

12.20.1 in the FS-LSI Control Room

12.20.2 at the FS-LSI Driver's Waiting Area

The meter(s) must be positioned at location(s) most likely to detect the highest dose rates while scanning targets.

### **12.21 Fixed Radiation Survey Meters - Backup**

One (1) additional fixed radiation survey meter must be provided to accommodate the logistics of instrument certification.

### **12.22 Shipping of Survey Meters**

All survey meters (handheld and fixed) must be of a type that can be shipped by air and do not require shipment as dangerous goods; they must also be provided with hard shelled shipping cases (Pelican or equivalent).

### **12.23 Collision Prevention**

The *FS-LSI Facility* must incorporate collision avoidance technology to prevent any contact between the *FS-LSI Facility* and the scanned objects (or their conveyances) during scanning.

### **12.24 Varying Dose Radiation Source**

The *FS-LSI Facility* should employ a varying dose radiation source to optimize the dose delivered to the target object while maintaining imaging performance.

## 13.0 INSPECTION PERFORMANCE REQUIREMENTS

### 13.1 Performance Measurement

- 13.1.1 For imaging performance measures outlined in the American National Standard for Determination of the Imaging Performance of X-Ray and Gamma-Ray Systems for Cargo and Vehicle Security Screening (ANSI N42.46), all testing must be based upon and completed in accordance with the procedures defined therein.
- 13.1.2 All performance must be achieved with a scanning speed of at least 0.4 meters/second and with source emission levels set to satisfy all radiation safety requirements.
- 13.1.3 The Maximum Performance Variance (MPV) is the tolerable difference in measured performance when the test apparatus is set up at the different listed positions.

### 13.2 Penetration

- 13.2.1 The *FS-LSI Facility* must enable measurement of a maximum Penetration greater than or equal to 317.5 mm (approx. 12.5 inches).
- 13.2.2 The MPV for Penetration, between performance at  $\frac{1}{4}H$  and  $\frac{1}{2}H$ , must be less than or equal to 10%.

### 13.3 Spatial Resolution Horizontal

- 13.3.1 The *FS-LSI Facility* must enable measurement of a minimum Spatial Resolution – Horizontal less than or equal to 10 mm.
- 13.3.2 The MPV for Maximum Spatial Resolution – Horizontal, between performance at  $\frac{1}{4}H$  and  $\frac{1}{2}H$ , must be less than or equal to 30%.

### 13.4 Spatial Resolution - Vertical

- 13.4.1 The *FS-LSI Facility* must enable measurement of a minimum Spatial Resolution – Vertical less than or equal to 7 mm.
- 13.4.2 The MPV for Maximum Spatial Resolution – Vertical, between performance at  $\frac{1}{4}H$  and  $\frac{1}{2}H$ , must be less than or equal to 30%.

### 13.5 Contrast Sensitivity @ 10%

- 13.5.1 The *FS-LSI Facility* must enable measurement of a maximum Contrast Sensitivity @ 10% less than or equal to 2%.
- 13.5.2 The MPV for Contrast Sensitivity @ 10%, between performance at  $\frac{1}{4}H$  and  $\frac{1}{2}H$ , must be less than or equal to 10%.

### 13.6 Contrast Sensitivity @ 50%

- 13.6.1 The *FS-LSI Facility* must enable measurement of a maximum Contrast Sensitivity @ 50% less than or equal to 3%.



13.6.2 The MPV for Contrast Sensitivity @ 50%, between performance at  $\frac{1}{4}H$  and  $\frac{1}{2}H$ , must be less than or equal to 1%.

### 13.7 Contrast Sensitivity @ 80%

13.7.1 The *FS-LSI Facility* must enable measurement of a maximum Contrast Sensitivity @ 80%, measured at  $\frac{1}{4}H$  and  $\frac{1}{2}H$ , must be less than or equal to 4%

13.7.2 The MPV for Contrast Sensitivity @ 80%, between performance at  $\frac{1}{4}H$  and  $\frac{1}{2}H$ , must be less than or equal to 2%.

### 13.8 Wire Detection

13.8.1 The *FS-LSI Facility* must enable measurement of a minimum size Wire Detection, measured less than or equal to 1.628 mm (14 AWG).

13.8.2 The MPV for Wire Detection, between performance at  $\frac{1}{4}H$  and  $\frac{1}{2}H$ , must less than or equal to 0.5 mm.

### 13.9 Material Discrimination – Very Low-Z (Organics)

The *FS-LSI Facility* must compute and display the correct Material Discrimination – Low-Z/Organics upon imaging an assembled mass of polyvinyl toluene [100 mm x 200 mm x 470 mm] [Width, Height, Depth], where Depth is the object thickness in-line with the source beam.

### 13.10 Material Discrimination – Low-Z (Intermediate Inorganics)

The *FS-LSI Facility* must compute and display the correct Material Discrimination – Inorganics upon imaging an assembled mass of aluminum [100 mm x 200 mm x 200 mm] [Width, Height, Depth].

### 13.11 Material Discrimination – Intermediate-Z (Metals)

The *FS-LSI Facility* must compute and display the correct Material Discrimination – Metals upon imaging an assembled mass of steel [100 mm x 200 mm x 76 mm] [Width, Height, Depth]..

### 13.12 Optical Character Recognition (OCR) Performance

The *FS-LSI Facility's* OCR capability must be accurate at least 90% of the time for any and all readable conveyance identification markings.

### 13.13 Sensitivity of Passive Radiation Detection Equipment

The *FS-LSI Facility* must be able to detect a minimum number of net counts (i.e., above background) for the following sources when scanned unshielded at the ANSI 42.46  $\frac{1}{2} H$  location.

Source	Nominal Activity <sup>5</sup>	Minimum Net Counts
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<sup>5</sup> Source activities must be within +/- 20% of nominal activities; and should be NIST traceable.



	[Ci = Curie, kBq = kilobecquerel]	[cps = counts per second]
<sup>241</sup> Am	47 µCi (1.74 MBq)	10 cps
<sup>57</sup> Co	5 µCi (185 kBq)	50 cps
<sup>133</sup> Ba	14 µCi (518 kBq)	100 cps
<sup>137</sup> Cs	16 µCi (592 kBq)	72 cps
<sup>60</sup> Co	7 µCi (259 kBq)	145 cps
<sup>252</sup> Cf	10 <sup>4</sup> n/s ± 20%	2.0 cps

### 13.14 Material Discrimination – High-Z (Attenuating Materials)

The FS-LSI Facility should compute and display the correct Material Discrimination – High-Z for an assembled mass of lead [100 mm x 200 mm x 50 mm].

## 14.0 DATA MANAGEMENT REQUIREMENTS

### 14.1 Administrator Rights

CBSA must be granted full "Administrator" rights to all *FS-LSI Facility* computer systems, servers and subsystems.

### 14.2 System Passwords

CBSA must be provided with a list of all user account types and passwords for all *FS-LSI Facility* computer systems, subsystems, servers and equipment.

### 14.3 Instrumentation Gateway (IGW) Server

The Contractor must provide a dedicated server (Dell R220 or better) mounted in the *FS-LSI Facility* network rack, to be used by CBSA as an Instrumentation Gateway (IGW), for reading and retrieving information of interest from the system data repositories.

14.3.1 The IGW server provided must have two Network Interface Cards

14.3.2 The IGW server provided must have Gb LAN connectivity

14.3.3 The IGW server provided must have Windows Server 2012 R2

14.3.4 The IGW server provided must have at least a 300 Gb hard drive, with RAID 1 mirroring

14.3.5 The IGW server provided must have at least 16 BG Ram

### 14.4 Unified Threat Management (UTM) Device

The Contractor must provide a Fortigate 80-C UTM device (no substitutes); mounted in the FS-LSI Facility network rack to be configured by CBSA for enable secure communications external systems.

### 14.5 CBSA Information of Interest

The *FS-LSI Facility* must capture all CBSA information-of-interest, including, but not limited to:

14.5.1 All scanning data, including, but not limited to: operator notes, camera images, gamma and neutron radiation detection data (raw detector counts).

14.5.2 All raw images (prior to any regularization or manipulation).

14.5.3 All operator manipulated images and those generated via the export of image tools specified in requirements below;

14.5.4 All system performance data, including hard drives and server health status.

14.5.5 All radiological safety system data.

14.5.6 All raw x-ray detector data

### 14.6 Provision of CBSA Information of Interest via Web-Service(s)

14.6.1 The *FS-LSI Facility* must employ a web-service(s) to enable automatic (or manual) discovery of the availability of new CBSA information-of-interest is available.

14.6.2 The *FS-LSI Facility* must employ a web-service(s) to enable automatic (or manual) retrieval and management (if required) of CBSA information-of-interest.

## **14.7 Data Compliance**

The *FS-LSI* datasets must be DHS-CPB N.25 compliant (version 1.5 or later), and must be in conformance with the National Information Exchange Model (NIEM) (version 2.1 or later).

## **14.8 IPv6 Compatible**

All networked systems must be IPv6 compatible.

## **14.9 Network Diagram and Communications**

The Contractor must provide a detailed network schematic of the *FS-LSI Facility* showing all lines of communication including IP addresses and communications programs.

## **14.10 Data Flow Chart**

The Contractor must provide a detailed data flow chart showing the generation, temporary storage and final storage of all files and database entries generated during the *FS-LS Imaging* process.

## **14.11 File Storage**

The *FS-LSI Facility* must employ a hard drive (minimum size of 1 TB) with a capacity sufficient to store all data (including all images) from a minimum of 1000 scans.

## **14.12 Hard Drive Protection**

All *FS-LSI Facility* computers, servers and hard-drives must have a minimum of RAID-1 mirroring redundant storage reliability.

## **14.13 Approaching Storage Limits**

When the maximum capacity of the file storage area is approached, the operating system or system application must display an informative plain language error message, and remain functional (not crash).

## **14.14 Automatic Data Housekeeping**

All housekeeping of data on the *FS-LSI Facility* is the responsibility of the Contractor and all data must be maintained for a period no less than 30 days.

## **14.15 Manual Data Housekeeping**

CBSA supervisors must have access to the file directory in which scanned data is saved for the purpose of copying and clearing this data manually as required.

## **14.16 Date and Time**

The *FS-LSI Facility* must incorporate a means for Network Time Protocol (NTP) synchronization. The NTP synchronization will enable the data and time to be displayed on the graphical interface and to stamp (register) on each image file.

This may be achieved by time synchronization with the CBSA Instrumentation Gateway, or by a manual method (note that *FS-LSI Facility* will not be granted any external access).

#### **14.17 Saving Images**

The *FS-LSI Facility* must automatically save scanned images using date and time of scan as storage and *retrieval* file name parameters.

#### **14.18 Export of Images**

It must be possible to export scan images, without distorting the aspect ratio, in the following standard formats: TIFF, JPEG, BMP.

#### **14.19 Export of Raw Image Data**

It must be possible to export raw image data for:

- 14.19.1 processing on a like system;
- 14.19.2 returning to the same system on which the original acquisition was captured; and/or
- 14.19.3 displaying on a remote workstation.

#### **14.20 Manual Retrieval of Scan Data**

It must be possible to export scan images and data files by copying and saving them to standard storage devices having USB-3 connectivity. Such devices must be automatically recognized by the operating system and made available for the movement of files without the need of special computer configuration.

#### **14.21 Additional Image Analysis Software**

The Contractor must provide a minimum of five (5) additional licenses for all software necessary for complete image review and analysis, for installation on CBSA computer systems.

#### **14.22 Export As FITS Images**

The *FS-LSI Facility* should enable export scan images, without distorting the aspect ratio, in the Flexible Image Transport System (FITS) format.

#### **14.23 Loading Manifest Information**

The *FS-LSI Facility* should be capable of loading electronic manifest information from a remote directory and associating it with the generated image dataset.

## 15.0 BUILDING REQUIREMENTS – CIVIL / SITE WORKS

### 15.1 SITE EARTHWORK

#### 15.1.1 References

Work must be in accordance with the requirements of the latest versions of the following codes, standards and to the requirements of authorities having jurisdiction. Where conflict occurs, the most stringent requirements will be applied.

- 15.1.1.1 ASTM D 698-91(1998), Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort 600 kN-m/m<sup>3</sup>
- 15.1.1.2 Canadian Environmental Assessment Act (CEAA), 1995, c.37.
- 15.1.1.3 Geotechnical Investigation
- 15.1.1.4 Civil Layout and Pavement design drawing
- 15.1.1.5 Transportation Association of Canada
  - 15.1.1.5.1 Geometric Design Guide for Canadian Roads
  - 15.1.1.5.2 Manual of uniform Traffic Control Devices for Canada
  - 15.1.1.5.3 Pavement Design and Management Guide
- 15.1.1.6 British Columbia Ministry of Transportation and Infrastructure 2009 Standard Specifications for Highway Construction (BC MoTI SS).
- 15.1.1.7 British Columbia Workers Compensation Act, R.S.B.C. 1996, c.492 and supporting Regulations. (BCWCA&R)

#### 15.1.2 Design and Performance Requirements

- 15.1.2.1 Site Grading
  - 15.1.2.1.1 Engage qualified Professional engineer to design site earthwork and all drainage.
  - 15.1.2.1.2 See Geotechnical report and topographical survey for existing conditions. Perform additional testing and survey as required.
  - 15.1.2.1.3 Geotechnical Report has indicated no contaminated soil is present. However, all contaminated soils removed under the buildings footprints must be removed and disposed of in accordance to the BC Contaminated Sites Regulations (BCCSR) and be replaced with suitable backfill in accordance with recommendations of geotechnical report. Unsuitable material is defined as being either: weak chemically unstable and compressible material, organic material, frost susceptible material, or any other material that would impede the proper performance of the building structure.
  - 15.1.2.1.4 Transition zones are required between differing sub-excavation grades.
  - 15.1.2.1.5 Sub-drains are required in bottom of excavations, unless otherwise noted

by geotechnical report or geotechnical engineer licensed to practice in the province of British Columbia.

15.1.2.2 Drainage and Erosion Control:

- 15.1.2.2.1 Engage qualified Professional Engineer to design site drainage and its discharge. As a minimum, comply with local Authority's storm water management requirements.
- 15.1.2.2.2 Grade to provide adequate surface drainage. Do not drain onto adjacent property or structures. Drain to adjacent ditches/natural runoffs from contours of the land or drain to new underground reservoir. Ensure adequate erosion control measures are designed and incorporated at discharge points
- 15.1.2.2.3 Slope grade away from building structures during grading operations.

15.1.2.3 Soil Stabilization, Slope Protection

- 15.1.2.3.1 Incorporate geotextile fabric to permit vegetation to take root on slopes where erosion will be too great for simple mulching techniques.
- 15.1.2.3.2 Slope swales and inclines to a maximum gradient of 1 in 3.
- 15.1.2.3.3 Desired pavement surface slopes are to be between 1% and 2%. Maximum permissible slope is not to exceed 3%. Minimum permissible slope not to be less than 0.5%. For building canopy areas, the design grade is to be from 1% to 2%.

15.1.3 Regulatory Requirements

- 15.1.3.1 Conform to applicable code for disposal of debris.
- 15.1.3.2 Undertake all work in full compliance with BCWCA&R

15.1.4 Submittals

- 15.1.4.1 Submit shop drawings and product data as required.
- 15.1.4.2 Shop Drawings: Required, with seal of Professional Engineer in the Province of British Columbia. Submit profiles, cross sections and quantities as well as disposal sites.
  - 15.1.4.2.1 Submit shop drawings for all precast concrete drainage items including associated iron works.
  - 15.1.4.2.2 Submit product data for underground pipes, fittings, and culverts.

15.1.5 Quality Assurance

15.1.5.1 General

- 15.1.5.1.1 Ensure work is performed in accordance with the Environmental Effects Assessment (EEA), included as an Appendix to Annex A, mitigation measures and applicable Provincial regulations. Submit environmental

mitigation measures in accordance with EEA.

15.1.5.1.2 All submittals to be sealed by Professional Engineer.

15.1.5.1.3 Submit Quality Assurance (QA) testing program for earthworks, including but not limited to sieve analysis, standard Proctor determination, on site compaction to ensure construction complies with design requirements. QA testing program must identify frequency and number of required testing to ensure full compliance with design. Ensure compliance with the QA Testing Program.

15.1.5.1.4 Provide all QA test results.

#### 15.1.6 Sustainability

15.1.6.1 Satisfy all sustainability requirements and provide Sedimentation Control Plan for control of runoffs.

#### 15.1.7 Source Quality Control

15.1.7.1 Installer/Supplier Qualifications:

15.1.7.1.1 Ensure precast manufacturer is certified to CSA A251.3.1

#### 15.1.8 Materials

15.1.8.1 Select Subgrade material to BC MoTI SS.

15.1.8.2 Engineered backfill to BC MoTI SS.

15.1.8.3 Approved Native Backfill: excavated site material, free of debris and/or deleterious substances, approved by professional Engineer for stock piling and/or re-use on site for its intended application.

#### 15.1.9 Excavation

15.1.9.1 Identify required lines, levels, contours, and datum.

15.1.9.2 Protect trees, shrubs, and lawns, remaining as a portion of final landscaping.

15.1.9.3 Protect above and below grade utilities which are to remain.

15.1.9.4 Excavate subsoil as required to accommodate pavement and site structures. Proof roll and remove all soft spots, or deleterious materials under the supervision of geotechnical engineer licensed to practice in British Columbia.

15.1.9.5 Machine cut banks and slopes.

15.1.9.6 Protect bottom of excavations and soil adjacent to and beneath foundation from frost.

15.1.9.7 In advance of excavation work, provide an Erosion Control and Sediment Plan, illustrating measures that will be in place during construction to prevent the spread of sediment, dirt and debris, and control surface erosion. Ensure at all times that measures specified in this Plan are in force and, as a minimum, verify the Plan provisions daily and if necessary, immediately repair or replace any measures damaged or not functioning. Provide daily log records confirming these activities are being done.

- 15.1.9.8 Remove surplus excavated material from site.
- 15.1.9.9 In cuts in bedrock, the roadbed must be subexcavated to 600mm below subgrade and on a plane parallel to subgrade cross-slope.
- 15.1.9.10 For roadways, provide subdrains or roadside ditches in accordance with BC MoTI SS and recommendations of Geotechnical Report/Engineer.
- 15.1.9.11 For building structures, provide subdrains in accordance with geotechnical Engineer's report recommendations.
- 15.1.10 Backfilling and Contouring
  - 15.1.10.1 Compact subgrade to density requirements for subsequent fill materials.
  - 15.1.10.2 Cut out soft areas of subgrade not capable of in-place compaction. Fill and compact with material recommended by geotechnical engineer licensed to practice in the province of British Columbia
  - 15.1.10.3 Backfill areas to required elevations.
  - 15.1.10.4 Systematically backfill to allow maximum time for natural settlement.
  - 15.1.10.5 Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
  - 15.1.10.6 Place and compact fill materials in continuous layers as per the recommendations of the geotechnical engineer, licensed to practice in the province of British Columbia. Do not backfill around or over cast-in-place concrete within 72 hours after placing of concrete, unless approved to do so by engineer licensed to practice in the province of British Columbia. Place layers simultaneously on both sides of installed Work to equalize loading.
  - 15.1.10.7 Contour finish grade. Make grade changes gradual. Blend slopes into areas. Ensure as-constructed grades are in conformance with design grades.
- 15.1.11 Quality Control
  - 15.1.11.1 Undertake Field Tests in accordance with Quality Assurance plan: perform compaction testing and analysis of fill materials. Submit copies of all test results.

## **15.2 PAVEMENT & ACCESSORIES**

- 15.2.1 References
  - 15.2.1.1 Work must be in accordance with the requirements of the latest versions of the following codes, standards and to the requirements of authorities having jurisdiction. Where conflict occurs, the most stringent requirements must apply.



- 15.2.1.1.1 British Columbia Ministry of Transportation and Infrastructure 2009 Standard Specifications for Highway Construction (BC MoTI SS).
- 15.2.1.1.2 British Columbia Workers Compensation Act, R.S.B.C. 1996, c.492 and supporting Regulations. (BCWCA&R)
- 15.2.1.1.3 Canadian General Standards Board (CGSB)
- 15.2.1.1.4 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric Series.
- 15.2.1.1.5 CAN/CGSB-16.3-M90, Asphalts for Road Purposes.
- 15.2.1.1.6 CAN/CGSB-1.74-2001, Alkyd Traffic Paint.
- 15.2.1.1.7 Canadian Standards Association (CSA)
- 15.2.1.1.8 CSA-A5-98, Portland Cement.
- 15.2.1.1.9 CSA-A23.1/A23.2-00, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
- 15.2.1.1.10 CSA-A23.4-00/A251-00, Precast Concrete – Materials and Construction/Qualification Code for Architectural and Structural Precast Concrete Products.
- 15.2.1.1.11 CSA G30.5-M1983(R1998), Welded Steel Wire Fabric Concrete Reinforcement.
- 15.2.1.1.12 CSA G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

#### 15.2.2 Design and Performance Requirements

- 15.2.2.1.1 Engage a qualified Professional Engineer to design pavement layout (alignment and grading) and structure, surface drainage and pavement markings. Pavement design must reflect the repetitive manoeuvring of trucks and the stationary requirements of parked vehicles in addition to the number of passes of design axles. The pavement design must support design weight vehicles moving and stationary without cracking, settlement, shoving or flow. All paving must be provided so that surface runoff drainage runs continuously to final storm water destination.
- 15.2.2.1.2 Design for vehicles as shown on civil drawing. Minimum width, radii and pavement structures are shown on the concept drawing. Verify and prove concept alignments. Design is to be based on provided concept design, do not deviate from indicated alignments unless approved by the Departmental Representative.
- 15.2.2.1.3 Where trenching is needed, full replacement of concrete panels between construction / expansion joints will be required, unless otherwise directed by PWGSC.
- 15.2.2.1.4 Design Minor storm drainage for 1 in 5 year storm event.
- 15.2.2.1.5 Design Major storm drainage for 1 in 100 year event.
- 15.2.2.1.6 Minimum size of storm sewer piping 200mm.
- 15.2.2.1.7 Minimum size of culverts 300mm.
- 15.2.2.1.8 Provide concrete walkways, curbs and gutters at locations as shown.
- 15.2.2.1.9 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.
- 15.2.2.1.10 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5m straight edge placed in any direction.
- 15.2.2.1.11 Ensure sidewalks have concrete curb/gutter.
- 15.2.2.1.12 Concrete Sidewalks, Curbs and Gutters: Finish surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface.
- 15.2.2.1.13 Granular Base and Granular Subbase: Finished surface to be within 10 mm of elevation as indicated but not uniformly high or low.
- 15.2.2.1.14 Pavement Markings designed to RTAC standards and materials to BC MoTI SS.

#### 15.2.3 Regulatory Requirements.

- 15.2.3.1.1 Conform to applicable code for disposal of debris.
- 15.2.3.1.2 Undertake all work in full compliance with BCWCA&R.
- 15.2.3.1.3 Ensure proper protection; signage, barriers, spatial separation, flagging, as required, is provided for pedestrian, vehicles, and workers is provided in accordance with BCWCA&R

#### 15.2.4 Submittals

##### 15.2.4.1 Shop drawings:

- 15.2.4.1.1 Identify roadway dimensions, elevations, gradients, profiles, and British Columbia.
- 15.2.4.1.2 Portland Cement concrete and asphaltic concrete mix designs to be approved by Registered Engineering Consultant for intended use and submitted.
- 15.2.4.1.3 Indicate layout pattern and relationship of concrete paving joints to fixtures and project formed details.

##### 15.2.4.2 Quality Assurance Submittals

- 15.2.4.2.1 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- 15.2.4.2.2 Test Reports: Submit certified test reports from independent testing laboratories indicating subgrade preparation conforms to levels and compaction for installation of granular base.
- 15.2.4.2.3 Geotechnical: Submit test reports for granular base, sub-base, asphalt and concrete paving.

#### 15.2.5 Quality Assurance

- 15.2.5.1.1 The Contractor must engage a civil engineering consultant registered in the Province of British Columbia to perform the above mentioned work.
- 15.2.5.1.2 The Contractor will provide engineering reports on the design and construction of the above mentioned works in addition to the design plans and specifications at the defined herein. These documents including approval certificates or letters from authorities having jurisdiction must demonstrate that engineering analysis has been done and all legislative and technical requirements mentioned above have been satisfied. Final reports must be stamped by a professional engineer licensed in British Columbia.
- 15.2.5.1.3 Construction Conformance Testing: Contractor is responsible to develop a construction advance material testing requirements; frequency, number, and schedule, to ensure supplied aggregates, paving, and concrete meet and adhere to design requirements. This program is to be prepared by and

administered by the professional Engineer licensed in province of British Columbia, responsible for the various design components.

#### 15.2.6 Materials

- 15.2.6.1.1 Paving Materials must satisfy BC MoTI SS and CSA- A23.1 Pavement Markings must satisfy BC MoTI SS and RTAC Standards
- 15.2.6.1.2 Granular Subbase: material in accordance with BC MoTI SS , type, thickness and compaction as per recommendations of Geotechnical Report.
- 15.2.6.1.3 Granular Base: material in accordance with BC MoTI SS , type, thickness and compaction as per recommendations of Geotechnical Report
- 15.2.6.1.4 Concrete properties in accordance with respective exposure classifications as defined within CSA-A23.1.
- 15.2.6.1.5 Construction details as per BC MoTI SS.
- 15.2.6.1.6 Precast concrete catch basins and manholes to BC MoTI SS.
- 15.2.6.1.7 Chain Link Fences and Gates: Nominal fence height for perimeter and seized vehicle compound 2.43 m.
- 15.2.6.1.8 Fence: Fabric Size: CLFMI Standard Industrial. Intermediate Posts: Round. Terminal, Corner, Rail, Brace, and Gate Posts: Round.
- 15.2.6.1.9 Fence Posts to be anchored in concrete per manufacturer's instructions. No Extension Arms at fence top. Gate Hardware: Shop/Factory Finish: Galvanized.

#### 15.2.7 Source Quality Control

##### 15.2.7.1 Installer/Supplier Qualifications:

- 15.2.7.1.1 Ensure precast manufacturer is certified to CSA A251.3.1

#### 15.2.8 Installation.

- 15.2.8.1 Install paving and accessories in accordance with Engineer's written instructions, product data, reference standards and authorities having jurisdiction.

#### 15.2.9 Field Quality Control.

##### 15.2.9.1 Engineer's Services:

- 15.2.9.1.1 Ensure Engineer's representative reviews work involved in handling, installation/application, protection and cleaning of products. Submit written reports, in acceptable format, to verify compliance of Work with contract.
- 15.2.9.1.2 Engineer's site review: Provide Engineer's site review consisting of product use recommendations and periodic site visits for inspection of product

installation in accordance with Engineer's instructions.

15.2.9.1.3 Obtain report, within 3 days of review, and submit immediately.

15.2.9.2 Verification:

15.2.9.2.1 Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

15.2.9.2.2 Submit reports from independent testing firm certifying material gradation and compaction results for paving course from licensed engineer.

15.2.9.2.3 Submit reports from independent testing firm certifying material gradation, asphalt cement extraction and compaction results for flexible pavement from licensed engineer.

15.2.9.2.4 Submit reports from independent testing firm certifying concrete results for rigid pavement and accessories from licensed engineer in accordance to CSA-A23.2.3.3.

15.2.10 Site Flood Test

15.2.10.1 Perform a site flood test to confirm water runoff drains as designed and to identify standing areas and ponding on green areas.

15.2.11 Cleaning

15.2.11.1 Clean installed products

## 15.3 STORM DRAINAGE

15.3.1 References

15.3.1.1 Work must be in accordance with the requirements of the latest versions of the following codes, standards and to the requirements of authorities having jurisdiction. Where conflict occurs, the most stringent requirements must apply.

15.3.1.1.1 Master Municipal Construction Documents (MMCD) Platinum Edition Sections 01 57 01; 03 20 01; 03 30 53; 31 05 17; 31 23 01; 31 23 17; 33 01 30.1; 33 11 01, and Standard Detail Drawings

15.3.1.1.2 Civil Drawings in Appendices

15.3.2 Design and Performance Requirements

15.3.2.1 The Equipment Enclosure area is overtop an existing storm drain pipe. The drain pipe must be relocated outside of the building envelope such that the new foundation and pipe are sufficiently distant from each other so that the pipe can be maintained or replaced in the future without affecting the stability of the building's foundation. Gravity service connections are to be provided as needed for roof drainage, foundation drains, the wash-down facility, and area drains.

15.3.2.2 Newly installed drain pipe must be video-inspected in accordance with accepted standards. Where defects or obstructions are encountered, the pipe will be

repaired and / or flushed as required. The pipe must be re-videoed to confirm that the problem has been remedied.

- 15.3.2.3 Site storm water storage and attenuation will not be required. An oil/grit/water separator sufficient in size and operation to treat expected waste from the wash-down facility to a standard acceptable to the City of Surrey is to be designed and constructed.

## 15.4 SANITARY SEWER

### 15.4.1 References

- 15.4.1.1 Master Municipal Construction Documents (MMCD) Platinum Edition Sections 01 57 01; 03 20 01; 03 30 53; 31 05 17; 31 23 01; 31 23 17; 33 01 30.1; 33 11 01, and Standard Detail Drawings
- 15.4.1.2 Civil Drawings in Appendices

### 15.4.2 Design and Performance Requirements

- 15.4.2.1 The FS-LS Imaging Enclosure area is located overtop of an existing sanitary sewer forcemain. The forcemain is to be relocated outside of the building envelope such that the new foundation and forcemain pipe are sufficiently distant from each other so that the pipe can be maintained or replaced without affecting the stability of the building's foundation. A minimum clear separation of 3.0m is to be maintained between watermain and sewer main pipes.
- 15.4.2.2 The newly installed forcemain must be pressure tested per requirements of the pipe manufacturer's specifications.
- 15.4.2.3 A gravity service connection is to be provided from the new building to either a nearby gravity main or directly to the existing sewer pump station located just east of the new building. The service is to serve one unisex washroom located in the building. Pump station operation is not to be interrupted.

## 15.5 POTABLE WATER

### 15.5.1 References

- 15.5.1.1 Master Municipal Construction Documents (MMCD) Platinum Edition Sections 01 57 01; 03 20 01; 03 30 53; 31 05 17; 31 23 01; 31 23 17; 33 01 30.1; 33 11 01, and Standard Detail Drawings
- 15.5.1.2 Civil Drawings in Appendices

### 15.5.2 Design and Performance Requirements

- 15.5.2.1 Provide a water pressure booster pump (dual pumps set) system if required to ensure sufficient water pressure at the most hydraulically remote fixture. Pumps must be constructed of materials suitable for use in potable water systems application
- 15.5.2.2 The FS-LS Imaging Enclosure area is located overtop an existing watermain. The watermain is to be relocated outside of the building envelope such that the new foundation and pipe are sufficiently distant from each other so that the pipe can be maintained or replaced without affecting the stability of the building's foundation. A minimum clear separation of 3.0m is to be maintained between

watermain and sewer main pipes.

- 15.5.2.3 The relocated watermain is to be 150mm diameter or as otherwise determined by a professional engineer licensed in British Columbia. Connection of the relocated pipe cannot be made to the existing water service to the existing Warehouse building unless that service is minimum 150mm diameter.
- 15.5.2.4 Water service to existing buildings is to be maintained at all times, or as otherwise agreed to by PWGSC.
- 15.5.2.5 A water service is to be sized and constructed to serve the new building. The service is to serve one unisex washroom located in the building, as well as a hose bib for the washdown facility. The hose bib is to be protected against backflow contamination with a Reverse Pressure Backflow Preventer.
- 15.5.2.6 All newly constructed watermain and appurtenances are to be pressure tested, leakage tested, flushed, and disinfected all to applicable AWWA Standards.
- 15.5.2.7 Superchlorinated water must not be discharged to the sanitary sewer. Superchlorinated water must not be discharged to the storm drain or other water course until it has been dechlorinated to meet Ministry of Environment and Federal Fisheries requirements.
- 15.5.2.8 After disinfection and final flushing, the newly installed watermain and appurtenances must be tested by a qualified testing facility for the presence of bacteria. Test results are to meet or exceed current limits per Canadian Drinking Water Standards prior to putting the newly installed works into service.

## **15.6 ELECTRICAL AND COMMUNICATIONS**

### **15.6.1 References**

- 15.6.1.1 Section 6.0 BUILDING REQUIREMENTS – ELECTRICAL
- 15.6.1.2 Trenching: City of Surrey Design and Engineering Specifications
- 15.6.1.3 Civil Drawings in Appendices

### **15.6.2 Design and Performance Requirements**

- 15.6.2.1 Ducts are to extend from the new building to the existing pull boxes on the north side of the Warehouse Building.
- 15.6.2.2 All underground conduits are to be Rigid PVC. Directional drilling may be used if less disruptive and is economically feasible.
- 15.6.2.3 Use Type 1 Portland Cement for concrete encasement; minimum 28 Mpa at 28 days. Encasement to be designed with steel reinforcing bars.
- 15.6.2.4 Underground service boxes are to be cast-in-place, or A.E Precast Concrete Products Ltd, 4040 Service Box or approved equal. Box covers to be steel checker plate, rated for H20 loading. Shop drawings are to be submitted.
- 15.6.2.5 All ducts to drain to the new service boxes. New service boxes must be drained to the nearest convenient storm drain.

## **16.0 BUILDING REQUIREMENTS – ARCHITECTURAL**

### **16.1 REFERENCES CODES AND STANDARDS**

16.1.1 Work must be in accordance with the requirements of the latest versions of the following codes, standards and to the requirements of authorities having jurisdiction. Where conflict occurs, the most stringent requirements must apply.

- 16.1.1.1 National Building Code of Canada
- 16.1.1.2 National Energy Code of Canada for Buildings (latest ed.)
- 16.1.1.3 CAN/CSA-B651 – Barrier-Free Design.
- 16.1.1.4 National Fire Code, Latest Edition.
- 16.1.1.5 NFPA – National Fire Protection Association.
- 16.1.1.6 Canada Labour Code – Part 2
- 16.1.1.7 ASTM – American Society for Testing and Materials.
- 16.1.1.8 AWMAC – Architectural Woodwork Manufacturers Association of Canada.
- 16.1.1.9 CSDFMA – Canadian Steel Door and Frame Manufacturer's Association.
- 16.1.1.10 CGSB – Canadian General Standards Board.
- 16.1.1.11 CRCA – Canadian Roofing Contractors Association.
- 16.1.1.12 CSA – Canadian Standards Association.
- 16.1.1.13 NAAMM – National Association of Architectural Metal Manufacturers.
- 16.1.1.14 NHLA – National Hardwood Lumber Association.
- 16.1.1.15 ULC – Underwriters Laboratories of Canada.
- 16.1.1.16 Any other applicable codes, standards and regulations

### **16.2 GENERAL ARCHITECTUAL REQUIREMENTS**

- 16.2.1 The FS-LSI Facility must provide for adequate clearance for circulation, fire truck access, and snow removal pedestrian traffic all around perimeter and normal imaging operations.
- 16.2.2 The FS-LSI Facility must include adequate physical protection (bollards, crash barriers, railings) external and internal to safeguard accidental damage to the facility by target objects.
- 16.2.3 The FS-LSI Control Room must be directly attached or integrated within the FS-LS Imaging Enclosure.
- 16.2.4 Unless otherwise secured by the FS-LS Imaging Enclosure, wall roof and flooring must be constructed as a secured wall to CBSA requirements with 12 gauge expanded sheet metal in 20 gauge metal stud walls, concrete blocks filled with high strength grout, or equivalent.
- 16.2.5 Contractor must provide a Site Plan showing the proposed facility overlaid with the existing facility and topographic survey.



16.2.6 Contractor must verify the adequacy of traffic and truck turning radii represented in the Conceptual Design to suit the largest truck going through the facility.

16.2.7 The FS-LSI Control Room must allow natural light to come into the room.

16.2.8 The Contractor must provide an entrance canopy to prevent ice and snow build up.

## **16.3 BUILDING MATERIALS**

### **16.3.1 Approval of Materials**

16.3.1.1 The following sections outline minimal requirements for materials where applicable. The Contractor has the option to submit alternatives for approval by the Departmental Representative.

16.3.1.2 All buildings must be of non-combustible construction.

### **16.3.2 Concrete Floors**

16.3.2.1 Concrete floor hardener must be applied to all exposed concrete floors and must be slip resistant and have high abrasion and impact resistance to withstand frequent wheeled traffic with high point loading. It must also be resistant to chemicals related to regular snow and ice removal.

16.3.2.2 Hardener must be applied in accordance with CSA-A23.1-94, Concrete Materials and Methods of Concrete Construction.

16.3.2.3 Floor Hardener to be non-metallic, premixed, aggregate type, dry shake surface hardener, cement to hardener ratio 2 to 1, colour selected from manufacturer's standard colour range.

### **16.3.3 Masonry**

16.3.3.1 Complete any masonry work in accordance with the latest edition of the following standards:

16.3.3.1.1 CSA A179-04: Mortar and Grout for Unit Masonry

16.3.3.1.2 CSA-A370-04: Connections for Masonry

16.3.3.1.3 CSA-A371-04: Masonry Construction for Buildings

16.3.3.1.4 CSA-S304.1-M84: Design of Masonry Structures

16.3.3.1.5 CSA A165 Series-04: Concrete Masonry Units

16.3.3.1.6 CSA G30.18 M92: Billet-Steel Bars for Concrete Reinforcement

### **16.3.4 Mortar and Grout**

16.3.4.1 Mortar and grout for masonry to CSA A179-94.

### **16.3.5 Reinforcement and Connectors**

16.3.5.1 Bar reinforcement: to CSA A371 and CSA G30.18.

16.3.5.2 Wire reinforcement: to CSA A371.

- 16.3.5.3 Connectors: to CSA A370 and CSA S304
- 16.3.5.4 Corrosion protection: to CSA S304 and CSA-A370 – stainless steel.
- 16.3.5.5 Connectors for masonry to be stainless steel.

#### 16.3.6 Accessories

- 16.3.6.1 Control joint filler: Purpose-made elastomer, to ASTM D2240 of size and shape required.
- 16.3.6.2 Weep hole vents: Purpose-made PVC, designed to drain cavities to exterior.

#### 16.3.7 Concrete Masonry Units

- 16.3.7.1 Standard concrete block units: to CAN-CSA-A165 Series (CSA-A165.1)
  - 16.3.7.1.1 Classification: H/15/D/M.
  - 16.3.7.1.2 Size: Modular.
- 16.3.7.2 Provide bull nose units at exposed corners
- 16.3.7.3 Jointing: Concave where exposed or where paint or similar thin finish coating is specified.

#### 16.3.8 Metal Fabrications

- 16.3.8.1 Reference Standards:
  - 16.3.8.1.1 Do welding work in accordance with CSA W59-1989.
  - 16.3.8.1.2 Steel sections and plates: to CSA G40.20/G40.21-98, Grade 300W.
  - 16.3.8.1.3 Steel pipe: to ASTM A53/A53M-01, standard weight, schedule 40, seamless black.
  - 16.3.8.1.4 Welding materials: to CSA W59-1989.
  - 16.3.8.1.5 Bolts and anchor bolts: to ASTM A307-00.
  - 16.3.8.1.6 High strength bolts: to ASTM A325M-00.
  - 16.3.8.1.7 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m2 to CAN/CSA G164-M92.
  - 16.3.8.1.8 Shop Coat Primer: to CAN/CGSB-1.40-M97 Anticorrosive Structural Steel Alkyd Primer.
  - 16.3.8.1.9 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181-99 Ready-Mixed Organic Zinc Rich Coating.
  - 16.3.8.1.10 Isolation coating: alkali resistant bituminous paint or zinc chromate prime coat to CAN/CGSB-1.108M89 Bituminous Solvent Type Paint.
  - 16.3.8.1.11 Apply one shop coat of primer to metal items, with exception of galvanized

or concrete encased items.

16.3.8.1.12 Galvanize exterior metals after fabrication.

#### 16.3.9 Millwork

16.3.9.1.1 All millwork must be custom grade as listed in the Quality Standards for Architectural Woodwork published by the Architectural Woodwork Manufacturers Association of Canada (AWMAC).

16.3.9.1.2 Provide custom millwork for the Control Centre to house all control and monitoring equipment including but not limited to the multi-analyst workstations, video monitoring and video display boards.

16.3.9.1.3 All millwork must have sound ergonomics to suit the tasks of the operators. Installed millwork must have lockable drawers and casework with secured cylinders as well as shelving for storage of documents for its daily operation. Provide in washroom vanity storage under the sink for storage of cleaning material and toilet supplies.

#### 16.3.10 Sheet Membrane/Air Vapour Barrier

16.3.10.1 Application: General requirement for building envelope work.

16.3.10.2 Modified bitumen, pressure/heat sensitive compound, self-adhering, thermofusible type or adhesive applied type, reinforced with polyethylene or glass scrim, nominal thickness of 40 mils.

16.3.10.3 Air leakage:  $<0.01 \text{ L/s} \cdot \text{m}^2$  @ 75 Pa to ASTM E283-91

16.3.10.4 Water vapour permeance:  $2.8 \text{ ng/Pa} \cdot \text{m}^2 \cdot \text{s}$  (0.05 perms) to ASTM E96

16.3.10.5 Low temperature flexibility:  $-30^\circ\text{C}$  to CGSB 37-GP-56M Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing

#### 16.3.11 Exterior Treatment / Finishes

16.3.11.1.1 FS-LS Imaging Enclosure exterior treatment must complement the existing Commercial Warehouse Building. The exterior palette includes aluminum framed windows/curtain walls and composite aluminum cladding.

16.3.11.1.2 All canopies over all doors must be clad in composite aluminum panels, with metal fascias and soffits.

16.3.11.1.3 The Contractor must submit to the Departmental Representative duplicate copy of a material, colour and pattern board to illustrate exterior and interior materials, quality, finish, colours and workmanship, for review and approval.

#### 16.3.11.2 Exterior Glazing

16.3.11.2.1 Provide Clear Microlayered Safety and Security Window Film to exterior glazing using 3M Ultra S600 or approved equal.

16.3.11.2.2 All exterior glazing must be uPVC or fiberglass and have minimum RSI

0.45 (R 2.57), SHGC 0.4, insulated frame, Low E soft coating, warm edged spacer, argon or krypton fill, hermetically seal units. Both panes must be tempered, minimum 6mm thick.

16.3.11.2.3 Provide glass break detectors to all exterior windows.

#### 16.3.12 Fastenings

- 16.3.12.1 Provide metal fastenings and accessories in same texture, colour and finish as base metal in which they occur. Prevent electrolytic action between dissimilar metals. Use hot dipped galvanized, corrosion resistant metal filled polymer coating, or stainless steel fasteners, anchors and spacers for securing exterior work.
- 16.3.12.2 Space anchors within limit of load bearing or shear capacity and ensure that they provide positive permanent anchorage.
- 16.3.12.3 Conceal fasteners where possible. Space evenly and layout neatly. Do not utilize fastenings, which cause spalling, or cracking.
- 16.3.12.4 Use fastenings of standard commercial sizes and patterns. Provide fasteners of material and finish suitable for service.
- 16.3.12.5 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- 16.3.12.6 Bolts may not project more than one diameter beyond nuts.
- 16.3.12.7 Use plain type washers on equipment. Use sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.
- 16.3.12.8 Exposed fastening devices to match finish of hardware. Use fasteners compatible with material through which they pass.

### 16.4 BUILDING ENVELOPE

#### 16.4.1 Design and Performance Requirements

- 16.4.1.1 The building envelope must be designed according to the rain screen principle as defined by the National Research Council. Any cladding must provide for an efficient barrier against rain penetration. Special detailing must allow for pressure equalization and drainage of the cavity behind the cladding. The design is to incorporate as many means as possible to shed water away from the wall surfaces.
- 16.4.1.2 The building envelope design must meet the latest National Energy Code of Canada for Buildings (NECB) and the National Building Code for thermal insulation, wind, water, air barrier and vapor protection.
- 16.4.1.3 The building envelope design must maintain continuity of air and vapor seals, particularly at intersections of walls, roofs, and openings. Air barrier and vapor retarders may consist of single materials used in combination or singly in an assembly, resulting in an air impermeable, structurally adequate barrier. Materials must be capable of resisting wind loads, building mechanical system pressures, other loads acting either as a pressure or suction (positive or negative) without

rupturing or breaking away from its support.

16.4.1.4 Avoid penetrating through building envelope air barrier. Where penetrations are necessary, maintain the integrity of the air barrier using suitable materials, methods and trades people approved by building envelope contractor.

16.4.1.5 Repair building envelope at all locations where envelope has been penetrated as a result of removal and/or relocation of existing equipment, piping, ductwork, conduit, cable, wiring, etc. in a manner approved by building envelope contractor.

#### 16.4.2 Thermal Protection

16.4.2.1 Insulation values listed in this document refers to the "effective" insulation value. All nominal values for insulation must meet or exceed referenced levels.

16.4.2.2 For roof insulation, see Roofing System

16.4.2.3 Provide mechanically fastened insulation in perimeter void of window/door frames.

##### 16.4.2.4 Wall Insulation

16.4.2.4.1 Provide insulation in thickness as required to obtain effective RSI 3.87 (R 22)

16.4.2.4.2 Extruded polystyrene: to CAN/CGSB-51.20-M87 Thermal Insulation, Polystyrene, Boards and Pipe Covering and CAN/ULC-S701, Type 3

16.4.2.4.3 Sprayed Urethane Foam Insulation (walls): to CAN/CGSB-51.23.92 Spray-Applied Rigid Polyurethane Cellular Plastic Thermal Insulation.

##### 16.4.2.5 Foundation Insulation

16.4.2.5.1 Extruded polystyrene, to CAN/CGSB-51.20-M87, Type 4; ship lapped edges.

16.4.2.5.2 Permanently protect exposed insulation from sunlight and physical damage with parging applied on lathe. Parging to extend 600 mm below finished grade.

16.4.2.5.3 Provide insulation in thickness as required to obtain RSI 3.87 (R 22)

#### 16.4.3 Composite Aluminum Cladding

16.4.3.1 Cladding must ensure water, snow and ice sheds from exterior surfaces and are not trapped in the assembly to cause deterioration and do not cause staining of finishes.

##### 16.4.3.2 Components of System

- 16.4.3.2.1 Composite Panels: two sheets of aluminum sandwiching a resin compound core formed in a continuous process with no applied glues or adhesives; complying with ASTM E 108 requirements modified to suit product requirements.
- 16.4.3.2.2 Face Sheets: 0.020 inch (0.5 mm) thick, alloy 3105 H25.
- 16.4.3.2.3 Core: Thermoplastic resin core (PE); flame spread index of 15 or less, smoke developed index of 120 or less, when tested in accordance with ASTM E 84 or CAN/ULC-S102.
- 16.4.3.2.4 Bond Integrity: Minimum of 40 inch-lb/inch, in accordance with ASTM D 1781 and ASTM C 481, Cycle B.
- 16.4.3.2.5 Thickness: 0.157 inch (4 mm).
- 16.4.3.2.6 Finish: Fluoropolymer coating utilizing 70 percent Kynar 500 resins, factory coil-applied on continuous process line, using single color coil paint run for entire project.
- 16.4.3.2.7 Solid Color Coating: Colorweld 300, consisting of 0.20 mil (0.005 mm) prime coat and 0.80 mil (0.02 mm) finish coat; minimum 1.0 mil (0.025 mm) nominal dry film thickness.
- 16.4.3.2.8 Extrusions: aluminum, ASTM B 221, alloy suitable for intended purpose.
- 16.4.3.2.9 Formed Members, Sheet, and Plate: aluminum, ASTM B 209, and as recommended by panel manufacturer.
- 16.4.3.2.10 Flashings: 0.063 inch (1.6 mm) minimum thickness aluminum sheet; where exposed, painted to match adjacent metal framing or panel system.
- 16.4.3.2.11 Sealants and Gaskets; Exposed and Within Panel System: Comply with panel manufacturer's requirements.
- 16.4.3.2.12 Exposed Fasteners: Stainless steel, or as recommended by panel manufacturer.
- 16.4.3.2.13 Concealed Fasteners: Climaseal coated, stainless steel, or as recommended by panel manufacturer.
- 16.4.3.2.14 Anchors: Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

#### 16.4.4 Sustainable Design

- 16.4.4.1 Coatings and adhesives with the lowest VOC and materials with the highest recycled content must be selected.

## 16.5 ROOFING SYSTEM

### 16.5.1 Application

Applicable to all roofs.

### 16.5.2 Quality Assurance

- 16.5.2.1 The FS-LSI Facility roofing must meet or exceed applicable Roofing Contractors Association of British Columbia (RCABC) standards and manufacturer's instructions / recommendations with 10 year guarantee.
- 16.5.2.2 The Contractor must provide a minimum 20-year roofing system guarantee by manufacturer with material coverage with comprehensive, no-dollar limit liability; "edge-to-edge" system coverage including membrane, insulation and metal. Any dispute must be submitted at local jurisdiction and not anywhere outside of Canada.
- 16.5.2.3 The roof covering must have a minimum Class A classification, in accordance with the current National Building Code of Canada, Subsection 3.1.15.2.(1).

### 16.5.3 Membrane

- 16.5.3.1 High performance 2 ply SBS modified bitumen roofing system installed to manufacturer's specifications to meet warranty requirements.
- 16.5.3.2 Capsheet must have a minimum solar reflectivity index (SRI) of 86 in accordance with the Cool Roof Rating Council (CRRCC) program.
- 16.5.3.3 Meets or exceeds ASTM D6162, CSA A123.21-10, FM 4470, CGSB 37.56-M, ULC-S107.
- 16.5.3.4 Acceptable Product: Soprema Sopraply Base 520 with Traffic Cap 560 and Sopraply HDGR or approved equal.

### 16.5.4 Insulation

- 16.5.4.1 Extruded polystyrene: to CAN/CGSB-51.20-M87 Thermal Insulation, Polystyrene, Boards and Pipe Covering and CAN/ULC-S701, Type 4.
- 16.5.4.2 Total effective RSI value to be minimum of 7.04.
- 16.5.4.3 Insulation to be installed in at least two layers with staggered joints.
- 16.5.4.4 Provide protection board between insulation and membrane to prevent adherence of insulation to membrane.
- 16.5.4.5 Any roof hatches must be insulated. Thermal insulation value must be no less than RSI 3.52(R20).

## 16.6 DOORS AND FRAMES

### 16.6.1 Application

Exterior and interior steel doors, interior wood doors, steel frames, sectional metal insulated overhead doors, when specified.

### 16.6.2 Alternative Materials

Where radiation requirements conflict with material selection, submit alternative to Departmental Representative for approval.



### 16.6.3 References

- 16.6.3.1 NFPA 80-1999 Fire Doors and Windows.
- 16.6.3.2 NFPA 252-1995: Fire Tests of Door Assemblies.
- 16.6.3.3 ASTM A 366/A 366M-91(1993) Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.
- 16.6.3.4 ASTM A 653/A 653M-95 Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
- 16.6.3.5 CAN4/ULC-S104-M80 (R1985), NFPA 252-1990: Fire Tests of Door Assemblies.
- 16.6.3.6 CAN/ULC-S105-M85 (R1992) Fire Door Frames.
- 16.6.3.7 CAN/CSA-G40.20-M92 General Requirements for Rolled or Welded Structural Quality Steel.
- 16.6.3.8 CAN/CGSB-1.40- M97 Anticorrosive Structural Steel Alkyd Primer.
- 16.6.3.9 CAN/CGSB-1.181-99 Ready-Mixed Organic Zinc-Rich Coating.
- 16.6.3.10 CAN/CGSB 51-GP-21M Thermal Insulation, Urethane and Isocyanurate, Unfaced.
- 16.6.3.11 CAN/CGSB-12.1-M90 Tempered or Laminated Safety Glass.
- 16.6.3.12 Canadian Steel Door Manufacturers Association (CSDMA): Dimensional Standards for Commercial Steel Doors and Frames.
- 16.6.3.13 National Association of Architectural Metal Manufacturers (NAAMM); Hollow Metal Manufacturers' Association (HMMA): NAAMM/HMMA 840 Installation Guide for Commercial Steel Doors and Frames

### 16.6.4 Number of doors

At a minimum, one man door must be provided at each end of facility.

### 16.6.5 Steel Doors and Frames

- 16.6.5.1 Exterior doors to be insulated steel construction, 1.2 mm thick sheet steel, commercial grade, flush, 4.45 cm thick. Insulating materials may not contain CFC based blowing agents.
- 16.6.5.2 Exterior frames to be thermally broken, constructed of 1.6 mm thick welded pressed steel.
- 16.6.5.3 Interior door frames to be 1.6 mm thick welded pressed steel frame.
- 16.6.5.4 Door and frame materials and construction by a manufacturer currently listed as a member of CSDFMA.
- 16.6.5.5 All portions of steel doors and steel frames to be painted.

### 16.6.6 Aluminum Doors, Windows and Frames

- 16.6.6.1 This section includes: aluminum punched windows, doors, curtain wall (storefront) windows, clerestory windows and spandrel panels.
- 16.6.6.2 Windows: to CAN/CSA-A440.2-04/A440.3-04: Energy Performance of Windows and Other Fenestration System.



- 16.6.6.3 Provide complete exterior window enclosures including frames and sealed glazing units, including seals to air/vapour membranes.
- 16.6.6.4 All windows to be supplied by same manufacturer.
- 16.6.6.5 All exterior windows must match building glazing systems including sealed glazing units, tint and colour.
- 16.6.6.6 Test Reports: Submit test reports for exterior windows and storefront entrance from independent testing laboratories, certifying compliance with specifications, for: Air leakage, Water leakage, Wind load resistance, condensation resistance
- 16.6.6.7 Windows to be aluminum type designed on rain screen principle with pressure equalized and drained glazing pockets.
- 16.6.6.8 Windows to withstand dead and live loads caused by pressure and suction of wind, acting normal to plane of system as calculated in accordance with NBC.
- 16.6.6.9 Horizontal members must withstand worst condition of glass gravity loading with deflection not to exceed 3 mm.
- 16.6.6.10 Grid members must have a resistance to heat transfer equal to or better than that of the area along the bottom of the glass units.
- 16.6.6.11 Windows to prevent water infiltration into the building under design wind loads.
- 16.6.6.12 Windows to prevent condensation forming on any interior surfaces of the aluminum members before any of the exposed area of the sealed glazing units reaches the dew point temperature.
- 16.6.6.13 Windows framing system to accommodate expansion and contraction with respect to thermal and structural movement.
- 16.6.6.14 Through-joints at windowsills, heads, jams and interconnections must not be used. Reliance on caulking for weatherproofing is not acceptable.
- 16.6.6.15 Windows must maintain continuity of air and vapour seals as part of wall construction.
- 16.6.6.16 Classification Rating: to CAN/CSA-A440
- 16.6.6.16.1 Air leakage: Fixed
- 16.6.6.16.2 Water leakage: B7
- 16.6.6.16.3 Wind load resistance: C5
- 16.6.6.16.4 Condensation resistance: I69
- 16.6.6.17 Main Frame and Sash: Insulated, thermally broken exterior doors and frames complete with hardware, weather-stripping and glazing.
- 16.6.6.18 Aluminum extrusions: conforming to ASTM B221M, 6063-T5 alloy, AAMA/NWWDA 101/I.S.2.
- 16.6.6.19 Sheet aluminum: must be 5005 alloy, temper as required, minimum 3 mm thick.
- 16.6.6.20 Core: Insulation manufactures standard.
- 16.6.6.21 Finishes

16.6.6.21.1 Finish exterior exposed surfaces of aluminum components with PPG Duranar fluoropolymer coating.

16.6.6.21.2 Finish interior exposed surfaces of aluminum components with PPG Polycron III polyester resin coating.

16.6.6.22 Sills Accessories

16.6.6.22.1 Sills, exterior: extruded aluminum of type and size to suit job conditions. Minimum 3 mm thick, complete with joint covers, jamb drip deflectors, chairs, anchoring devices. Sill to be positively sloped away from window.

16.6.6.22.2 Sills, interior: Anodized aluminum where windows extend to floor, plastic laminate covered plywood at all other locations.

16.6.6.22.3 Trim and facings: brake formed aluminum of type and size to suit job conditions.

16.6.6.23 Sealants

16.6.6.23.1 Refer to the Sealant section.

## 16.7 HARDWARE

### 16.7.1 Application

Applicable to doors specified.

### 16.7.2 Approval of Materials

16.7.2.1 Provide hardware schedule and specifications for approval of Departmental Representative.

### 16.7.3 Regulatory Requirements

Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

### 16.7.4 References

16.7.4.1 Provide door hardware complying to ANSI/BHMA Standards, of heavy duty institutional grade 1 rating supplemented by additional requirements specified herein.

16.7.4.2 When specified standard does not exist, the hardware item must be specifically made to suit the specific function, be heavy duty designed for institutional applications and have been proven in use.

16.7.4.3 ANSI/BHMA: American National Standards Institute and Builders Hardware Manufacturers Association – Standards for the manufacturing and testing of finish door hardware.

16.7.4.4 DHI: Door and Hardware Institute of Canada

16.7.4.5 NBC-2005, National Building Code of Canada

16.7.4.6 ANSI/BHMA A156.1-2000, Butts and Hinges

- 16.7.4.7 ANSI/BHMA A156.3-2001, Exit Devices
- 16.7.4.8 ANSI/BHMA A156.4-2000, Door Controls (Closers)
- 16.7.4.9 ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products
- 16.7.4.10 ANSI/BHMA A156.13-2005, Mortise Locks and Latches
- 16.7.4.11 ANSI/BHMA A156.18-2000, Materials and Finishes
- 16.7.4.12 ANSI/BHMA A156.19-2002, Power Assist and Low Voltage Energy Power Operated Doors
- 16.7.4.13 CSA B651-04, Accessible Design for the Built Environment

#### 16.7.5 Design and Performance Requirements

- 16.7.5.1 Use products from one manufacturer for all similar items.
- 16.7.5.2 Equip each door with all required door hardware as recommended by DHI best practices and ANSI/BHMA standards to:
  - 16.7.5.2.1 Allow proper functioning and operation of door to suit building use;
  - 16.7.5.2.2 Comply with applicable codes having jurisdiction and barrier free requirements of CSA B651;
  - 16.7.5.2.3 Meet building user's operational and security requirements.
- 16.7.5.3 Door Hardware Minimum Requirements
  - 16.7.5.3.1 Locksets and latchsets: mortised type for all doors to ANSI A156.13, series 1000, heavy duty grade 1, designed for function as stated in Hardware Schedule and having 19 mm latch bolt throw and 25 mm deadbolt throw and as follows:
  - 16.7.5.3.2 Trim Design: lever design, solid handle contoured C shape angle return.
  - 16.7.5.3.3 Provide rectangular escutcheons with concealed tamperproof fasteners on secure doors as identified by Departmental Representative. Round roses is suitable for most doors.
- 16.7.5.4 Card Access: Provide proximity card system that integrates with existing Keyscan System in the adjacent Warehouse Building.
- 16.7.5.5 Electromagnetic Locks: not permitted.
- 16.7.5.6 Cylinders (for locksets, exit devices and other locks): 6 pin minimum mortised unit, high security pick proof and drill resistant in accordance with UL 437 standard, restricted and registered keyway, suitable for master keying and grandmaster keying all buildings of project into one system for entire site. Cylinder must match the ones installed in the Commercial Warehouse Building.
- 16.7.5.7 Finish: stainless steel on exterior and humid areas.
- 16.7.5.8 Butts and hinges: to ANSI/BHMA A156.1, minimum 2 ball bearing type for all doors, 4 ball bearing type or continuous hinge on heavy weight and high use

doors, size and number of hinges per door to suit door type.

16.7.5.8.1 Provide non removable pins on all out-swinging doors.

16.7.5.9 Electric Hinge: heavy duty high quality grade, long life, maintenance free hinge as proven in use, concealed switch or monitoring device purposely suited as required to function with electrical or electronically operated hardware item.

16.7.5.10 Surface mounted or exposed power transfer armored door loop devices are not acceptable.

16.7.5.11 Electric strike: to ANSI/BMHA A156.5 and A156.31, heavy duty grade 1, mortised design, and as follows:

16.7.5.11.1 All stainless steel body and parts, tamper resistant, minimum opening force resistance of 10.7 KN, tested to meet 2,000,000 cycles of operation.

16.7.5.11.2 Function: fail secure type for most locations; fail safe type in conditions where the locking device is locked on both sides of door and does not provide immediate free egress except by key. Use fail safe only when directed by Departmental Representative.

16.7.5.11.3 Voltage: to suit access control system.

16.7.5.11.4 Monitoring: Latch bolt and strike monitor option as deemed required to suit building security system

16.7.5.11.5 Provide stainless steel protective lock guard plate with tamper proof through-bolt fasteners for all exterior strikes and for interior strikes where security or detention may be compromised.

16.7.5.12 Door Closers and door control devices: to ANSI/BHMA A156.4, heavy duty grade 1, fully adjustable from size 1 to 5 to meet all barrier free conditions, complete with arms and brackets as required.

16.7.5.13 Power Operated Door Operator: to ANSI/BHMA A156.19, heavy duty grade, designed for high use and exterior windy conditions when applicable.

16.7.5.14 Power supply shut-off switch for exterior and vestibule doors to be done by key switch master keyed into the building's keying system.

16.7.5.15 Exit Devices: to ANSI/BHMA A156.3, heavy duty grade 1, modern design push pad, of function as stated in schedule, exterior trim when specified to be lever of same design to match locksets, equipped with breakaway feature, all dogging of push pad when specified to be done by cylinder dogging, all exterior and interior vestibule doors and high use doors to have stainless steel 630 finish.

16.7.5.16 Protective Plates: Provide kick plate, mop plate or armour plate as recommended by DHI best practises for application on doors of vestibules, corridors, washrooms and other doors subject to damage.

16.7.5.17 Sound Seals: for STC rated rooms and other locations as determined by Departmental Representative:

16.7.5.18 Jamb & Head Gasketing: commercial quality, adjustable type, neoprene gasket, suitable design to achieve STC rating.

16.7.5.19 Bottom Seal: automatic drop seal, recessed into rebated door edge, adjustable with felt insert for carpet areas and over thresholds, neoprene insert for sheet or smooth surface flooring.

16.7.5.20 Threshold: extruded aluminum, barrier free design of maximum 12 mm height.

#### 16.7.6 Keying

16.7.6.1 Doors to be keyed differently, master-keyed and grandmaster-keyed such that all buildings of this project are tied into one keying system. Prepare a detailed keying schedule in conjunction with the Departmental Representative prior to proceeding with keying.

16.7.6.2 Provide two (2) keys for every lock in this Contract. Provide two (2) keys for every Master-key groups for the Grandmaster-key.

16.7.6.3 Construction keying: perimeter doors of all buildings to be controlled by a temporary key system during construction.

16.7.6.4 Supply 3 copies of construction keys to Departmental Representative for his use.

16.7.6.5 Restrict distribution and control of other copies of construction key to limited personnel as approved by Departmental Representative.

16.7.6.6 Stamp keying code on keys and cylinders barrels. Do not stamp codes on cylinder face.

16.7.6.7 Turn over all final cut keys, complete with keying schedule as one package, directly to Departmental Representative.

16.7.6.8 Supply key control system complete with lockable key box, control tags and register. Size system to be expanded by 50% in future.

#### 16.7.6.9 Installation Instructions

16.7.6.9.1 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

16.7.6.9.2 Furnish manufacturers' instructions for proper installation of each hardware component.

16.7.6.9.3 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.

#### 16.7.7 Quality Control

16.7.7.1 Coordinate the supply and installation of door hardware with the building security system and with the electrical door access control system being provided by other subcontractors on project.

16.7.7.2 Ensure use of correct locking function and appropriate electric strike on doors equipped with proximity card readers.

16.7.7.3 Provide all labour as required to assist in the installation of security door control access system and ensure that no operational conflicts exists between the door hardware and the access control system.

- 16.7.7.4 Schedule of Hardware Sets: see Schedule of Hardware Sets and Conceptual Architectural Drawings for door type and locking function.
- 16.7.7.5 Develop door hardware schedule following BHMA standard practices and format.

## **16.8 BUILDING INTERIOR**

### **16.8.1 Metal Studs**

- 16.8.1.1 All metal studs should be minimum 92 mm 22 gauge metal studs.

### **16.8.2 Gypsum Board**

- 16.8.2.1 All interior gypsum finishes must be GA-214 Level 4.
- 16.8.2.2 All washroom gypsum must be water resistant board: to ASTM C 630 (reference was CAN/CSA A82.27), regular, 12.7 mm thick, 1200 mm wide x maximum practical length.

### **16.8.3 Acoustic Insulation**

- 16.8.3.1 Application: All interior walls.
- 16.8.3.2 Acoustic Batt Insulation to: CAN/ULC-S702-97; Mineral Fibre Thermal Insulation in Buildings, (Type 1-unfaced).

### **16.8.4 Resilient Flooring**

#### **16.8.4.1 Application**

- 17.8.4.1.1 Control Centre and ancillary areas.

#### **16.8.4.2 General Requirement**

- 16.8.4.2.1 To meet Ecologo CCD 152 D
- 16.8.4.2.2 Pattern and colour: to be selected by the Departmental Representative from a standard range.
- 16.8.4.2.3 All FS-LSI Control Room flooring must be Linoleum, 100 mm rubber base.

### **16.8.5 Suspended Acoustic Ceiling Tiles**

- 16.8.5.1 Application: Control Centre and washroom.
- 16.8.5.2 General Requirement

- 16.8.5.2.1 Suspension system: to ASTM C635-91, exposed grid system, heavy duty main tee, intermediate cross tee.
- 16.8.5.2.2 Install suspension system in accordance with ASTM C636; panels in accordance with Canadian Acoustical and Insulating Materials Association.
- 16.8.5.2.3 Finish: flat white to match acoustic panels.
- 16.8.5.2.4 System to be complete with angle-shaped wall moulding, hangers and accessories as required for complete system.
- 16.8.5.2.5 Maintenance material: 2% full length support grid.
- 16.8.5.2.6 Suspension system and acoustical panels to be from one manufacturer.
- 16.8.5.2.7 Maximum deflection of suspended acoustical ceiling assembly: 1/360th of span to ASTM C635 deflection test.
- 16.8.5.3 Typical Acoustical tiles
  - 16.8.5.3.1 To CAN/CGSB-92.1-M89 Sound Absorption Prefabricated Acoustical Units, non-combustible, mineral fibre, square edge, minimum NRC 0.65, minimum CAC 35 and minimum light reflectance 75%.
  - 16.8.5.3.2 Size: 610 mm x 1220 mm
  - 16.8.5.3.3 Maintenance material: two (2) cartons.
- 16.8.5.4 Washroom Acoustical tiles
  - 16.8.5.4.1 to CAN/CGSB-92.1-M89 Sound Absorption Prefabricated Acoustical Units, non-combustible, vinyl faced mineral fibre, square edge, minimum NRC 0.65, minimum CAC 35 and minimum light reflectance 75%.
  - 16.8.5.4.2 Size: 610 mm x 1220 mm
  - 16.8.5.4.3 Maintenance material: one (1) carton.

## **16.9 PAINTING**

- 16.9.1 Application: Exterior and interior painting.
- 16.9.2 Follow Master Painters and Decorators Association of British Columbia (MPDABC) recommendations and procedures as listed in the MPDABC Architectural Painting Specification Manual for surfaces evaluation, surface preparation and paint application.
- 16.9.3 Select suitable paints following the MPI finish coating and formulae numbering system. Use only paint materials, including primers, as listed in the latest issue of the Approved Products List (APL) as published by Master Painters Institute.



- 16.9.4 Select specific paint coatings for various exterior and interior substrate applications which are categorized as durable and excellent commercial/industrial grade quality by MPI. Use 3 paint coats, stipulated as "Premium Grade" in the MPI finishing system, for all coating applications. However, number of paint coats specified above to be considered minimum requirements. Use appropriately tinted primers, particularly when dark colours are selected, and apply sufficient number of finish coats to fully hide substrate and provide uniform paint colour and finish.
- 16.9.5 Use only qualified products which are "Environmentally Friendly", rated at minimum E2 and preferably E3, by MPI and which are water-borne or have the lowest possible VOC content without compromising quality and performance of the finish coating. Where several products meet the environmental rating specified, use one which has highest environmental characteristics but that does not compromise quality and performance.
- 16.9.6 Where special painting, coating or decorating system applications (example: elastomeric coatings) are to be used, paint or coating manufacturer must provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on-site supervision and approval of their paint or coating system application as required at no additional cost to the Departmental Representative.
- 16.9.7 Submittals:
- 16.9.7.1 Submit manufacturer's technical product data for each primer and paint product proposed for use. The submittal must include the following:
  - 16.9.7.2 Product name, type and use.
  - 16.9.7.3 Manufacturer's product number.
  - 16.9.7.4 Colour numbers.
  - 16.9.7.5 MPI Environmentally Friendly classification system rating.
  - 16.9.7.6 Manufacturer's Material Safety Data Sheets (MSDS).
  - 16.9.7.7 Installation and application instructions.
  - 16.9.7.8 Submit manufacturer's full range colour sample chips to Engineer for colour selection and development of room colour chart prior to commencement of painting operations.
  - 16.9.7.9 Upon request provide proof, by means of purchase orders, invoices, receipts or other documents, that paint materials are supplied from those listed in MPI – Approved Product List.
- 16.9.8 Application:
- 16.9.8.1 Stringently follow paint manufacturer's instructions and recommendations on suitable temperature, humidity and substrate moisture content levels and other stipulated environmental conditions for application of their paints.
- 16.9.9 Qualifications:
- 16.9.9.1 Paint Contractor must have a minimum of five years proven satisfactory experience. When requested, provide a list of last three comparable jobs including, job name and location. Use only qualified journeymen who have a "Tradesman Qualification Certificate of Proficiency". Apprentices may be



employed provided they work under the direct supervision of a qualified journeyman in accordance with trade regulations.

#### 16.9.10 Standard of Acceptance

- 16.9.10.1 Walls: No defects visible from a distance of 1000 mm at 90 degree to surface.
  - 16.9.10.2 Ceilings: No defects visible from floor at 45 degree to surface when viewed using final lighting source.
  - 16.9.10.3 Paint all metal work as required in Section 3.0 – Metal Fabrications
  - 16.9.10.4 Paint steel doors and frames as required in Section 13.0 – Steel Doors and Frames.
  - 16.9.10.5 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.
- 16.9.11 Disposal: Paint and related materials (thinners, solvents, etc.) are regarded as hazardous products and are subject to regulations for disposal. Treat leftover materials as hazardous waste; handle and dispose of in accordance with governing regulations. Where paint recycling is available, collect waste paint materials by type and deliver to recycling facility.

### 16.10 WASHROOM ACCESSORIES

16.10.1 Application: Required accessories in washroom.

#### 16.10.2 General Requirement

- 16.10.2.1 Accessories: commercial quality; stainless steel construction. Products to be of the same manufacturer as the other facilities. Provide all applicable items for the washroom.
- 16.10.2.2 Toilet paper dispensers: double roll type, surface mounted, stainless steel.
- 16.10.2.3 Feminine napkin disposals: stainless steel, continuous hinged door, self-closing, surface mounted.
- 16.10.2.4 Mirrors: sheet mirror to CAN/CGSB-12.5-M86 Mirrors, Silvered, Type 1A; one-piece, full width of counter top x 5 mm thick; complete with concealed stainless steel mounting clips and butyl tape. Maximum tolerance permitted from edge of wall is 13 mm on each side.
- 16.10.2.5 Soap dispensers: one hand operation, maximum force of 22.2 N to dispense soap, minimum 1.0 litre capacity.
- 16.10.2.6 Mounting: lavatory or countertop mounting. Ensure that mounting location in no manner obstructs for under-counter soap container refill.
- 16.10.2.7 Waste receptacle: free standing, heavy gauge or reinforced stainless steel, removable galvanized steel or plastic waste receptacle, minimum waste capacity 45 litres.
- 16.10.2.8 Paper towel dispenser: professional hard roll hand towel dispenser.
- 16.10.2.9 Robe hook : stainless steel, two in each of the water closet.

16.10.3 Ensure adequate support in walls for accessories.

16.10.4 Ensure wall framing is installed to accept fully recessed units.

## **16.11 MISCELLANEOUS SPECIALTIES**

16.11.1 Application: Required traffic signal, signage and marking.

16.11.2 Traffic Signal, Signage and Pavement Marking

16.11.2.1 Supply and install

16.11.2.1.1 Height clearance bar, stop signs, pavement markings, directional signs and stop/go traffic signal must be provided at FS-LS Imaging Enclosure entrance and exit.

16.11.2.1.2 Emergency system signage, for both enclosures.

16.11.2.1.3 Signage related to the use of the equipment.

16.11.2.1.4 Building identification signage.

16.11.2.1.5 Signage related to maintenance requirements.

16.11.2.1.6 All signage is to be bilingual (English and French). Signage formatting must be as per FIP.

## **17.0 BUILDING REQUIREMENTS – STRUCTURAL**

### **17.1 DESIGN CERTIFICATION BY PROFESSIONAL ENGINEER**

- 17.1.1 The structural system for this facility must be certified by a Professional Engineer licensed to practice in British Columbia in conformance with all federal, provincial and municipal laws and regulations. The design must conform to the National Building Code and all of the referenced codes, standards and guidelines contained therein.

### **17.2 REFERENCE DRAWINGS AND DOCUMENTS**

- 17.2.1 Work must be in accordance with the requirements of this section and must also be coordinated with the requirements of the other disciplines.

### **17.3 GENERAL STRUCTURAL REQUIREMENTS**

- 17.3.1 Refer to architectural performance requirements for a description of the design intent.
- 17.3.2 The structural system for this facility must be designed by a Structural Engineer licensed to practice in British Columbia in conformance with all federal, provincial and municipal laws and regulations.
- 17.3.3 The structural system for the Pacific Highway Port of Entry is to meet design loading requirements and compliance with current National Building Code and Canadian Highway truck loading.
- 17.3.4 The structural system must minimize the building self-weight, lowering the seismic forces as well as concentrated load for footings.
- 17.3.5 Ground floor slab must be temperature and shrinkage steel reinforced
- 17.3.5.1 Design of floor slab should be based on
- 17.3.5.1.1 System equipment static and dynamic loading
- 17.3.5.1.2 Dynamic loading to accommodate traffic volumes of 40 highway trucks per hour, travelling at less than 10 km per hour.
- 17.3.5.1.3 Static loading from commercial trucks temporarily parked during examinations.
- 17.3.5.2 Elevation of floor slab must be grade or above. No running water into the building. Smooth transition of traffic from compound apron into the building.
- 17.3.5.3 Coordinate with floor drains for snow, rain water or cleaning.
- 17.3.6 Floor and Roof Framing Systems
- 17.3.6.1 If metal deck on open web steel joists (OWSJ) system is selected, the OWSJ depth needs to be deeper than the minimum requirements to allow secondary ducts to pass through the joists. All metal deck, joists, beams and columns need to have fire proofing to meet required ratings. Steel decking is mechanically fastened to the joists and beams rather than welding, allowing work to be completed in all weather conditions.

### 17.3.7 Lateral Load –Resisting System

- 17.3.7.1 Seismic and wind forces must be resisted by one or more of the following systems which transfer the forces to the foundation with defined load paths – flexible roof diaphragm, structural steel braces and/or shear walls.

- 17.3.8 Considerations must be taken to support system equipment, such as anchorage requirements.

- 17.3.9 The Contractor may rely on the Geotechnical Report prepared by Stantec Consulting Inc. dated April 25, 2013 attached in Appendix solely for information pertaining to existing soil conditions on site. The Contractor at his own initiative may rely on the interpretations and adopt the recommendations contained therein for his own benefit and at his own risk. The Contractor must retain Stantec Consulting Inc. or any other consulting firm, at his own expenses, to develop a comprehensive strategy for foundation works, including but not limited to additional investigation if necessary, design and field review of work. Provide Professional Engineer's Letters of Assurance. It should be noted the neighbouring warehouse building was recently designed and built on piles.

## **18.0 BUILDING REQUIREMENTS – MECHANICAL**

### **18.1 REFERENCE CODES, STANDARDS AND GUIDELINES**

18.1.1 The mechanical systems for this facility must be certified by a licensed Professional Engineer in conformance with all federal, provincial and municipal laws and regulations and must conform to the latest edition or revision of the codes and standards of the following technical associations and organizations:

- 18.1.1.1 AABC – American Air Balance Council
- 18.1.1.2 AMCA – Air Moving and Conditioning Association
- 18.1.1.3 ANSI – American National Standard Institute
- 18.1.1.4 ASHRAE – American Society of Heating, Refrigeration and Air Conditioning Engineers
- 18.1.1.5 ASME – American Society of Mechanical Engineers
- 18.1.1.6 ASTM – American Society for Testing and Materials
- 18.1.1.7 ARI – Air Conditioning and Refrigeration Institute
- 18.1.1.8 CSA – Canadian Standards Association
- 18.1.1.9 CGSB – Canadian General Standards Board
- 18.1.1.10 MSS – Manufacturers Standard Society of the Valve and Fittings Industry
- 18.1.1.11 NBC – National Building Code
- 18.1.1.12 NFC – National Fire Code
- 18.1.1.13 Model National Energy Code of Canada for Buildings
- 18.1.1.14 NFPA – National Fire Protection Association
- 18.1.1.15 NPC – National Plumbing Code
- 18.1.1.16 NRC – National Research Council of Canada
- 18.1.1.17 SMACNA – Sheet Metal and Air Conditioning Contractors National Association Inc.
- 18.1.1.18 TIAC – Thermal Insulation Association of Canada
- 18.1.1.19 ULC – Underwriter's Laboratory of Canada
- 18.1.1.20 CSA 446M-94
- 18.1.1.21 ARI 325 & 330
- 18.1.1.22 CEPA 2008-197
- 18.1.1.23 CSA B139

### **18.2 REFERENCE DRAWINGS AND DOCUMENTS**

Design must be based on the information contained in this specification and data sheets.  
Design must also be coordinated with Site Services, Structural/Architectural, Electrical and Building Automation System specifications, data sheets and drawings.

### **18.3 SITE SERVICES MECHANICAL**

The Mechanical work will be inclusive within the building up to 1.5 meters of the outside wall.

### **18.4 GENERAL MECHANICAL REQUIREMENTS**

- 18.4.1 The Contractor must include all design, documentation, labour, materials and equipment required for design, installation, testing and commissioning of mechanical systems as detailed in all sub-sections of this Mechanical Performance Specification.
- 18.4.2 The Contractor must ensure that the systems designed and constructed can be adjusted, repaired and overhauled by means of general purpose tools with minimum removal or disruption of other elements. Ease-of-maintenance provisions must be incorporated to ensure good clearance and accessibility to equipment and functioning parts.
- 18.4.3 Existing Conditions: Investigate site, existing adjacent building and local conditions affecting work under this specification, including: location, routing and depth of site services from the civil/municipal engineer including sanitary sewer, storm sewer, and watermain. Permits and Regulations: Obtain all regulatory permits and pay all fees for performing the work based on the approved final engineering drawings.
- 18.4.4 Review approved drawings with the Departmental Representative and authorities having jurisdiction to ensure compliance with all applicable codes and bylaws. Supply design calculations upon request of Departmental Representative to verify that project requirements are satisfied.
- 18.4.5 Install concealed pipes and ducts neatly, close to building structure so furring is minimum size. Make provisions for thermal expansion and contraction in piping systems. Pipes, ducts and equipment installed improperly, to be removed and replaced without cost to PWGSC.
- 18.4.6 Provide metal nameplate on each piece of equipment, mechanically fastened complete with raised or recessed letters. Indicate system served, size, capacity and equipment rating. Identify piping to CAN/CGSB-24.3-92 Identification of Piping Systems, identify medium by lettered legend classification, with primary and secondary colours and direction of flow arrows. Ductwork to have 50 mm stencilled letters and direction arrows.
- 18.4.7 Access Doors
  - 18.4.7.1 Supply access doors to concealed mechanical equipment for operating, inspecting, adjusting and servicing.
  - 18.4.7.2 Access doors must match surrounding surface in aesthetics and insulation value.
  - 18.4.7.3 Sized according to access requirements.
  - 18.4.7.4 Roof mounted mechanical equipment is permissible where lockable access is be provided.
- 18.4.8 Equipment Drains
  - 18.4.8.1 Pipe to floor drains, with cleanouts for easy cleaning.

### **18.5 ELECTRIC MOTORS, DRIVES AND WIRING**

- 18.5.1 Provide electric motors for all equipment supplied in this section in compliance with Canadian Electrical Code requirements; and must be inverter-duty rated as applicable.
- 18.5.2 All electric motors supplied must be capable of being serviced locally.
- 18.5.3 All three phase motors must have a service factor of 1.15 times nominal rated horsepower of the motor.
- 18.5.4 Motors 0.75 kw (1 hp) and larger must be high efficiency motors as defined and tested to CSA C390 or IEEE 112B Standards. Motors 0.37 kw (0.5 hp) and over, to be 575 V/3ph/60 Hz unless specified otherwise. Motors under 0.37 kw to be 120V/1ph/60 Hz.
- 18.5.5 All motors must be inverter duty rated.
- 18.5.6 All motors using variable frequency drive devices must be rated for such use.
- 18.5.7 Belt drives to match motor and driven equipment. Vibration not to exceed nameplate rating of motor. Drive motor to be adjustable and allow for alignment.
- 18.5.8 Provide guards for unprotected drives.
- 18.5.9 Provide protection for fan inlets or outlets.
- 18.5.10 Equipment Supports
  - 18.5.10.1 Employ equipment supports typically supplied by equipment manufacturer.

## **18.6 THERMAL INSULATION**

- 18.6.1 Thermal insulation systems must be provided for all mechanical systems, including domestic water, hydronic heating and cooling, refrigerant piping, and ductwork, in accordance with ASHRAE 90.1.

## **18.7 PLUMBING & MISCELLANEOUS PIPING SYSTEMS**

- 18.7.1 Complete plumbing, fixtures and rough-in piping, to service one (1) only unisex washroom for staff use only, two hose-bibbs for the washdown of floors within the Equipment Enclosure, and drainage systems to handle sanitary, storm and run-off loads.
- 18.7.2 Provide one non-freezing lockable exterior hose bib.
- 18.7.3 All plumbing will be to the latest requirements of the National Plumbing Code of Canada 2010 and the Province of British Columbia Plumbing Code 2012 .
- 18.7.4 All fixtures will be designed for low water usage.
- 18.7.5 Floor drains must be provided in the FS-LS Imaging Enclosure for regular washing with hose bibbs, washrooms, janitor's rooms, mechanical rooms, including trap primers (where required), and floors sloped to the drains. Floor drains serving the FS-LS Imaging Enclosure to be connected to an oil interceptor, prior to discharging to the storm sewer system.
- 18.7.6 Provide trench drains at the entrance and exit to the FS-LS Imaging Enclosure.

18.7.7 Provide roof drains and connect to the storm sewer system.

18.7.8 The proposed heating source of domestic water heating consists of instantaneous water heaters. Provide one (1) to serve unisex washroom.

#### 18.7.9 Materials - Plumbing

The following product listing is not intended to be an exhaustive list/specification of the plumbing and miscellaneous piping components required, but represents the minimum standards that the Contractor must satisfy, exceed and supplement to achieve a complete functional system.

##### 18.7.9.1 Piping: Domestic Water

18.7.9.1.1 For above ground applications within the building, the domestic cold water piping must be copper tube, hard drawn, type L: to ASTM B88M. Fittings must be cast copper, solder type in accordance to ANSI B16.18, or wrought copper and/or copper alloy in accordance to ANSI/ASME B16.22.

18.7.9.1.2 For underground applications, the domestic cold water piping must be copper tube, soft annealed, type K, or PEX piping, in long lengths with no buried joints.

##### 18.7.9.2 Joints:

18.7.9.2.1 Solder must be lead-free.

18.7.9.2.2 Teflon tape must be applied for threaded joints.

18.7.9.2.3 Dielectric connections between dissimilar metals must have dielectric unions/flanges complete with thermoplastic fiber sleeve & washer/gasket.

##### 18.7.9.3 Gate Valves:

18.7.9.3.1 NPS 2 and under soldered gate valves: complete with rising stem in accordance with MSS SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc.

18.7.9.3.2 NPS 2 and under screwed gate valves: complete with rising stem in accordance with MSS SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc.

##### 18.7.9.4 Globe Valves:

18.7.9.4.1 NPS 2 and under soldered globe valves: complete with rising stem in accordance with MSS SP-80, Class 125, 860 kPa, bronze body, renewable composition disc. Lockshield handles must be used where applicable.

18.7.9.4.2 NPS 2 and under screwed globe valves: complete with rising stem in accordance with MSS SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc. Lockshield handles must be used where applicable.

##### 18.7.9.5 Swing Check Valves:

18.7.9.5.1 NPS 2 and under soldered swing check valves: in accordance with MSS



SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat.

18.7.9.5.2 NPS 2 and under screwed swing check valves: in accordance with MSS SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat.

18.7.9.6 Ball Valves:

18.7.9.6.1 NPS 2 and under soldered ball valves: rated for 4,150 kPa , bronze body, chrome plated brass ball, Teflon seat, steel lever handle, with soldered connections.

18.7.9.6.2 NPS 2 and under screwed ball valves: rated for 4,150 kPa, bronze body, chrome plated brass ball, Teflon seat, steel lever handle.

18.7.9.7 Piping and Fittings: Copper DWV

18.7.9.7.1 For above ground applications inside the building, sanitary (including condensate drains), storm and vent piping, must be type DWV in accordance with ASTM B306. Fittings must be cast brass in accordance with CAN/CSA B125, or wrought copper fittings in accordance with CAN/CSA B125. Solder fittings must be lead free in accordance with ASTM B32.

18.7.9.8 Cast Iron Piping and Fittings:

18.7.9.8.1 For above ground applications inside the building, storm and vent piping must be in accordance with CAN/CSA-B70. Mechanical joints must be neoprene or butyl rubber compression gaskets with stainless steel clamps.

18.7.9.9 PVC Piping and Fittings:

18.7.9.9.1 For buried service, ABS-DWV pipe and fittings must be in accordance with CAN/CSA-B181.1, or PVC-DWV pipe and fittings accordance with CAN/CSA-B181.2. Solvent weld joints must be in accordance with ASTM D2235 for ABS, and ASTM D2855 for PVC.

18.7.9.10 Plumbing Fixtures and Trims, Plumbing Specialties:

- 18.7.9.10.1 Fixtures must be manufactured in accordance with CAN/CSA-B45 series. Trim and fittings must be manufactured in accordance with CAN/ CSA-B125. Exposed plumbing brass to be chrome plated. Fixtures to be the product of one manufacturer and of the same type. Trim in any location to be the product of one manufacturer and of the same type. Reference CAN/CSA-B651-M95 Barrier Free Design.
- 18.7.9.10.2 Backflow Prevention: double check valve assembly, reduced-pressure principle backflow preventers, hose connection vacuum breakers, full port resilient seated ball or gate valves, valve test cocks: bronze construction, 1200 kPa rated.
- 18.7.9.10.3 Floor Drains: drains in traffic areas to have heavy duty cast iron grates with dura-coated cast iron body and clamp.
- 18.7.9.10.4 Drains in washrooms to be cast iron body and clamp collar, polished nickel bronze strainer head with grate c/w trap primer connection
- 18.7.9.10.5 Water Hammer Arrestors: all stainless steel construction with internal bellows and 19 mm NPT connection.
- 18.7.9.10.6 Lavatories: counter-top porcelain on steel, self-rimming, with front overflow, semi-oval, supply openings 200mm OC, chrome plated supply and waste fittings, mixing spout, waterless pop up waste, aerator, indexed metal blade handles. Colour white
- 18.7.9.10.7 Janitor's Room Sinks: Terrazo mop service basin, 900 x 600 mm, 250 mm high walls, combination dome strainer and stainless steel lint basket, colour indexed metal handles with integral stops, top brace spout, vacuum breaker, hose thread outlet.
- 18.7.9.10.8 Water Closets – Standard: vitreous china, floor mounted, low consumption, elongated rim, pressure-assisted siphon jet flush action, moulded solid plastic open front seat without cover, stainless steel hinges and solid brass post inserts. Colour white.
- 18.7.9.10.9 Hose Bibbs (interior): interior, 20 mm hose connection, bronze body, wheel handle, integral vacuum breaker assembly.
- 18.7.9.10.10 Non-Freeze Wall Hydrant: outdoor, 20 mm hose connection, non-freezing, encased type, wall hydrant, bronze head and valve, and integral vacuum breaker assembly. Nickel bronze box with hinged access cover and lock, minimum 3 keys with each wall hydrant.
- 18.7.9.10.11 Roof Drains: epoxy coated cast iron body, with combination membrane flashing clamp/gravel guard and metal dome, waterproof flange, under deck clamp, size 300 mm.
- 18.7.9.10.12 Clean Outs: epoxy coated cast iron body with integral anchor flange, adjustable combined access cover and plug with gasket seal. Unfinished areas with ductile iron cover and plug.

18.7.9.10.13 Trap Seal Primers: automatic trap primer, all bronze body with integral vacuum breaker, non-liming internal assembly with gasketed bronze cover.

18.7.9.10.14 Expansion Tank: carbon steel tank shell, polypropylene liner, heavy-duty butyl diaphragm, stainless steel system connection, 380 kPa pre-charge pressure.

18.7.9.10.15 Domestic hot water heater: wall mounted instantaneous (tankless) water heater, vent (as required), electronic controls, adjustable thermostats, pressure and temperature relief valve. Provide drains as required by code and local authorities.

18.7.9.11 Escutcheons:

18.7.9.11.1 On pipes passing through walls, partitions, floors and ceilings in finished areas: Chrome or nickel-plated brass or Type 302 stainless steel, one-piece type with set screws. Outside diameter to cover opening or sleeve, inside diameter to fit around finished pipe.

18.7.10 Installation

18.7.10.1.1 Locate so that concealed items are accessible.

18.7.10.1.2 Locate so that hand or body entry (as applicable) is achieved.

18.7.11 Painting

18.7.11.1 Prime and touch up marred finished paintwork to match original.

18.7.11.2 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

18.7.12 Vibration Isolation Seismic Control Measures

18.7.12.1 Provide vibration devices such as elastomeric pads /mounts, spring mounts and hangers as required to control equipment generated vibration.

## **18.8 FIRE PROTECTION**

18.8.1 Portable Fire Extinguishers:

18.8.1.1 Type A, B, C, rechargeable canister type, mounted in hose cabinets wherever feasible, with wall mounting enclosure, clear front, mounting hardware and signage. In compliance with NFPA 10.

18.8.2 Automatic Fire Sprinklers

18.8.2.1 Design, supply, and install the sprinkler system for the FS-LS Imaging Enclosure, Operator Enclosure in conformance with the fire protection system protecting the site, and in compliance with NFPA, NBC, and BCBC

## **18.9 HVAC AND EXHAUST SYSTEMS**

18.9.1 All HVAC systems must meet the Federal Halocarbons Regulations and be CFC and HCFC free.

18.9.2 Any exterior equipment should be visually screened to match adjacent finishes.

#### 18.9.3 FS-LS Imaging Enclosure

18.9.3.1 The FS-LSI Facility must actively exhaust all pollutants introduced by examining trucks and large conveyances. Ventilation must be provided to maintain safe environmental conditions when vehicles are driven in and out of the building; vehicle engines are turned off while stationary (i.e. the vehicle will not idle).

18.9.3.2 The FS-LSI Facility must employ a monitoring system for pollutants related to transport systems (e.g., CO, CO<sub>2</sub>, NO & NO<sub>2</sub>) to ensure levels to below safe limits.

18.9.3.3 The FS-LSI Facility must maintain the minimum ventilation rates necessary to satisfy the "Indoor parking requirements" codes.

18.9.3.4 Ductwork must be galvanized steel. Exhaust grilles will be located to efficiently collect any exhaust contaminants.

18.9.3.5 The FS-LSI Facility must maintain a temperature at least three (3) degrees Celsius above the dew-point temperature, under all conditions, so that condensation and(or) ice does not form on any of the surfaces inside the enclosure.

18.9.3.6 The FS-LSI Facility must maintain a maximum temperature below 40 degrees C.

#### 18.9.4 FS-LSI Control Room

18.9.4.1 Must be capable of energy efficient heating, ventilating and cooling, to maintain operator's space temperature set point between 20°C and 24°C under all conditions.

18.9.4.2 Filtration efficiency to be MERV 08 or higher.

##### 18.9.4.3 FS-LSI Server Room

18.9.4.3.1 Must be capable of removing heat from the electronic equipment racks and ancillary equipment.

18.9.4.3.2 Must maintain positive pressure at all times relative to adjacent rooms

18.9.4.3.3 Filtration efficiency to be MERV 11 or higher.

### 18.10 IN-SLAB HEATING

18.10.1 FS-LS Imaging Enclosure must include a properly rated in-slab radiant heating system to melt snow and maintain the internal temperature of the enclosure.

### 18.11 ENERGY MANAGEMENT & CONTROL SYSTEM (EMCS)

#### 18.11.1 Site Integration

18.11.1.1 The control system must interface with and connect to an existing site LAN network.

#### 18.11.2 Remote Monitoring and Control

- 18.11.2.1 The system must be capable of controlling and remotely monitoring the performance of the added systems, and ensure proper sequence of operation under different conditions (normal occupied mode, unoccupied mode, emergency conditions, loss of power, fire, disaster conditions, smoke etc.).
- 18.11.2.2 The system must allow the remote adjustment of set points, and trend logging of all monitored points.

## **18.12 TESTING, ADJUSTING, AND BALANCING (TAB)**

- 18.12.1 The Contractor must conduct TABs on all operating and life-safety systems in order to verify installation, ensure safety and optimize performance in compliance with contractual and design requirements. Systems include but are not limited to: safety devices, air systems, water systems, and control instrumentation.
- 18.12.2 The Contractor must engage a company who is a registered member of Associated Air Balance Council (AABC) to conduct TABs; the final report must bear seal and certification number.
- 18.12.3 The Contractor must coordinate sequence of operation of all systems with reference to the Building Automation System Specification.
- 18.12.4 The Contractor must submit one copy of the TAB Report to the Departmental Representative for verification and approval prior to execution. The Contractor must detail proposed methodology and procedures for performing TAB if different from referenced standard.
- 18.12.5 The Contractor must initiate a TAB only when construction is essentially completed including: installation of ceilings, doors, windows, and other construction affecting results.

## **19.0 BUILDING REQUIREMENTS – ELECTRICAL**

### **19.1 DESIGN CERTIFICATION BY PROFESSIONAL ENGINEER**

- 19.1.1 The design of electrical systems for this facility must be certified by a licensed Professional Engineer in conformance with all federal, provincial and municipal laws and regulations and must conform to the latest edition or revision of the codes and standards of the following technical associations and organizations.

### **19.2 REFERENCE CODES, STANDARDS AND GUIDELINES**

- 19.2.1 Specific requirements listed in this document may exceed the minimum requirements stated in the codes, standards, etc. of the following organizations. The Contractor is advised that in all cases the most restrictive requirements must apply.
- 19.2.1.1 CSA – Canadian Standards Association
  - 19.2.1.2 NBC – National Building Code
  - 19.2.1.3 NFC – National Fire Code
  - 19.2.1.4 NFPA – National Fire Protection Association
  - 19.2.1.5 ULC – Underwriter's Laboratory of Canada
  - 19.2.1.6 Canadian Electrical Code, CSA-C22.1, latest edition.
  - 19.2.1.7 All Provincial Amendments and Bulletins to C.E.C.
  - 19.2.1.8 Provincial Electrical Safety Code
  - 19.2.1.9 EIA/TIA Standards for Fibre Optic and Category 6 UTP Cabling
  - 19.2.1.10 CSA-Z462- Arc Flash Std.
  - 19.2.1.11 ASHRAE 90.1 - Energy Standard for Buildings
  - 19.2.1.12 Comply with requirements of the Electrical Supply Authority, the latest edition of the Canadian Electrical Code, with all Provincial and Municipal Laws, Rules and Ordinances, and to the satisfaction of those persons having jurisdiction over same.

### **19.3 REFERENCE DRAWINGS AND DOCUMENTS**

- 19.3.1 Underground conduit requirements and pull boxes are shown on Civil Drawings in the Appendices.
- 19.3.2 Upon request by the Departmental Representative, the Contractor must submit a copy of design calculations to satisfy the Departmental Representative that specific design criteria and requirements are being met.

### **19.4 GENERAL ELECTRICAL REQUIREMENTS**

- 19.4.1 Investigate site and local conditions affecting work under this specification. Obtain Departmental Representative approval before commissioning and placing systems into service. System commissioning must be performed in the presence of the Departmental Representative.

19.4.2 Provide two exterior power outlets on opposite corners of the FS-LSI Facility.

## 19.5 DESIGN AND PERFORMANCE REQUIREMENTS

Install concealed wiring and equipment neatly, close to building structure so furring is minimum size.

### 19.5.1 Voltage Utilization

19.5.1.1 Electrical voltages must be 600/347 V, three phase, 4 wire and 208/120 V, three phase, 4 wire.

19.5.1.1.1 Load or motor size: Voltage:

19.5.1.1.2 < 0.5 kW 120V or 208V single phase

19.5.1.1.3 >0.5kW to 2kW 600V 3 phase preferred, 208V 3 phase acceptable

19.5.1.1.4 4> 2 kW 600V 3 phase

19.5.1.1.5 Lighting 120V and 347V single phase

### 19.5.2 Sprinkler Proofing

19.5.2.1 All major pieces of electrical equipment must be protected by supplying sprinkler shields for equipment if possible.

### 19.5.3 Identification of Electrical Equipment

19.5.3.1 Suitably identify all panels and equipment racks (i.e., power, lighting,) on top of the door to indicate designation, function and characteristics of panel. Panel directories must be typewritten to indicate equipment and location of equipment controlled by each branch circuit. All directories must be securely mounted on the inside of the panel door and must have a protective transparent cover.

19.5.3.2 All disconnect switches, pull boxes and splitters installed, where identification may only be on the outside, must have neat, securely fastened nameplates to indicate their function. Motor starters and control devices wired under this contract must be suitably marked as to purpose with similar nameplates.

19.5.3.3 All labels and nameplates must be "Lamicoid" plates or equal, securely fastened with screws. Lamicoids should be black with white face for normal power and red with white face for emergency power.

19.5.3.4 All convenience receptacles and emergency power outlets must have a Lamicoid strip on which the panel and breaker number from which it is fed is indicated. The identification must be secured on the cover plate of the appropriate outlet.

19.5.3.5 Adjacent to each breaker in CDP type panel boards, provide and mount Lamicoid nameplates identifying their respective load, voltage and phase, and which panel or equipment is being fed by the respective circuit.

19.5.3.6 Prior to nameplate fabrication, submit to the Departmental Representative for approval a copy of all panel directories and a list stating exact wording and fabrication details for all nameplates.

19.5.3.7 All junction boxes, pull boxes, wiring boxes etc., which are in concealed locations,

must be identified with clearly legible hand printed permanent black markers.

#### 19.5.4 Access Doors

- 19.5.4.1 The locating of electrical equipment in concealed locations is discouraged.
- 19.5.4.2 Provide access doors where electrical equipment must be accessible.
- 19.5.4.3 Access doors located in fire rated ceilings must be approved ULC stamped, fire rated doors. Access doors to match adjacent aesthetics and insulation.
- 19.5.4.4 Access doors must be lockable. Provide minimum 3 keys per door except where access doors are keyed alike.

#### 19.5.5 Copper Current Carrying Electrical Components

- 19.5.5.1 All current carrying components of the electrical installation must be copper. This must include all conductors, bus work, interconnecting components, etc. No aluminum components will be allowed without written permission from Departmental Representative.

#### 19.5.6 Openings in Fire Separations

- 19.5.6.1 Electrical tradespeople having openings in fire separations for the passage of conduit, duct, etc., must be responsible for fire stopping around such holes in order to the integrity of the fire separations.

#### 19.5.7 Housekeeping Pads

- 19.5.7.1 All floor mounted electrical equipment must be mounted on concrete housekeeping pads. Pads to be 100 mm high. Pads and equipment floor must be painted with epoxy paint prior to equipment installation.

#### 19.5.8 Lighting Design

- 19.5.8.1 Lighting design calculations for all areas inside the building and areas on site adjacent to the building.

#### 19.5.9 Load flow calculations

- 19.5.9.1 Calculations must include demand load figures for existing CBSA site distribution system and confirmation that adequate spare capacity exists in the system for calculated additional loads.

#### 19.5.10 Fault Level And Protective Coordination Study

- 19.5.10.1 The Contractor must perform a preliminary fault level and protective coordination study during the design of the distribution system to ensure major electrical equipment is sized and equipped to be capable of providing selective coordination under all scenarios. A formal fault level and coordination study must be submitted for review during the design stage. The study must include Arc Flash currents calculations for equipment labeling as per CSA Z462.

#### 19.5.11 Existing Site Service

- 19.5.11.1 The CBSA site where the new FS-LS Imaging Enclosure will be located is fed by a 500kVA pad mounted transformer. According to BC Hydro records, the highest measured demand over the past 12-month period has been 288 kW that was



registered for Dec 2012/Jan 2013.

- 19.5.11.2 The existing main distribution system for the entire site is backed up by a 500kVA stand-by diesel generator.

#### 19.5.12 Electrical Service Source

- 19.5.12.1 Service must be fed from the existing distribution centre 6EW-CDP in Electrical Room in CBSA Warehouse building located south of new FS-LS Imaging Enclosure. Refer to Civil Drawings in Appendix D, Figure 2.

#### 19.5.13 Service Size

- 19.5.13.1.1 Electrical service size needs to be verified by the Contractor.

#### 19.5.14 Service Entrance Switchgear

- 19.5.14.1 The Main Electrical Board must be designed and installed as a service entrance switchboard.
- 19.5.14.2 A digital metering package must be installed complete with Current Transformer (CT) and Potential Transformer (PT) and provide signals to CBSA site Building Automation System (or system as directed by Departmental Representative).

#### 19.5.15 Power Factor Correction Equipment

- 19.5.15.1 The Contractor must review the requirement for power factor correction.
- 19.5.15.2 The power factor system, if required, must operate automatically to control the power factor to near unity.
- 19.5.15.3 The system must be a detuned system capable of handling the anticipated harmonic loads of the building.
- 19.5.15.4 Capacitors must have LED phase indicator lamps and have a design life of 200,000 hours.

#### 19.5.16 Wiring Methods

- 19.5.16.1.1 All above ground wiring must be installed in Electrical Metallic Tubing (EMT) conduit with steel fittings. All underground wiring must be installed in rigid PVC conduit. Use of flexible metallic raceway is allowed only for last connection to light fixtures and vibrating equipment such as motors and transformers.
- 19.5.16.1.2 Minimum conduit size is 21mm. All conduits must have a spare capacity of at least 20% or three No. 12 gauge insulated wires, whichever is greater.
- 19.5.16.1.3 All wiring to be copper. Minimum wire size for 120 volt and above must be No. 12 gauge.
- 19.5.16.1.4 Branch circuits feeding receptacles must not share neutrals. An individual neutral must be run for each circuit. Lighting circuits may not share neutrals.
- 19.5.16.1.5 An insulated green ground conductor must be installed in all conduit runs

irrespective of conduit type.

- 19.5.16.1.6 Major multiple conduit runs must be grouped on suspended channels (Unistrut or approved equal) with minimum of 25% spare space for future runs.
- 19.5.16.1.7 Pull boxes must be provided every 16 meters or less.
- 19.5.16.1.8 Pull box and junction box covers must be provided with colour markings to indicate contents or designated purpose (power, communication, data and voice, fire alarm, building automation, security and System controls etc.). Colour marking must be approved by Departmental Representative prior to implementation. Utilize permanent marker to indicate additional information related to content of pull boxes and junction boxes on the inside of all cover plates
- 19.5.16.1.9 Receptacle boxes must be mounted on or between steel studs with appropriate metal bracing to assure that receptacle boxes are securely mounted and that boxes for voice / data outlets are mounted adjacent to power outlets with consistent 100 mm clear separation between boxes.
- 19.5.16.1.10 Conduits to be color coded or identified at points where conduits enter the wall, ceiling, of floor and at 15 m intervals.

#### 19.5.17 CDP Panel Boards

- 19.5.17.1 600V CDP panel boards must have copper bars and must be complete with main breaker for local isolation purposes.
- 19.5.17.2 600V CDP panel boards in the main electrical room must have an ammeter, ammeter switch, and three current transformers for monitoring the load. Meter must be able to accept any of the three CT inputs as selected by the ammeter switch and measure instantaneous currents. Meter must also be capable of recording peak current loads to assist in determining spare capacity for future loads.
- 19.5.17.3 Panel Boards must be equipped with locks and keyed alike.
- 19.5.17.4 Sub-distribution panels must only be located in electrical / mechanical rooms and service closets. Any proposed variances require preapproval in writing from Departmental Representative.
- 19.5.17.5 The above requirements must also apply to 120/208V sub-distributions.

#### 19.5.18 Dry Type Transformers

- 19.5.18.1.1 Dry type transformers must be provided in the electrical centre to provide 208/120V power and any other voltages as required.
- 19.5.18.1.2 Transformers to have copper windings with standard taps, and impedance.
- 19.5.18.1.3 Transformers to be delta wye connected.
- 19.5.18.1.4 Transformers to be rated to accept anticipated harmonic content.
- 19.5.18.1.5 Transformers to have vibration isolation.
- 19.5.18.1.6 Transformers must be equipped with drip shields.

#### 19.5.19 120/208V Panel Boards

- 19.5.19.1.1 120/208V panel boards must have copper bus bars. Main breakers are required where the panel is located remotely from its source transformer.
- 19.5.19.1.2 Panel boards must be equipped with locks and keyed alike.
- 19.5.19.1.3 All panels must be equipped with SURGE SUPPRESSION DEVICES.
- 19.5.19.1.4 120/208 V panel boards must only be located in electrical / mechanical rooms and service closets.
- 19.5.19.1.5 Where required by code, GFI breakers must be used.
- 19.5.19.1.6 Electrical panels must be equipped with type bolt-on breakers.

#### 19.5.20 Duplex Receptacles

- 19.5.20.1.1 Receptacles must be duplex type and coloured ivory normal 15 amp receptacles.
- 19.5.20.1.2 Must be Hubble model 5262 or approved equal.
- 19.5.20.1.3 Receptacles fed from UPS must be coloured BLUE or ORANGE.
- 19.5.20.1.4 Power outlet cover plates must be stainless steel.
- 19.5.20.1.5 Receptacles in main FS-LS Imaging Enclosure must be mounted at a height of 1200 mm above the floor finish.

#### 19.5.21 Circuit Loading

- 19.5.21.1.1 Adjacent outlets must be on alternating circuits.
- 19.5.21.1.2 Not more than four outlets must be served by one circuit in all areas.
- 19.5.21.1.3 Open space area: One 120V/20A outlet must be provided not more than 8 meters apart.
- 19.5.21.1.4 Duplex receptacles for network printers and photocopiers must be 5-20R type on dedicated circuit.
- 19.5.21.1.5 Exterior Walls and Roof: 120V/15 A weatherproof duplex outlets with metal covers must be provided every 20 meters. Associated circuits must be entirely dedicated to exterior outlets only to permit isolation when not in use. Not more than two outlets must be on one dedicated GFI circuit.

#### 19.5.22 Emergency Power

- 19.5.22.1 All life safety devices must be battery back-up and all emergency lighting must be D.C. type.

#### 19.5.23 Wiring Systems

- 19.5.23.1 With the exceptions listed below, all wiring for all systems must be run in EMT conduit.
- 19.5.23.2 Final 1 meters of power cabling to panel boards, transformers, motors, may be run in TECK cable or flexible conduit and wiring.
- 19.5.23.3 Final connections to light fixtures in concealed ceiling spaces may be run in type AC cable – BX.
- 19.5.23.4 Provide neat U-channel supports to group multi conduit/cable runs.
- 19.5.23.5 All junction boxes, pull boxes etc. (located in concealed ceilings, electrical rooms, mechanical rooms, telephone closets, mechanical / electrical closets etc.) must be colour coded and marked clearly in indelible black ink, the system and contents they contain.

#### 19.5.24 Wire And Cable

- 19.5.24.1 All building wire must be RW90 copper with 600V rated XLPE insulation.
- 19.5.24.2 All cables must be FT-4 rated.

#### 19.5.25 Grounding

- 19.5.25.1 Grounding must meet the Canadian Electrical Code Requirements.
- 19.5.25.2 Ground wire must be bare soft drawn, standard copper.
- 19.5.25.3 Inaccessible ground system connections must be made using exothermic or compression type connections.
- 19.5.25.4 All conduit runs containing feeders and branch circuits must be complete with an insulated green ground wire bounded to all outlet boxes, junction boxes, pull boxes, equipment enclosures, etc. The conduit system must be continuous but must not be relied on to serve as the equipment grounding means.
- 19.5.25.5 Multi-conductor TECK feeders must utilize the integral ground conductor or

sheath unless otherwise noted.

#### 19.5.26 Electric Heating

Electric space heaters may not be used unless written permission is provided by the Departmental Representative.

#### 19.5.27 Motor Control

- 19.5.27.1 Motors for HVAC equipment must be controlled from Motor Control Centres, (MCC) located in a single Mechanical / Electrical area/room.
- 19.5.27.2 Motor control centre starters to be complete with HOA selectors run and stop pilot lights and elapsed time meters.

#### 19.5.28 Variable Speed Drives

- 19.5.28.1 Motors controlled through Variable Frequency Drives (VFD), these drives must be located separately adjacent to the respective MCC's. Non-fused switches must be provided to allow isolation of variable speed drives.
- 19.5.28.2 Drives must be supplied with line reactors and long lead filters as required by the drive suppliers.
- 19.5.28.3 Drives must have the following functions and features:
  - 19.5.28.3.1 User friendly interface features with large clear LED Screens
  - 19.5.28.3.2 Self-Diagnostics
  - 19.5.28.3.3 Programmable range of frequency skip (minimize mechanical resonance effects)
  - 19.5.28.3.4 Capable of continuous operation in a 40C ambient
  - 19.5.28.3.5 Drives by ABB or approved equal.

#### 19.5.29 Building Automation System – Site Connection

- 19.5.29.1 The Contractor must connect the FS-LSI Facility to the existing Building Automation System.
- 19.5.29.2 All wiring to connect the FS-LSI Facility must be installed by an electrical contractor.

#### 19.5.30 Lighting - General

- 19.5.30.1.1 Lighting design must be in general compliance with the current edition of the IES Lighting Handbook and ASHRAE 90.1 with respect to energy efficiency and illumination levels. Submit for review a detailed design report complete with minimum, maximum and average lighting levels in each area.
- 19.5.30.1.2 Light fixtures must have low EMI emission, low harmonic distortion and high power factor.
- 19.5.30.1.3 All interior lighting must be 120 V. Voltage for any new site lighting to match existing on site.
- 19.5.30.1.4 Incandescent lamps are not acceptable.

#### 19.5.31 Indoor Lighting

- 19.5.31.1 Fluorescent light source is recommended for indoor lighting. In inaccessible locations and on the ceiling of the FS-LS Imaging Enclosure, all lighting must be LED.
- 19.5.31.2 All fluorescent fixtures must be controlled from line or low voltage switches. Switches must be ivory in color; cover plates are to be brushed stainless steel.
- 19.5.31.3 All fluorescent fixtures must utilize T8 or T5HO lamps and must be furnished with high efficiency electronic ballast.
- 19.5.31.4 Premium specification grade recessed fluorescent luminaires c/w acrylic lens in finished areas, industrial fluorescent luminaires in service rooms and high efficient fluorescent luminaires c/w wire guard and Miro type reflectors in FS-LS Imaging Enclosure.
- 19.5.31.5 Acrylic lenses must be K12 type, minimum 3.3mm thick and easily removable for re-lamping (hinged covers).
- 19.5.31.6 Mechanical / electrical rooms must be equipped with dual strip fluorescent fixture with white reflector shields and wire guards.
- 19.5.31.7 Permanent night lighting must be provided for areas such as building entrance area, lobbies, reception/security counter, corridors, stairwells and in any other area as directed by PWGSC.
- 19.5.31.8 Lighting Control – All interior lighting must be designed and laid out to accommodate lighting control by line voltage room switches or via low voltage lighting control panel boards. Relay circuits and/or contactor circuits for group switching of luminaires will not be acceptable. Low voltage lighting control system must be capable of time-of-day scheduling and ON/OFF zone control. Provide low voltage dual processing occupancy sensors for light control with overriding capabilities in spaces such as washrooms and service rooms.
- 19.5.31.9 In general, night lights must not be switchable, but must be controllable by individual lighting panel board breakers.
- 19.5.31.10 Lighting in FS-LSI Control Room must be multi-level or dimming type to allow the operator to adjust the lighting to comfortable levels.
- 19.5.31.11 Daylight sensors compatible with low voltage lighting system must be provided to dim or switch electric lighting in response to changing daylight availability in

spaces where there is opportunity for daylight harvesting.

#### 19.5.32 Outdoor Lighting

- 19.5.32.1 The site lighting must provide adequate illumination to enable video surveillance capabilities and facilitate traffic management while providing a low operating and maintenance cost.
- 19.5.32.2 Roadway lighting – 14 lux 3:1 Average to minimum
- 19.5.32.3 Approach to entry into the building and exit from the building – 5 FC (50 lux) 3:1 Average to minimum
- 19.5.32.4 Parking Facilities – 22 lux minimum average vertical and 10 lux minimum average horizontal.
- 19.5.32.5 Allow for lighting system depreciation of 50%. Above figures are maintained values – not initial values.
- 19.5.32.6 Pedestrian areas – use figure 22-10 (IESNA lighting handbook – ninth edition) where walkways exist. Provide lighting for pedestrian security where required. Assume road surface classification is type R3 (IESNA lighting handbook).
- 19.5.32.7 All site lighting must be through lamps with high Color Rendering Index (80+) and quality fixtures with low light pollution.
- 19.5.32.8 Provide LED lighting all around the perimeter of the new building. Use the same correlated color temperature (CCT) as adjacent buildings.
- 19.5.32.9 Use only luminaires with optics to maximize the control of glare.
- 19.5.32.10 Provide safeguard against bird roosting and dirt accumulation on light fixtures as necessary.
- 19.5.32.11 Switching of building exterior lighting must be through one common photocell output signal and multi-channel / control through astronomical time clock with override capability for testing. ON/OFF time-of-day scheduling for exterior lighting control to match existing adjacent Warehouse Building.
- 19.5.32.12 Provide LED lighting above all man / overhead doors.
- 19.5.32.13 Exterior Signs must be lit by LED and controlled by a photocell with override switches to be controlled same as building exterior lighting.

#### 19.5.33 Emergency DC Lighting

- 19.5.33.1 Provide independent D.C. battery pack lighting and LED type remote heads in service rooms, and along egress paths.

#### 19.5.34 Exit Lighting

- 19.5.34.1 Exit lights must be long life, low power consumption LED style suitable for connection to both AC and DC voltage sources.
- 19.5.34.2 Emergency exit signs must be green “running man” type to comply with NBC 2010.
- 19.5.34.3 All exit lights must be CSA 22.2 No. 141-10 compliant.

#### 19.5.35 Building Communications Systems



- 19.5.35.1 The Contractor must install a complete Voice/data communications cabling system which includes horizontal cablings, outlets, cover plates, patch panels, racks, patch cords, termination blocks, labelling, cable management, testing, etc.

#### 19.5.36 Telephone System

- 19.5.36.1 The Contractor must supply and install a multi-pair flooded telephone cable – minimum 10-pair – from the telephone backboard in the FS-LSI Facility to the existing telephone backboard in RCR Room in Warehouse Building. Multi-pair cable is to be installed in underground duct bank and terminated using Insulation Displacement Connectors (IDC). IDC connectors must be BIX or 110 type to match existing.
- 19.5.36.2 Provide fusible protection blocks at both ends of multi-pair flooded telephone cable and ground protection blocks with #6 Insulated Green Ground Wire.
- 19.5.36.3 All horizontal telephone cabling in new building to be category 6 and to be designed and installed in compliance with the latest edition of all EIA/TIA standards and all the addenda and latest edition of BICSI TDM manual. The cabling system must be terminated on IDC connectors mounted on the telephone backboard and RJ45 jack at the workstation end.
- 19.5.36.4 Provide at least two voice jacks at each of the three the workstations in FS-LSI Control Room.
- 19.5.36.5 Provide at least one voice jack and one data jack in the FS-LS Imaging Enclosure. All voice jacks to be black collared.
- 19.5.36.6 All voice cabling to be white collared.
- 19.5.36.7 All voice cabling to be installed in EMT conduit. Voice and data cabling may be installed in same conduit. Minimum conduit size to be 21mmC.
- 19.5.36.8 All voice cabling and jacks to be tested for category 6 compliance. Submit all test reports. Submit category 6 certification documentation.
- 19.5.36.9 The voice cabling system to be warranted by manufacturer for 25 years of performance as per EIA/TIA standards for category 6.

#### 19.5.37 Local Area Network Connectivity

- 19.5.37.1 The Contractor must supply and run a 4-Strand, 50 micron, flooded Fibre Optic cable from the LAN Cabinet in FS-LS Control Centre to the existing LAN rack in RCR Room in Warehouse Building. Fibre Optic cable is to be installed in underground duct bank and terminated using 'SC' type connectors at each end.
- 19.5.37.2 All final connections with existing LAN must be done by the CBSA authorized or screened personnel.
- 19.5.37.3 The Contractor must supply and install a wall mounted LAN Cabinet in the building to terminate Fibre Optic Cable, all horizontal Category 6 Patch Panels and Network Switch. LAN Cabinet to be steel, ventilated, hinged front door and back door. Front and back door to be lockable. Pre-drilled rack mounting rails for 19" rack mounted equipment. Cabinet depth to be 610 mm minimum. Cabinet height to accommodate 100 % expansion of patch panels and network switches. Provide a 5-15R Duplex Receptacle on a dedicated circuit breaker mounted inside cabinet connected to the UPS that is to be furnished as part of the FS-LSI-NII System. Ground LAN Cabinet using #6 Green Ground Wire.



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- 19.5.37.4 All horizontal LAN cabling to be category 6 and to be installed in compliance with the latest edition of all EIA/TIA standards and all addenda and latest edition of BICSI TDM manual. The cabling system must be terminated using RJ45 jacks at workstation end and RJ45 Patch Panels in LAN Cabinet.
- 19.5.37.5 Provide at least two data jacks at each of the three the workstations in FS-LSI Control Room.
- 19.5.37.6 All Data jacks to be white collared.
- 19.5.37.7 All Data cabling to be blue collared.
- 19.5.37.8 All Data cabling to be installed in EMT conduit.
- 19.5.37.9 Voice and data cabling may be installed in same conduit. Minimum conduit size to be 21mmC.
- 19.5.37.10 All data cabling and jacks to be tested for category 6 compliance. Submit all test reports. Submit category 6 certification documentation.
- 19.5.37.11 The cabling system to be warranted by manufacturer for 25 years of performance as per EIA/TIA standards for category 6.
- 19.5.38 Fire Alarm System
- 19.5.38.1 The fire alarm system must be zoned, non-coded single stage, fully supervised and microprocessor based addressable.
- 19.5.38.2 Main panel must have remote system's LED panel annunciation fully integrated with that of main panel.
- 19.5.38.3 The text messages of the system's device annunciation must be structured under the direction of the Departmental Representative.
- 19.5.38.4 The fire alarm panel must be wired in a class 'B' system.
- 19.5.38.5 Annunciation panel must be located where required by code.
- 19.5.38.6 Fire alarm devices such as manual pull stations, heat and smoke detectors, duct detectors, horns, bells etc., must all be by one manufacturer. All fire alarm devices to be bilingual.
- 19.5.38.7 The new fire alarm panel must be networked to the fire alarm panel for the existing Commercial and Traffic buildings that is located in the Electrical Room in Traffic building. Investigate and utilize existing site underground conduit system connecting Warehouse building to Commercial building and Commercial Building to Traffic Building for wiring installation.
- 19.5.39 UPS Power Connection
- 19.5.39.1 The Contractor must supply and install a rack mounted on-line UPS to support the Video Surveillance system and other security systems.
- 19.5.40 Access Control System
- 19.5.40.1 The Contractor must provide a complete door control and monitoring system including proximity card readers, proximity cards, door contacts, request-to-exit devices, software and any other items required for a fully functional system.
- 19.5.40.2 Access Control System in the new FS-LS Imaging Enclosure must be Keyscan to

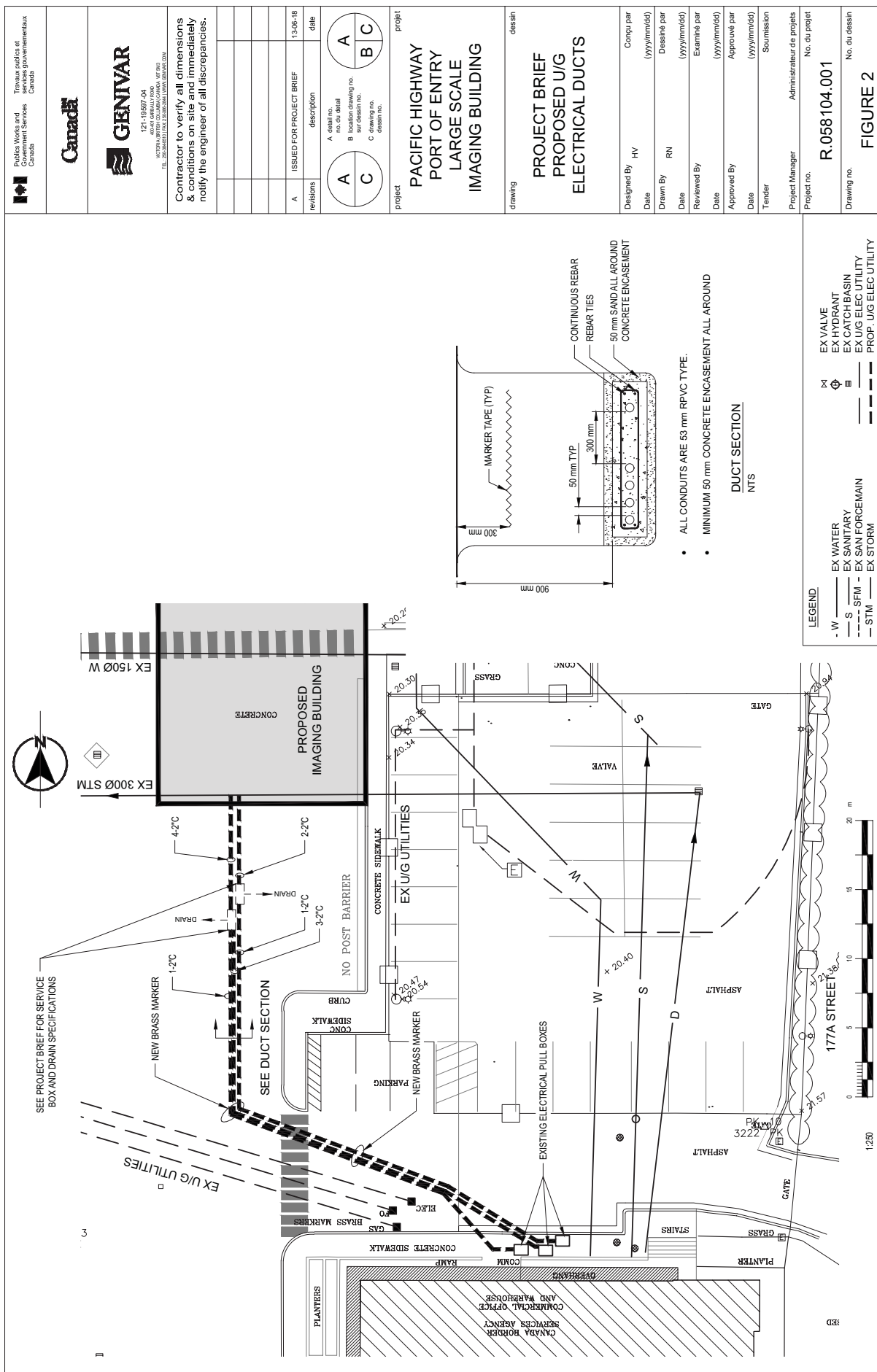
match the existing system used on site.

- 19.5.40.3 All exterior doors must be card accessed. As a minimum, allow for one Keyscan CA8500 Access Control Unit (ACU) in the new building that can accommodate up to eight (8) monitored doors.
  - 19.5.40.4 Allow for two doors to have augmented security whereby a keypad can be used in tandem with a card reader.
  - 19.5.40.5 Access control system is to be connected to the Video Surveillance UPS power.
  - 19.5.40.6 A Client Computer / Server is not required for the access control system in the new building as the new system is to be integrated into the existing system in Warehouse building.
  - 19.5.40.7 Provide 30 proximity cards.
  - 19.5.40.8 Integration – The ACU in the new building must be integrated into the existing Keyscan system in the adjacent Warehouse building and function as part of this system in terms of monitoring and annunciation in the event of a door held open or door forced open or any other un-authorized entry.
  - 19.5.40.9 Provide a Keyscan NETCOM2P TCP/IP communication module to enable the new ACU to be connected and communicate over the network. Use the Video Surveillance fibre optic cable and network switch to connect the new ACU to Warehouse building
- 19.5.41 Intrusion Detection System
- 19.5.41.1 The Contractor must provide a complete intrusion detection system including control panel, keypads, motion detectors, glass break detectors, door contacts, sirens and any other items required for a fully functional system.
  - 19.5.41.2 All exterior doors, man doors and overhead doors must be monitored.
  - 19.5.41.3 All spaces with glass window exposed to the exterior must have glass break detectors.
  - 19.5.41.4 Provide keypad and motion sensor at main entrance/s to the building.
  - 19.5.41.5 The intrusion detection system must be integrated to the access control system via an interface card to display and report all zone alarms, zone fault, zone tampers and zone secure on the card access system Graphic User Interface in Warehouse building. Provide all necessary programming and devices. Any wiring interconnection that may be required between the two systems must be installed in underground duct bank.

## ATTACHMENT 1 to Annex A – Civil Drawings

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## **ATTACHMENT 2 to Annex A – Geotechnical Report**

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# PROPOSED FIXED-SITE NON-INTRUSIVE IMAGING SYSTEM

Geotechnical Assessment

***FINAL REPORT***

***Prepared for:***

Public Works and Government Services Canada  
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Vancouver, BC, V6Z 2V8

***Site Address:***

Pacific Highway Port of Entry  
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***PWGSC Project No.:***

R.058104.001

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***Stantec Project No.:***

1233-10945

***Date:***

April 25, 2013



**Stantec**





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**Stantec**

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## **1 INTRODUCTION**

Stantec Consulting Ltd. (Stantec) has completed a geotechnical assessment for the proposed fixed-site non-intrusive imaging system at the Pacific Border Crossing in Surrey, BC. The purpose of this assessment was to identify subsurface conditions and provide geotechnical recommendations for design and construction of the proposed development.

The scope of work for this assessment consisted of geotechnical site investigation and testing program, detailed laboratory testing, engineering analysis and preparation of this report. Our work has been completed in general accordance with the Stantec proposal dated December 11, 2012.

## **2 PROJECT AND SITE DESCRIPTION**

Stantec understands the proposed fixed-site non-intrusive inspection system will consist of x-ray imaging equipment housed in an approximately 50 m x 15 m building. The building will be a single storey structure, and may be up to 10 m in height to accommodate the large target objects, such as marine containers, transport trucks, vehicles etc. It is understood that the building walls and ceiling will be lead lined or constructed of an adequate thickness of concrete such that the safe zone external radiation requirements are met. It is further understood that other structural details of the building are not known, therefore structural design loads have not been provided for the Stantec geotechnical assessment.

Stantec understands the x-ray imaging equipment operates on tracks that run almost the entire length of the building. The inspection system operates as a drive-thru, where the targeted object enters at one end of the building and exits at the other end. A control room housing the control equipment and operator workstations may be connected to the building, but is outside of the shielding walls.

The Pacific Border Crossing site is roughly rectangular in shape with an approximately total area of 16 acres, and is bounded by 176<sup>th</sup> Street to the west, 1<sup>st</sup> Avenue to the north, 177A Street to the east, and the Canadian-US Border to the south. The location of the proposed building to house the non-intrusive inspection system is within the north-east portion of the site adjacent to 1<sup>st</sup> Avenue and 177A Street. The proposed location of the building is currently part of a truck compound that is surfaced with concrete slab-on-grade. Stantec understands that proposed design grades will not differ significantly from the current site elevations and filling will not be required.

### 3 GEOTECHNICAL SITE INVESTIGATION

Stantec completed a geotechnical subsurface investigation for the proposed development on February 5<sup>th</sup>, 6<sup>th</sup>, and 8<sup>th</sup>, 2013. The investigation consisted of two (2) mud-rotary boreholes, two (2) electronic cone penetration tests (CPT's), one (1) of which included seismic shear wave testing, and one (1) flow penetrometer test via the ball method. The drilling investigation and in-situ testing program were completed utilizing truck-mounted drill rigs operated by Sea to Sky Drilling Ltd. of Coquitlam, and ConeTec Investigations Ltd. of Richmond, respectively.

The mud-rotary boreholes were advanced to depths of 20.1 m (66 ft.) and 30.3 m (99.5 ft.) below current site grades. Soil sampling was carried out via Standard Penetration Tests (SPTs) using a 50 mm OD split spoon sampler which is driven into the ground at depth using a 63.5 kg automatic trip hammer over a drop height of 0.76 m. The number of blows from the hammer required to advance the sampler via three sets of 150 mm penetration was recorded. The SPT N-value is represented by the sum of the final two sets of 150 mm penetration.

Thin-walled Shelby tubes (75 mm) were used to obtain undisturbed samples of cohesive materials. Following sampling, the ends of the recovered Shelby tubes were sealed with wax, stored vertically and transported to our geotechnical soil laboratory in Burnaby for extrusion, classification, and testing. Select samples were sent to Marine and Earth Geosciences Ltd. (MEG Consulting) for additional laboratory testing.

The CPT's were advanced to depths between 12 m (39.4 ft.) and 14 m (45.8 ft.) below current site grades and consisted of hydraulically pushing a stainless steel cone into the ground at a constant rate of penetration. The cone device consists of transducers and sensors mounted on the cone tip and friction sleeve (shaft of the cone) to measure end-bearing resistance at the tip, friction resistance along the sleeve and pore water pressure induced by the cone. The electronic readings from the transducers and sensors were recorded at 50 mm depth intervals. The CPT soundings were used to obtain a detailed stratigraphic log, static groundwater and pore pressure dissipation data, an indication of the strength and compressibility of the cohesive (silt and clay) soils, and density of the granular deposits. Each of the CPT's was terminated due to practical refusal within a native deposit of dense soil.

The Seismic Shear Wave testing consisted of measuring the shear and compression wave velocity at regular depth intervals. Prior to obtaining the seismic wave measurements the CPT rods were decoupled from the rig to minimize background noise. The shear waves were generated via a hammer striking a steel beam which is placed beneath the jack-pads of the CPT rig. The sledgehammer striking the beam acts as an electrical contact trigger, initiating the recording of the seismic wave traces. Multiple hits were recorded to enable the operator to check the consistency of the wave forms. The receiver consisted of a horizontally active geophone within the body of the cone penetrometer. The location of the geophone in relation to the penetrometer tip as well as the offset of the steel beam from the cone was taken into consideration during calculation of the seismic wave velocities.

The Flow Penetrometer testing consisted of pushing a ball penetrometer through soft soils. The test incorporates a standard cone penetrometer body (typically 10 cm<sup>2</sup> plan area) and a spherical

attachment that replaces the standard 60 degree conical tip. Flow penetrometer testing is used for assessing the undrained shear strength ( $S_u$ ) of low to medium strength soils. During penetration the soil is able to flow around the penetrometer, significantly reducing the influence of overburden stress as compared to the cone penetration test. Data are recorded continuously and the test is performed in the same manner as the CPT; however, because of the subdued sleeve and pore pressure response, flow penetration test results are not used for the interpretation of other geotechnical parameters such as soil classification.

The field work was continuously monitored by a Stantec representative, who identified the test hole locations, retrieved representative soil samples, and observed and recorded pertinent site features. The location of the test holes are shown on Drawing No. 1 (**Appendix B**).

## 4 LABORATORY TESTING

Representative disturbed soil samples collected from the boreholes were stored in moisture tight containers and returned to the Stantec laboratory in Burnaby, BC for further visual identification and classification, natural water content measurements and fines content determination. The results of the laboratory testing are included on the Borehole Records in **Appendix C**, and discussed in the text of this report.

Representative undisturbed samples of cohesive materials were sent to MEG Consulting for additional detailed laboratory testing including one dimensional consolidation tests, and unconsolidated-undrained triaxial compression tests.

One-dimensional consolidation (oedometer) tests using standard load increment (LIR) were performed on selected samples to evaluate the compressibility characteristics and stress history of the soil. Once the sample is prepared, placed in the testing apparatus, and fully saturated, loads are applied incrementally. Loads are applied sequentially, the magnitude of which is roughly doubled at each load step to a maximum vertical pressure of 1600 kPa. Time, magnitude of applied normal load, and vertical displacement readings are recorded and used to compute the void ratio-effective vertical pressure relationship. The testing procedures are in accordance with ASTM D2435.

In addition, unconsolidated-undrained (UU) triaxial compression tests were performed on selected samples to measure the undrained shear strength and stress-strain relationships of the soil. A soil sample was prepared and placed in a rubber membrane inside a triaxial cell. The sample was subjected to a cell pressure greater than the in-situ total vertical stress (including the weight of water), but without being allowed to consolidate under the influence of the confining pressure prior to testing. The specimen was then loaded uniaxially to failure at a constant rate of strain (1% per min) under undrained conditions. Procedures for the sample preparation and shearing are in accordance to procedures in ASTM D2850.

The results of the laboratory testing conducted by MEG Consultants are presented in **Appendix E**.

## 5 SUBSURFACE CONDITIONS

Based on our review of Geological Survey of Canada Surficial Geology Map 1484A: New Westminster; the geologic deposition for this area of the Vancouver Lower Mainland consists of Capilano Sediments comprised of raised marine, deltaic, and fluvial deposits of marine silt loam to clay loam with minor sand, silt and stoney glacio-marine material. Raised beach medium to coarse sand containing fossil marine shell clasts may also be present.

The subsurface soil strata and groundwater conditions encountered in the boreholes are described in detail on the Borehole Records, with additional and supplementary information provided in this section. All soil descriptions and identifications were made in accordance with ASTM Standard D2488 (Visual Manual Procedure). The detailed borehole records, along with an explanation of the symbols and terms used in their description, are presented in **Appendix C**.

Additionally, the detailed CPT plots which include the interpreted soil conditions based on Lunne, Robertson and Powell (1997) are presented in **Appendix D**.

In general, the soil conditions consisted of surficial fills overlying native deposits of silty clay and clayey silt with depth. The clayey silt becomes sandy with depth, containing some gravel, and is underlain by silty sand and gravel glacial till. Further information regarding the on-site subsurface conditions encountered is presented below.

### **Fill**

Surficial fills were encountered in both of the boreholes. The fill consists of predominantly sand and gravel with trace to some silt. Based on our drilling observations, the fills are generally compact and are overlain by an approximately 175 to 200 mm thick concrete slab. The granular fill beneath the concrete slab is approximately 0.6 m in thickness.

### **Silty Clay**

A native deposit of brown/grey mottled silty clay underlies the surficial fills. The silty clay deposit was generally stiff near the surface transitioning to firm/soft with increasing depth, contained traces of sand and gravel, as well as sand partings, and was approximately 5.3 m in thickness. Natural water contents of samples collected from the silty clay deposit ranged from 31 to 64%. Atterberg Limits testing was completed on 2 samples collected from the silty clay deposit. The results of Atterberg Limits testing conducted on selected samples from the silty clay deposit generally categorizes the soil as high plasticity clay under the Unified Soil Classification System. A summary of the Atterberg Limits tests for the silty clay samples are shown in Table 5.1, below. The graphic results are presented in **Appendix E**.

**Table 5.1: Summary of Atterberg Limits Tests for Silty Clay**

Borehole No. (Sample Depth)	Liquid Limit %	Plastic Limit %	Plasticity Index %	Natural Water Content %
BH13-1 (2.7 m)	61	26	35	40
BH13-1 (5.7 m)	51	21	30	46

A single laboratory consolidation test was completed in the silty clay deposit. This test was completed to provide information on compressibility characteristics. A summary of the consolidation test results is presented in Table 5.2, below. The graphic results are presented in **Appendix E**.

**Table 5.2: Summary of Consolidation Test Results for Silty Clay**

Borehole No. (Sample Depth)	Moisture Content	In-Situ Void Ratio ( $e_o$ )	Compression Index ( $C_c$ )	Re-Compression Index ( $C_r$ )
BH13-1 (4.6 m)	38.3	1.11	0.48	0.066

#### ***Clayey Silt***

A native deposit of grey clayey silt underlies the grey/brown mottled silty clay. The clayey silt deposit was generally soft, contained traces of sand and sand partings, and was approximately 4.0 to 6.0 m in thickness. Natural water contents of samples collected from the clayey silt deposit ranged from 26 to 45%.

A single laboratory consolidation test was also completed in the clayey silt deposit. A summary of the consolidation test results is presented in Table 5.3, below. The graphic results are presented in **Appendix E**.

**Table 5.3: Summary of Consolidation Test Results for Clayey Silt**

Borehole No. (Sample Depth)	Moisture Content	In-Situ Void Ratio ( $e_o$ )	Compression Index ( $C_c$ )	Re-Compression Index ( $C_r$ )
BH13-2 (5.8 m)	28.9	0.82	0.226	0.034

#### ***Gravelly Sand and Clayey Silt***

A native deposit of grey gravelly sand and clayey silt was encountered beneath the clayey silt deposit in each of the Stantec boreholes. It is inferred that this deposit is the transition between the overlying clayey silt deposit, and the underlying glaciated silty sand and gravel deposit. This transition zone was generally stiff to very stiff, and was approximately 1.2 to 1.6 m in thickness.

#### ***Glacial Till***

A native deposit of grey glaciated silty sand and gravel (glacial till) was encountered beneath the clayey silt transition zone within each of the Stantec boreholes. This glaciated silty sand and gravel deposit was generally very dense, contained some cobbles and traces of clay, and extended beyond the borehole termination depths. Natural water contents of samples collected from the glacial till deposit ranged from 8 to 11%.

#### ***Groundwater***

Due to the drilling techniques utilized, the depth to standing water cannot be readily recorded during the geotechnical investigation; however, based on interpretation of CPT results, it is estimated that the groundwater table is approximately 2.0 m below existing site grades. Based on the present soil conditions, it is envisaged that the groundwater level will not fluctuate significantly following extended periods of heavy precipitation or from seasonal changes.



## 6 DISCUSSION AND RECOMMENDATIONS

### 6.1 General

Based on the results of the Stantec field work, review of existing information, and engineering analyses, the main geotechnical findings are as follows:

1. Soil conditions at the time of our subsurface investigation generally consisted of a surficial cover of concrete over granular fills underlain by native deposits of silty clay and clayey silt with depth. The clayey silt is underlain by a deposit of glaciated silty sand and gravel (glacial till) which contained some cobbles and traces of clay and extended beyond the termination depths of the test holes.
2. The proposed development is considered feasible for the site. Conventional spread footings or pile foundations may be used to support the proposed building. Site preparation measures including preloading will likely be required for a building supported on conventional shallow foundations and for a grade support slab.
3. Site preparation within the proposed development area will likely include stripping of the existing concrete cover and any underlying fills required to achieve design grades. Stantec understands that design grades for the proposed development will not differ significantly from existing grades in this portion of the site. Excavated fill from beneath the existing concrete slab will likely not be suitable for reuse as structural fill.
4. The native soil deposits are sensitive to moisture and susceptible to mechanical disturbance; appropriate measures should be taken to protect these soils from softening or disturbance. Any bearing surfaces that become overly softened or saturated will need to be sub-excavated, and replaced with compacted, structural fill. Stantec recommends that earthworks are undertaken during a period of extended dry weather.
5. Based on the results of the Stantec subsurface investigation, it is considered appropriate to classify the seismic site response as Site Class E (in accordance with the 2012 BCBC). Earthquake induced liquefaction of the native soil deposits beneath the site is considered unlikely.

The following sections of this report present our geotechnical recommendations in greater detail. Recommendations for various geotechnical aspects of the project are based on the information obtained during the field investigation, and on detailed engineering analyses.

Terminology and specifications for aggregates, granular materials and asphalt pavement used in subsequent sections of this report are in accordance with the Master Municipal Construction Document (MMCD) Volume II, 2000 edition, developed jointly by the Consulting Engineers of BC, the BC Road Builders and Heavy Construction Association, and the Municipal Engineers Division of the Association of Professional Engineers and Geoscientists of BC.

## 6.2 Settlement and Preload Requirements

Cohesive soil deposits susceptible to consolidation are present on the subject site. Typically, three modes of consolidation or compression are associated with these deposits: elastic compression, primary consolidation, and secondary consolidation.

In general, settlements due to elastic compression will occur immediately as the load is applied and is considered to be minor in comparisons to settlements due to primary/secondary consolidation. Settlements due to primary consolidation are associated with the dissipation of excess porewater pressure induced by the development loads. In the Lower Mainland, this is typically a concern for cohesive soils with a soft to firm consistency. Settlements due to secondary consolidation are typically only a concern for organic rich soils and/or very thick cohesive deposits.

Analyses were carried out using the computer software Settle 3D to evaluate the primary consolidation settlements associated with the use of conventional spread footings. Based on the geology of the region, the near surface silty clay deposit is considered to be lightly to moderately over consolidated, and the underlying clayey silt deposit to be normally consolidated. Thus, settlement concerns for spread footings are predominantly associated with primary consolidation of the deeper native clayey silt deposit.

Footing settlements will be a function of both the footing size and the structural loads. Based on a lightly loaded structure where conventional minimum foundation requirements of column footings and strip foundations (i.e. 900 mm pad widths and 450 mm strip footing widths) are sufficient, post construction settlements of approximately 30 mm are anticipated.

For similar projects within the Lower Mainland, mitigation of settlements for shallow foundations due to primary consolidation of cohesive soil deposits is often addressed by preloading the building footprint prior to construction of the building. Under satisfactory completion of preloading, maximum total post construction settlements associated with primary consolidation are anticipated to be in the order of 25 mm. Stantec has not yet provided detailed preloading requirements for the proposed fixed-site non-intrusive imaging system structure. It is envisaged that once the structural design loads are finalized, Stantec will be contacted to provide recommendations regarding foundation design and potential preloading programs.

Based on preliminary analyses, implementation of a preloading program is feasible to mitigate post construction settlements to tolerable levels for column design loads up to approximately 1500 kN in magnitude.

Stantec assumes that column or point loads on concrete spread footings will be included within the proposed development as a result of structural loads spanning large openings that will be required on either end of the structure to drive trucks into. In general, column loads often result in the maximum observed settlements and will dictate the preload requirements. Therefore, once loading conditions for the proposed structure have been developed, Stantec should be contacted to further assess preload feasibility and finalize the preload height and duration requirements. Based on column loading conditions of up to 1500 kN, it is anticipated that the preload height may approach 3 m. At

this time, Stantec considers preloads in excess of 3 to 4 m in height may not be practical for the proposed development area based on the current site configuration.

It should be noted that in all cases the actual preload duration will be dependent on the observed rate of consolidation and measured settlements. Subsequent to finalizing the proposed building layout Stantec will provide recommendation regarding the minimum number of settlement gauges to be installed within the building footprint to verify substantial completion of primary consolidation prior to removal of the preload. The settlement gauges should be surveyed prior to the placement of preload fill, immediately subsequent to preload placement, and weekly thereafter until it is determined that these temporary fills can be removed. The preload should extend at full height to a minimum of 2.0 m beyond the proposed building lines. An as-built drawing of the temporary preload fills should be prepared by a certified BC Land Surveyor and provided to Stantec for our review to verify adequate preload extents.

### **6.3 Structural Fill**

Structural fill should consist of pre-approved, engineered 75 mm (3 inch) minus pit run sand and gravel (MMCD, Section 02226, Item 2.3). Structural fill should be placed in maximum 300 mm lifts and compacted to at least 100% Standard Proctor Maximum Dry Density (SPMDD) within building areas and pavement areas. Inspection and testing by Stantec will be required during construction to ensure that all fill used is suitable and is placed and compacted to the above-noted specifications.

### **6.4 Foundation Design**

Determination of the most cost-effective foundation scheme for the proposed fixed-site non-intrusive imaging system structure on the site will depend largely on the structural design loads, which are not known during the preparation of this report.

Provided that adequate site preparation is carried out, it is anticipated that a lightly loaded structure (e.g., typical loading of a one storey, steel frame warehouse-type building) could be constructed on conventional strip and pad footings founded on a layer of structural fill atop the native silty clay. Stantec considers that conventional shallow foundations would likely be the most economical foundation scheme for a lightly loaded structure.

For a heavily loaded structure (e.g., typical loading of multi-story concrete buildings), the use of conventional strip and pad footings would likely not be practical due to the relatively low bearing capacity of the silty clay, and the settlements associated with primary consolidation of the underlying clayey silt deposit. In such a scenario, the use of pile foundations to support heavily loaded structures may be a more economical option.

#### **6.4.1 Shallow Foundations**

Based on the finalized design loads, the proposed imaging system structure may be supported on conventional pad and strip footings founded on the native silty clay deposit or on compacted structural fill (as defined in Section 6.3) over these native soils. It should be noted that based on the

design loads and settlement criteria, successful completion of an adequately designed preloading program may be required such that post construction settlements are within tolerable limits.

Pad and strip footings should be designed for a Serviceability Limit State (SLS) bearing resistance of 150 kPa, which, subsequent to the preloading program, corresponds to an estimated total post-construction settlement of less than 25 mm, as outlined in Section 6.2. We recommend using a factored Ultimate Limit States (ULS) bearing resistance of 225 kPa for pad and strip footings founded on the soils listed above. The factored ULS bearing resistance includes a geotechnical resistance factor of 0.5.

Strip and pad footings should have minimum widths of 450 mm and 900 mm, respectively. All exterior footings in permanently heated buildings should be founded at least 450 mm below finished exterior grade for protection against frost action.

Lightly loaded footings which are relatively insensitive to settlements including light-posts, signs, etc. could be founded on inorganic fill (i.e. existing site grading fills). The minimum footing depths should be 450 mm for frost protection, though many of these structures may require additional footing embedment to resist overturning loads.

All bearing surfaces for footings shall be dry and free of loose or deleterious material prior to placement of concrete. Where construction is undertaken during winter conditions, foundations should be protected against heave due to frost. Foundation bearing soils should not be allowed to freeze, and in no case may frozen soil be used as foundation backfill.

#### **6.4.2 Deep Foundations**

If the structural loads are large enough, the use of conventional strip and pad footings may not be practical due to the settlements associated with primary consolidation of the clayey silt deposit. In such a scenario, the fixed-site non-intrusive imaging system structure may be pile supported.

Stantec understands that the building layout and structural details have not yet been finalized, and anticipates that there is the possibility that pile foundations may support either:

- Loads from perimeter walls and columns
- Loads from perimeter walls, columns, and the x-ray equipment
- Loads from perimeter walls, columns, x-ray equipment, and entire slab

Based on the soil conditions encountered on-site and the anticipated loading conditions, Stantec considers that conventional end bearing pile foundations driven to a design criteria refusal in the very dense glaciated soils underlying the near surface cohesive deposits to be most practical.

Driven timber piles are often a cost effective foundation option for settlement sensitive structures. Typical allowable or SLS design capacities for a 200 mm tip diameter timber pile driven to refusal in the very dense glaciated soils would be in the order of 200 kN. It should be noted that if the finalized design loads of the x-ray equipment and structure are large enough, timber piles may no longer be feasible as the pile spacing will be reduced beyond practical limits and this foundation scheme will become cost prohibitive.

Steel pipe piles are often a cost effective foundation option for more heavily loaded settlement sensitive structures. Typical allowable or SLS design capacities for a 300 mm diameter steel pipe pile driven to refusal in the very dense glaciated soils would be in the order of 450 kN. It should be noted that, if warranted by the design loads of the x-ray equipment and structure, larger diameter steel pipe piles typically have increased design capacities.

## **6.5 Slabs**

Based on design loads, the slab of the proposed imaging system building may be either grade supported without completion of a preloading program, grade supported with completion of a preloading program, or pile supported. If the slab loading conditions are significant enough that tolerable settlement criteria are exceeded, it may be feasible to implement a preloading program such that settlements are mitigated to tolerable magnitudes; however, there is a practical limit to preload heights and the slab may need to be pile supported if design loads are large enough.

If slab-on-grade floors are utilized (with or without a preloading program), the floor slab should be placed on a bedding layer consisting of at least 300 mm of clean, free-draining 19 mm minus clear crushed gravel (MMCD, Section 02226, Item 2.6) compacted to 100% SPMDD. Where the slab is near or below final exterior grades, the underslab drainage layer should be connected to a perimeter drainage system. This may be done by providing 100 mm diameter weep holes through the foundation wall at typically at 3 m on-centres at an elevation above the level of the perimeter drains.

Often, a vapour barrier is used below concrete slab areas. However, the usage of a vapour barrier could result in curling of the concrete slab. Floor covers sensitive to moisture typically requires the usage of a vapour barrier. A materials or structural engineer should be consulted regarding the detailing of the vapour barrier below concrete slabs. The American Concrete Institutes ACI 360R-06 Design of Slabs on Grade and ACI 302.1R-04 Guide for Concrete Floor and Slab Construction are recommended references for vapour barrier selection and floor slab detailing.

## **6.6 Building and Site Drainage**

Permanent drainage measures should include perimeter drainage at foundation base elevation around all portions of buildings constructed below final grade, and underslab drainage for all proposed slabs below or near final site grades.

It is recommended that a perimeter drainage system, consisting of at least 100 mm diameter slotted or perforated rigid wall pipe, be placed around all portions of the building with slabs below a level 150 mm above average final site grades. The drainage pipes should be surrounded by a minimum of 150 mm of 19 mm drain rock or 19 mm clear crush gravel (MMCD, Section 02226, Item 2.6). The invert elevation of the drain pipes should be at least 150 mm below the underside of the slabs.

The perimeter drainage system should be designed to direct water by gravity flow into a permanent storm water drain or collector sump. The roof and surface runoff should be collected and directed to a storm sewer in a solid wall pipe, separate from the perimeter drainage. Final ground surfaces around the development should be graded to direct surface runoff away from building areas.

## 6.7 Lateral Loads and Backfill Adjacent to Subgrade Walls

Any proposed subgrade walls (i.e., basement foundation walls, retaining walls etc.) must be designed to resist static lateral soil pressures and dynamic lateral pressures induced by seismic activity. For subgrade walls up to 3 m in height, lateral earth loads should be calculated on the basis of a uniform pressure of 20 kPa. This pressure includes both static and seismic loading.

If positive drainage is not provided in the backfill behind the subgrade walls, full hydrostatic pressures should be included in the calculation for lateral loads. In order to reduce hydrostatic pressures that may build up in the backfill, subgrade walls should be backfilled with at least a 450 mm wide zone of free-draining backfill. The free-draining backfill should extend to within 600 mm of final grade.

## 6.8 Excavations, Utility Trenches and Dewatering

Excavations greater than 1.2 m (4 ft.) in depth must have side slopes no steeper than 1H:1V (horizontal to vertical) to a maximum depth of approximately 3 m (10 ft.). Deeper unsupported excavation slopes should be no steeper than 1.5H:1V. These slope configurations assume relatively minor groundwater seepage into the excavation as well as no significant loads along the excavation crest. Flatter excavation slopes may be required for notable seepage conditions and/or significant loads within 5 m of the excavation crest.

Excavations should be inspected regularly for signs of instability and slopes flattened, if required. All excavations should be carried out in accordance with Workers' Compensation Board (WCB) regulations applicable in BC.

Bedding fill for pipes and utilities should conform to Master Municipal Construction Document or the pipe supplier's specifications. Bedding fill should be compacted to a minimum 90% MPMDD. In general, a minimum of 150 mm of bedding fill should be placed below all pipes. If wet conditions are encountered in the utility trench, drain rock (MMCD, Section 02226, Item 2.6) can be used as bedding below pipes. Trench backfill above bedding fills should consist of structural fill as defined in Section 6.3.

It is not likely that groundwater will be encountered in shallow excavations less than 2.0 m in depth. However, all excavations must be kept dry during construction, and we consider that dewatering can likely be handled with conventional sump and pump techniques.

## 6.9 Seismic Considerations

Seismic design for "normal structures", such as warehouses, low-rise commercial buildings, and high-rise office towers, is based on the 2010 National Building Code of Canada (NBCC), which was adopted in the 2012 British Columbia Building Code (BCBC) last year. The primary objective of the NBCC earthquake resistant design requirements for "normal structures" is to protect the life and safety of the building occupants as the building responds to strong ground shaking. Structures designed in conformance with the NBCC provisions may undergo extensive structural damage during strong ground shaking but should not collapse. Collapse is defined to be a state where occupants can no longer exit the building because of structural failure. This implies that key structural components

of a building and supporting foundations necessary to ensure the building's post-earthquake stability must be protected against collapse under design levels of shaking.

The 2010 NBCC seismic design procedures are based on ground motion parameters [e.g., peak ground acceleration (PGA) and spectral acceleration ( $S_a$ ) values] having a 2% probability of exceedence in 50 years, which corresponds to a 0.04% probability of exceedence (i.e., the 2,475 year return period earthquake event). The design PGA for firm ground for this site in the City of Surrey is 0.51g (g = acceleration due to gravity).

Based on the results of the Stantec field investigation and the subsurface conditions encountered at the subject site, it is considered appropriate to classify the seismic site response as Site Class E.

While some damage to the building would be expected under the influence of 2010 NBCC design earthquake event, it is not anticipated that collapse of the building would occur due to foundation failure, and the intent of the building code would be achieved.

## **7 ENGINEERING FIELD REVIEW DURING CONSTRUCTION**

Stantec should be retained to provide part-time geotechnical engineering field review during construction in order to verify that the soil conditions encountered are consistent with our design assumptions and that the intent of our recommendations is being met. The field and engineering review as outlined below will fulfill the obligations specified in the British Columbia Building Code Letters of Assurance as required by the City of Surrey.

- Verify the soil bearing at footing locations.
- Density testing to verify compaction of structural fills.
- Verify under-slab and perimeter drainage requirements.
- Density testing to verify compaction below slab-on-grade floors.
- Density testing to verify compaction of new pavement sections.



## 8 CLOSURE

This report was prepared for the exclusive use of Public Works and Government Services Canada (PWGSC) and their agents. Any use of this report or the material contained herein by third parties, or for other than the intended purpose, should first be approved in writing by Stantec.

The recommendations contained in this report are based on assumed continuity of soils with those of our boreholes, and preliminary design grades. Stantec should be provided with final architectural and structural drawings when they become available in order that we may review our design recommendations and advise of any revisions, if necessary.

Use of this report is subject to the Statement of General Conditions provided in Appendix A. It is the responsibility of PWGSC, who is identified as “the Client” within the Statement of General Conditions, and its agents to review the conditions and to notify Stantec should any of these not be satisfied. The Statement of General Conditions addresses the following:

- Use of the report
- Basis of the report
- Standard of care
- Interpretation of site conditions
- Varying or unexpected site conditions
- Planning, design or construction

This report was prepared by Tyler Trudel, M.Eng., P.Eng. and reviewed by Wayne Quong, M.A.Sc., P.Eng.

Respectfully submitted,  
**Stantec Consulting Ltd.**

**Original Signed By:**

Tyler Trudel, M.Eng., P.Eng.  
Geotechnical Engineer

TT/WQ/nlb

**Original Signed By:**

Wayne Quong, M.A.Sc., P.Eng.  
Senior Associate





# **APPENDIX A**

## **Statement of General Conditions**

## Statement of General Conditions

**USE OF THIS REPORT:** This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Stantec Consulting Ltd. (Stantec) and the Client. Any use which a third party makes of this report is the responsibility of such third party.

**BASIS OF THE REPORT:** The information, opinions, and/or recommendations made in this report are in accordance with Stantec's present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Stantec is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

**STANDARD OF CARE:** Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state or province of execution for the specific professional service provided to the Client. No other warranty is made.

**INTERPRETATION OF SITE CONDITIONS:** Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Stantec at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

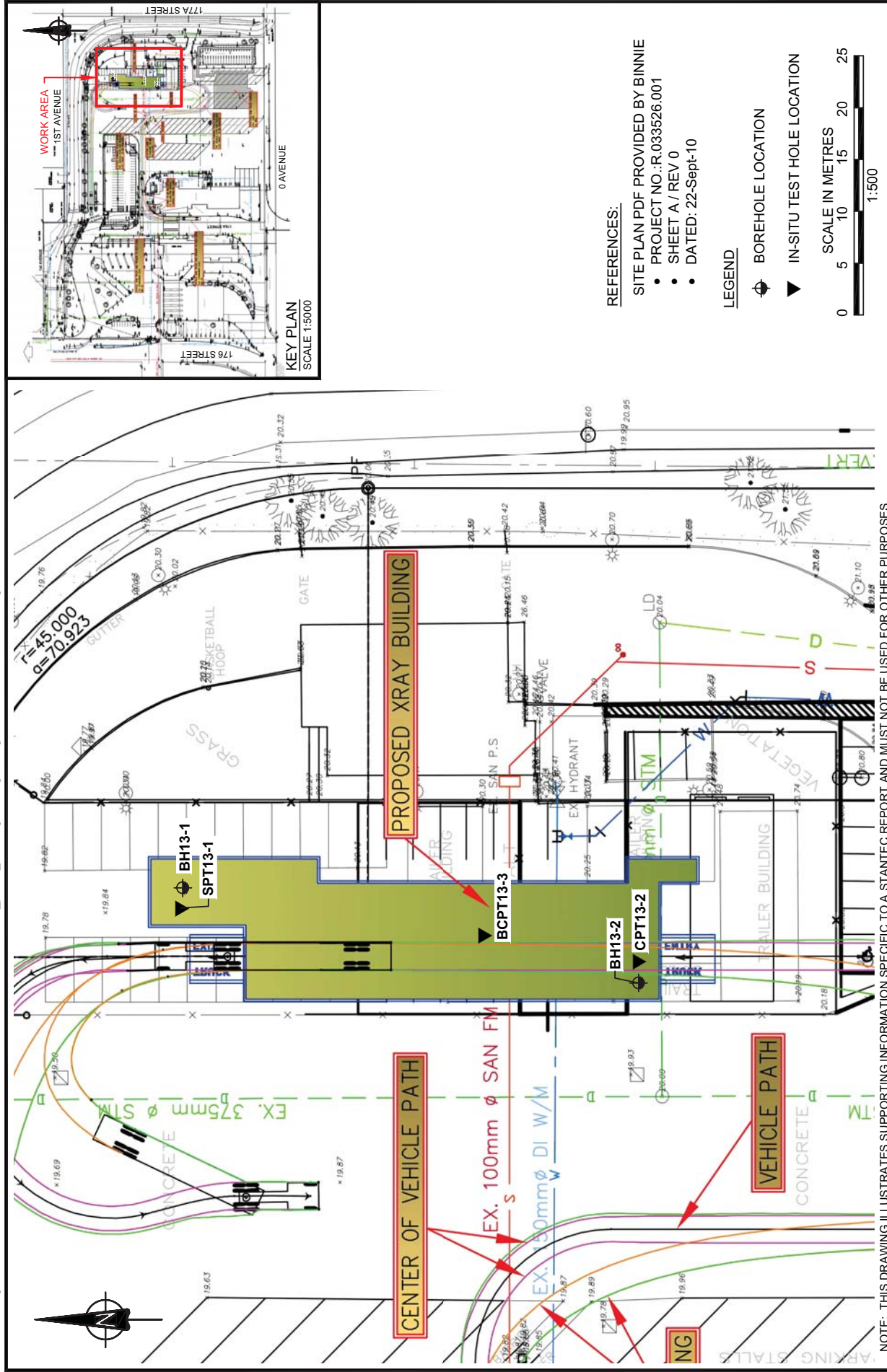
**VARYING OR UNEXPECTED CONDITIONS:** Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Stantec must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Stantec will not be responsible to any party for damages incurred as a result of failing to notify Stantec that differing site or sub-surface conditions are present upon becoming aware of such conditions.

**PLANNING, DESIGN, OR CONSTRUCTION:** Development or design plans and specifications should be reviewed by Stantec, sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Stantec cannot be responsible for site work carried out without being present.



# **APPENDIX B**

## **Testhole Location Plan**




- REFERENCES:**
- SITE PLAN PDF PROVIDED BY BINNIE
  - PROJECT NO.: R.033526.001
  - SHEET A / REV 0
  - DATED: 22-Sept-10

**LEGEND**

- BOREHOLE LOCATION
- IN-SITU TEST HOLE LOCATION

SCALE IN METRES  
0 5 10 15 20 25  
1:500

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<b>BOREHOLE LOCATION PLAN</b>		<b>Job No.:</b> 123310945	<b>Dwg. No.:</b>  <b>1</b>	
<b>PROPOSED FIXED SITE NON-INTRUSIVE INSPECTION SYSTEM</b> <b>PACIFIC HIGHWAY PORT OF ENTRY - 176TH STREET, SURREY, BC</b>		<b>Scale:</b> 1:500		
		<b>Date:</b> 20-Mar-13		
		<b>Dwn. By:</b> GH		
		<b>App'd By:</b> TT		
<b>Client:</b>	<b>PUBLIC WORKS &amp; GOVERNMENT SERVICES CANADA</b>			





# APPENDIX C

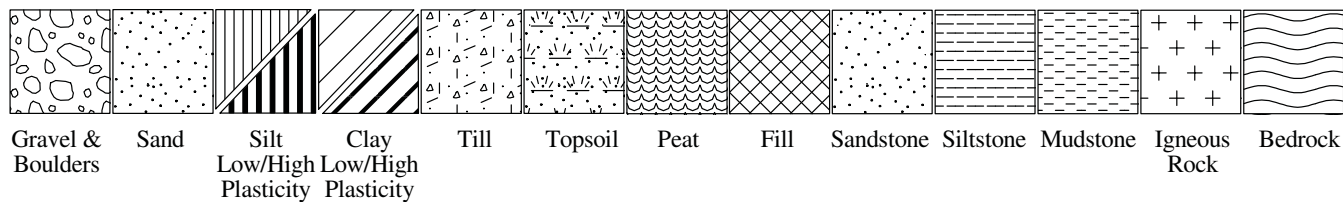
## Borehole Records



# Stantec

## SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

### STRATA PLOT



Initial water level reading

Long term water level reading  
(date)

### SOIL DESCRIPTION

Terminology used for describing soil strata based upon the proportion of individual particle sizes present:

less than 10%	Trace	20-35%	Adjective (e.g. silty or sandy)
10-20%	Some	35-50%	And (e.g. silt and sand)

The standard terminology to describe cohesionless soils includes the state of packing, as determined by laboratory test or by the Standard Penetration Test 'N' -value: the number of blows of 140 pound (64kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8mm) O.D. split spoon sampler one foot (305 mm) into the soil. The state of packing approximately relates to the SPT 'N' value as follows:

State of Packing	'N' Value	Relative Density %	State of Packing	'N' Value	Relative Density %
Very Loose	<4	<15	Dense	30-50	65-85
Loose	4-10	15-35	Very Dense	>50	>85
Medium Dense	10-30	35-65			

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer test, unconfined compression tests, or occasionally by standard penetration tests.

Consistency	Undrained Shear Strength kips/sq.ft.	Undrained Shear Strength kPa	'N' Value	Consistency	Undrained Shear Strength kips/sq.ft.	Undrained Shear Strength kPa	'N' Value
Very Soft	<0.25	<12.5	<2	Stiff	1.0-2.0	50-100	8-15
Soft	0.25-0.5	12.5-25	2-4	Very Stiff	2.0-4.0	100-200	15-30
Firm	0.5-1.0	25-50	4-8	Hard	>4.0	>200	>30

### SAMPLES



GS... Grab Sample



RC... Rock Core



NR... No Recovery



AS... Auger Sample



ST... Shelby tube or thin wall tube



UNDIST .. Undisturbed Sample



SS... Split spoon sample  
(Obtained by performing the  
Standard Penetration Test)

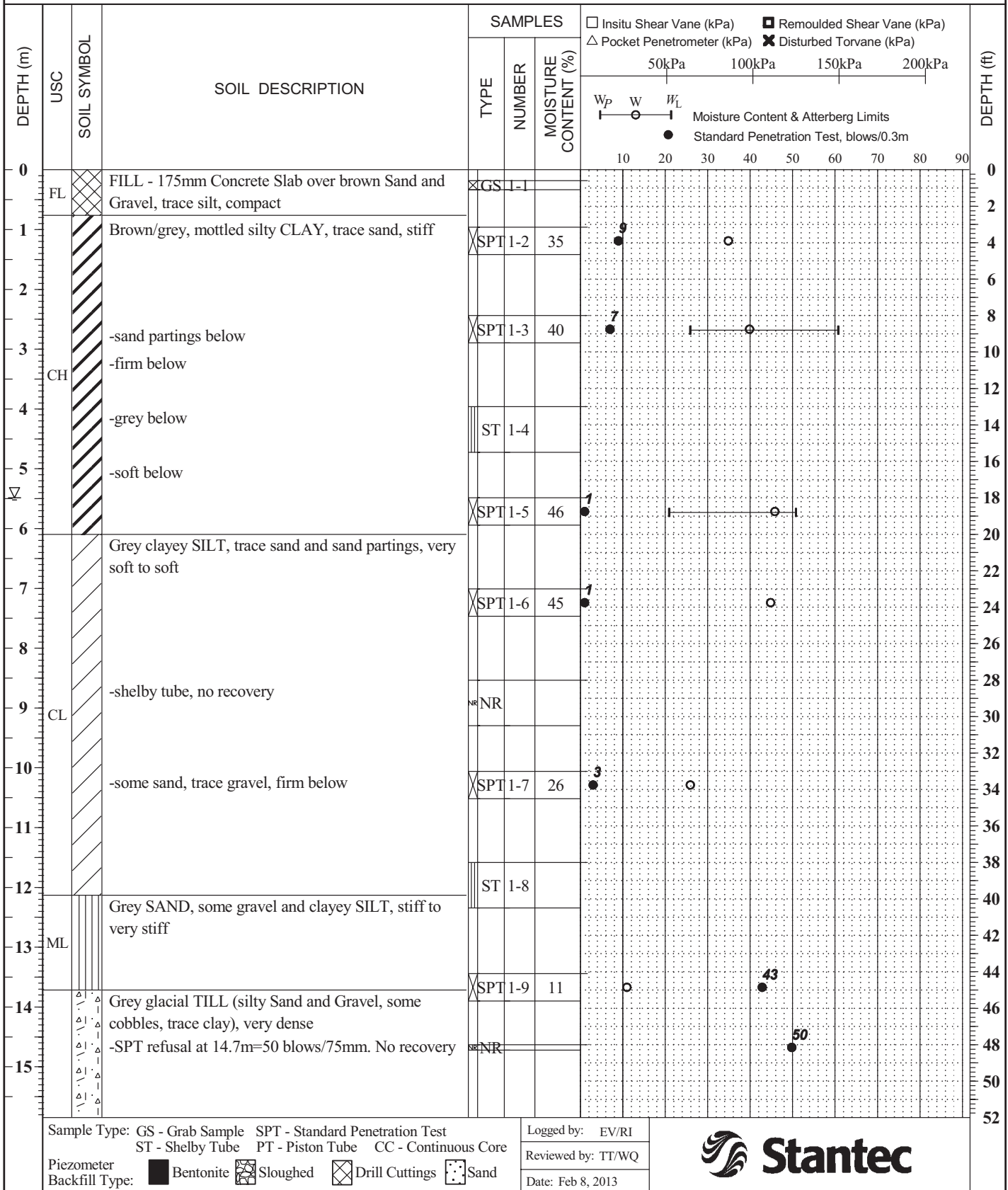


Ps... Piston Sample

# BOREHOLE RECORD

TH13-1

CLIENT PUBLIC WORK AND GOVERNMENT SERVICES CANADA PROJECT No. 123310945  
 PROJECT Geotechnical Assessment DATUM                      NORTHING                       
 LOCATION Pacific Crossing, 176A St. and 0 Ave., Surrey, BC ELEVATION                      EASTING                       
 DRILLING DATE Feb 5, 2013 DRILLING CO. Sea to Sky DRILLING METHOD Mud Rotary

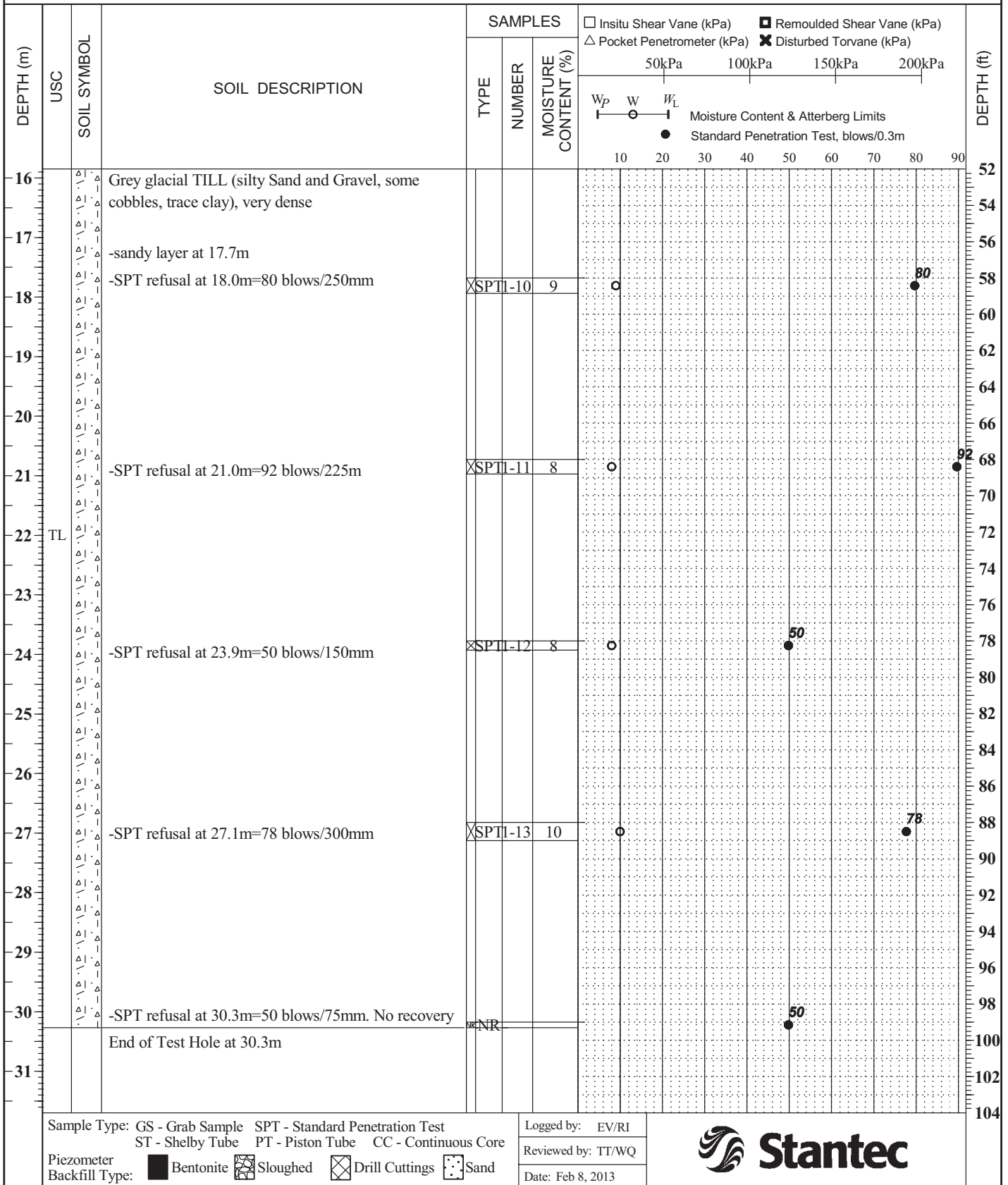




# BOREHOLE RECORD

TH13-1 cont'd

CLIENT PUBLIC WORK AND GOVERNMENT SERVICES CANADA PROJECT No. 123310945  
 PROJECT Geotechnical Assessment DATUM                      NORTHING                       
 LOCATION Pacific Crossing, 176A St. and 0 Ave., Surrey, BC ELEVATION                      EASTING                       
 DRILLING DATE Feb 5, 2013 DRILLING CO. Sea to Sky DRILLING METHOD Mud Rotary

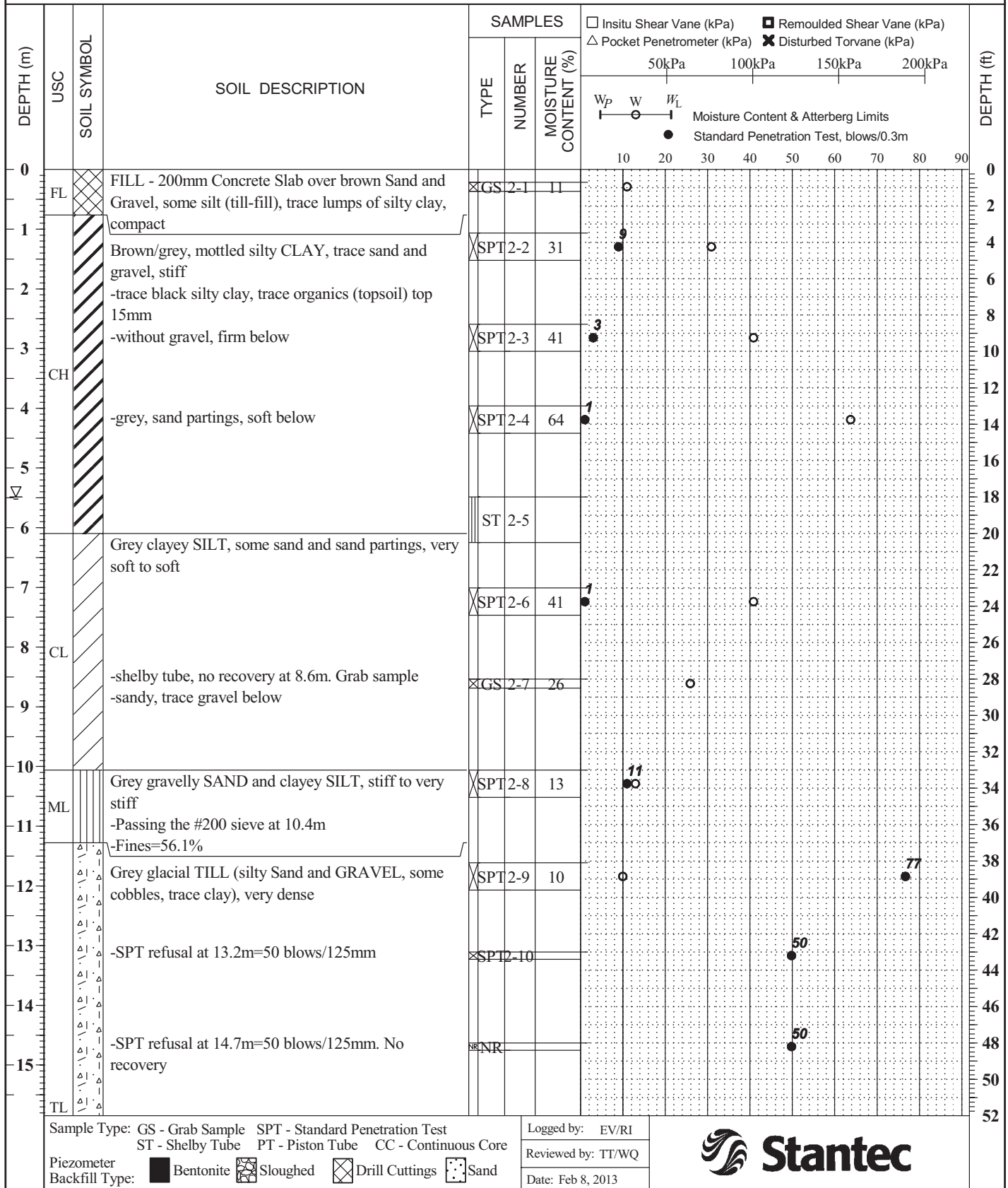




# BOREHOLE RECORD

TH13-2

CLIENT PUBLIC WORK AND GOVERNMENT SERVICES CANADA PROJECT No. 123310945  
 PROJECT Geotechnical Assessment DATUM                      NORTHING                       
 LOCATION Pacific Crossing, 176A St. and 0 Ave., Surrey, BC ELEVATION                      EASTING                       
 DRILLING DATE Feb 6, 2013 DRILLING CO. Sea to Sky DRILLING METHOD Mud Rotary



# BOREHOLE RECORD

TH13-2 cont'd

CLIENT PUBLIC WORK AND GOVERNMENT SERVICES CANADA PROJECT No. 123310945  
 PROJECT Geotechnical Assessment DATUM                      NORTHING                       
 LOCATION Pacific Crossing, 176A St. and 0 Ave., Surrey, BC ELEVATION                      EASTING                       
 DRILLING DATE Feb 6, 2013 DRILLING CO. Sea to Sky DRILLING METHOD Mud Rotary

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			Moisture Content & Atterberg Limits		DEPTH (ft)
				TYPE	NUMBER	MOISTURE CONTENT (%)	W <sub>p</sub>	W <sub>L</sub>	
16		Δ	Grey glacial TILL (silty Sand and Gravel, some cobbles, trace clay), very dense						52
17		Δ	-SPT refusal at 16.2m=50 blows/100mm						54
18		Δ							56
19		Δ							58
20		Δ							60
21		Δ							62
22		Δ							64
23		Δ							66
24		Δ							68
25		Δ							70
26		Δ							72
27		Δ							74
28		Δ							76
29		Δ							78
30		Δ							80
31		Δ							82
			End of Test Hole at 20.1m						84
									86
									88
									90
									92
									94
									96
									98
									100
									102
									104

Sample Type: GS - Grab Sample SPT - Standard Penetration Test


ST - Shelby Tube PT - Piston Tube CC - Continuous Core

Piezometer Backfill Type: ☒ Bentonite ☒ Sloughed ☒ Drill Cuttings ☒ Sand

Logged by: EV/RI

Reviewed by: TT/WQ

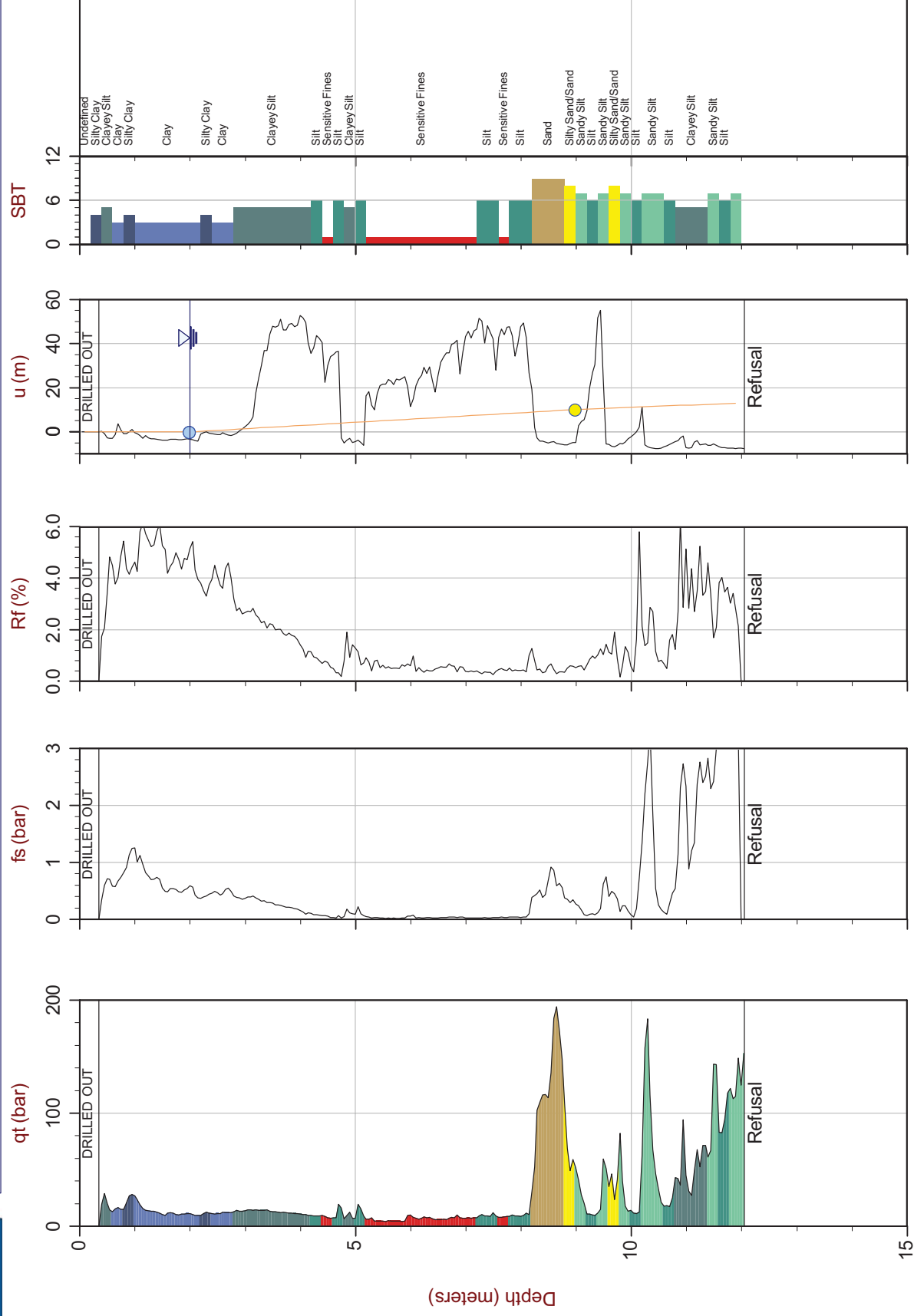
Date: Feb 8, 2013





# **APPENDIX D**

## **In-Situ Testing Results**



Max Depth: 12.050 m / 39.53 ft  
Depth Inc: 0.050 m / 0.164 ft  
Avg Int: 0.200 m Overplot Ite

File: 13-02021\_SP01.COR  
Unit Wt: SBT Chart Soil Zone

SBT: Lunne, Robertson and Powell, 1997  
 Coords: UTM 10 North N: 5427817m E: 519594m  
 Page No: 1 of 1

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



Stantec

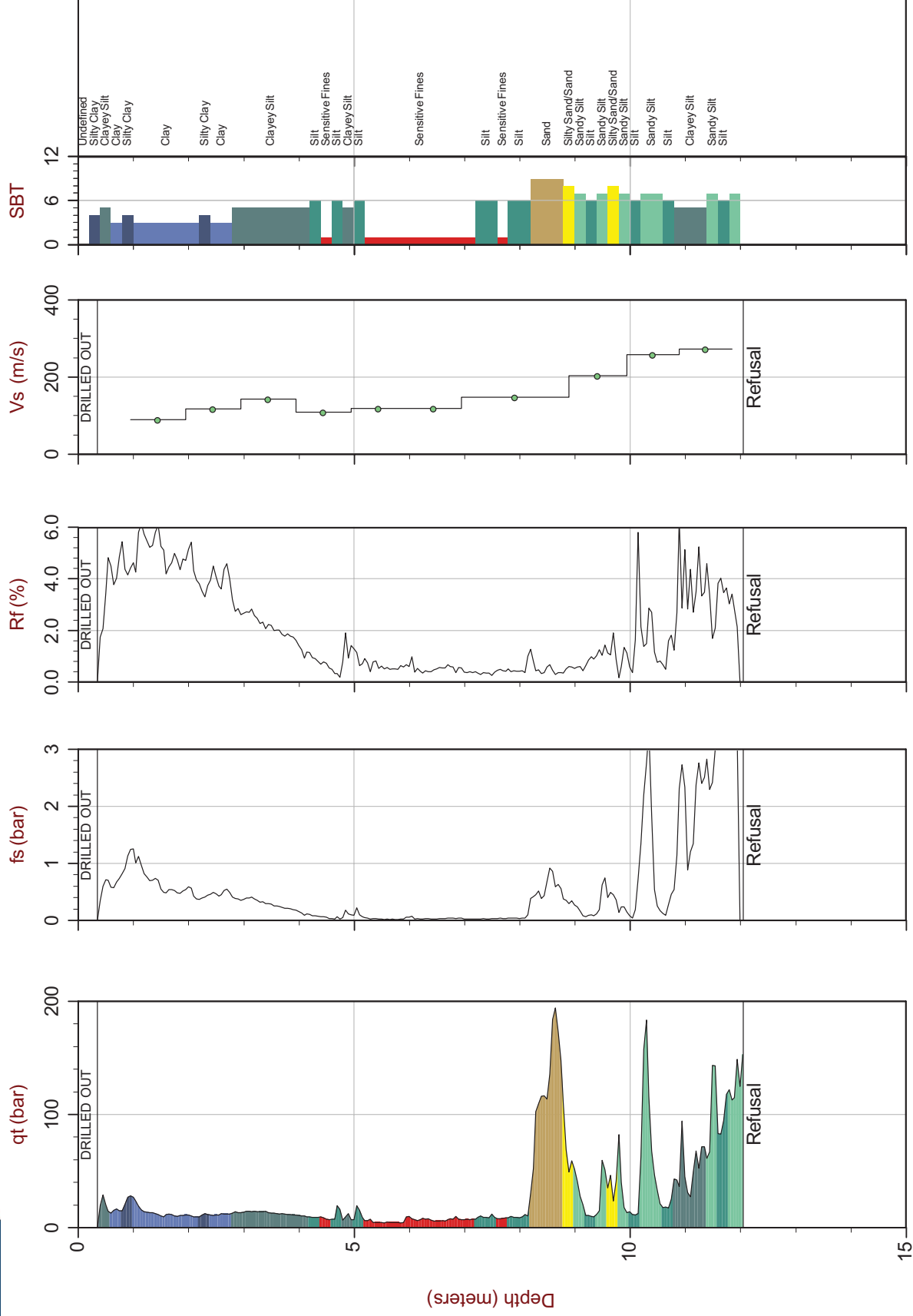
Job No: 13-02021

Date: 02:08:13 08:41

Site: Pacific Highway Border Crossing, Surrey, BC

Sounding: SCPT13-01

Cone: 381:T1500F15U500



Max Depth: 12.050 m / 39.53 ft  
Depth Inc: 0.050 m / 0.164 ft  
Avg Int: 0.200 m

File: 13-02021\_SP01.COR  
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997  
Coords: UTM 10 North N: 5427817m E: 519594m  
Page No: 1 of 1

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



Stantec

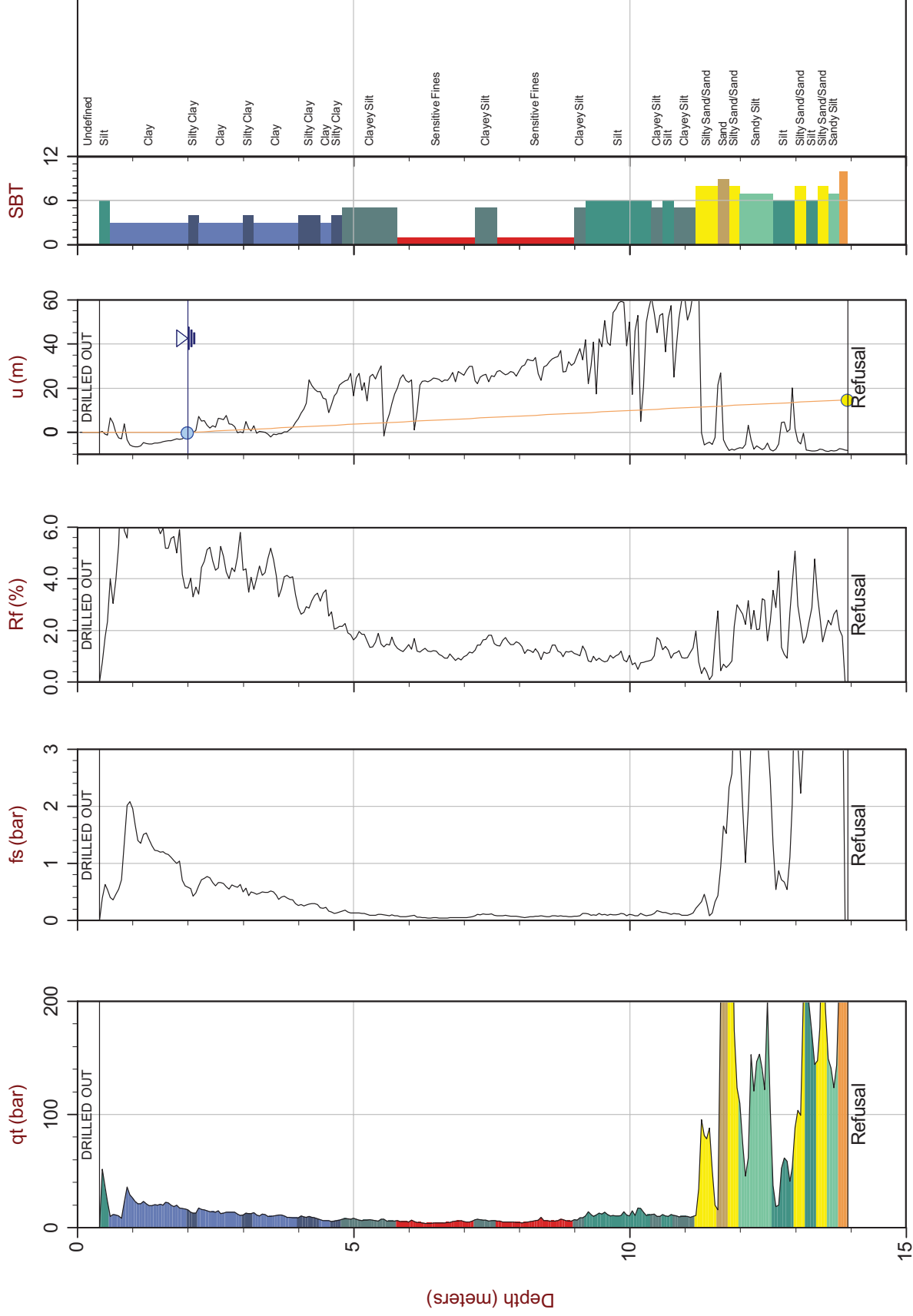
Job No: 13-02021

Date: 02:08:13 10:21

Site: Pacific Highway Border Crossing, Surrey, BC

Sounding: CPT13-02

Cone: 247:T500F10U500



Max Depth: 13.950 m / 45.77 ft  
Depth Inc: 0.050 m / 0.164 ft  
Avg Int: 0.200 m Overplot Item:

File: 13-02021\_CP02.COR  
Unit Wt: SBT Chart Soil Zones

● Equilibrium Pore Pressure (Ueq) ● Assumed Ueq

— Ueq Line

SBT: Lunne, Robertson and Powell, 1997  
Coords: UTM 10 North N: 5427874m E: 519597m  
Page No: 1 of 1

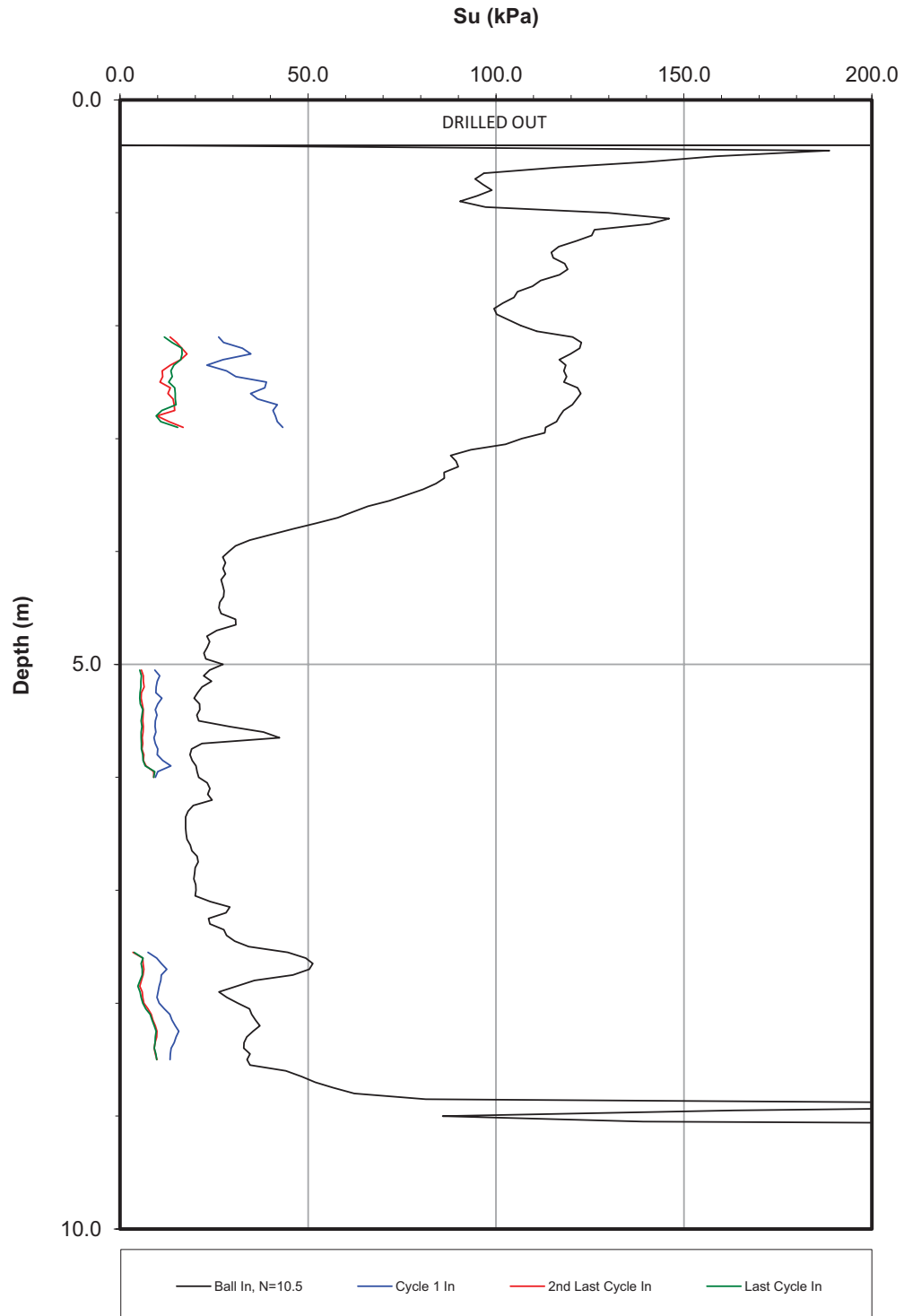
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



Job No:13-02021  
Client: Stantec Consulting Ltd.  
Project: Pacific Border Crossing, BC  
Sounding: BCPT13-03  
Sounding Date: February 8, 2013

Coordinate System: UTM 10 North  
Northing (m): 5427839  
Easting (m): 519601

### Flow Penetrometer Undrained Strength





# **APPENDIX E**

## **Laboratory Testing Results**




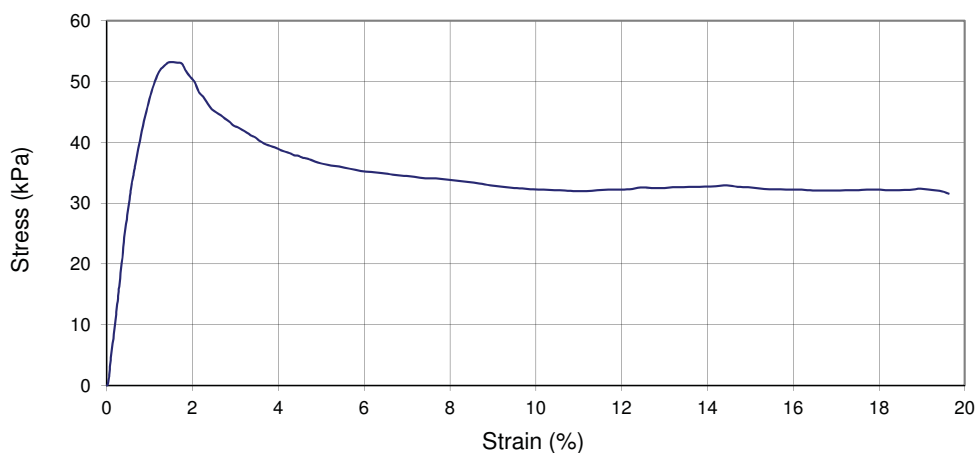
**Unconsolidated-Undrained Triaxial Compression Test  
(ASTM D 2850)**

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-1	Station:	UU
Sample No.:	13-15.33'	Depth (m):	4.22

Sample Data	
Diameter (mm)	72.77
Height (mm)	174.59
Weight of container + sample (g)	1246.48
Weight of container (g)	0.00
Cell Pressure (kPa)	100.00
Strain rate (%/min)	1
Total Unit Weight (kN/m <sup>3</sup> )	16.84
Water Content	
Tin No.	11
Weight of tin (g)	32.91
Tin + Wet weight (g)	69.73
Tin + Dry weight (g)	58.70
Water Content (%)	42.8
Sample Properties	
Shear Strength (kPa)	26.6
Strain at Failure (%)	1.6
Total Unit Weight (kN/m <sup>3</sup> )	16.84
Dry Unit Weight (kN/m <sup>3</sup> )	11.80
Water Content (%)	42.8

Sample Failure





Observations: Some areas are more silt and crack easily.

Performed By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 14, 2013	Date:	February 15, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

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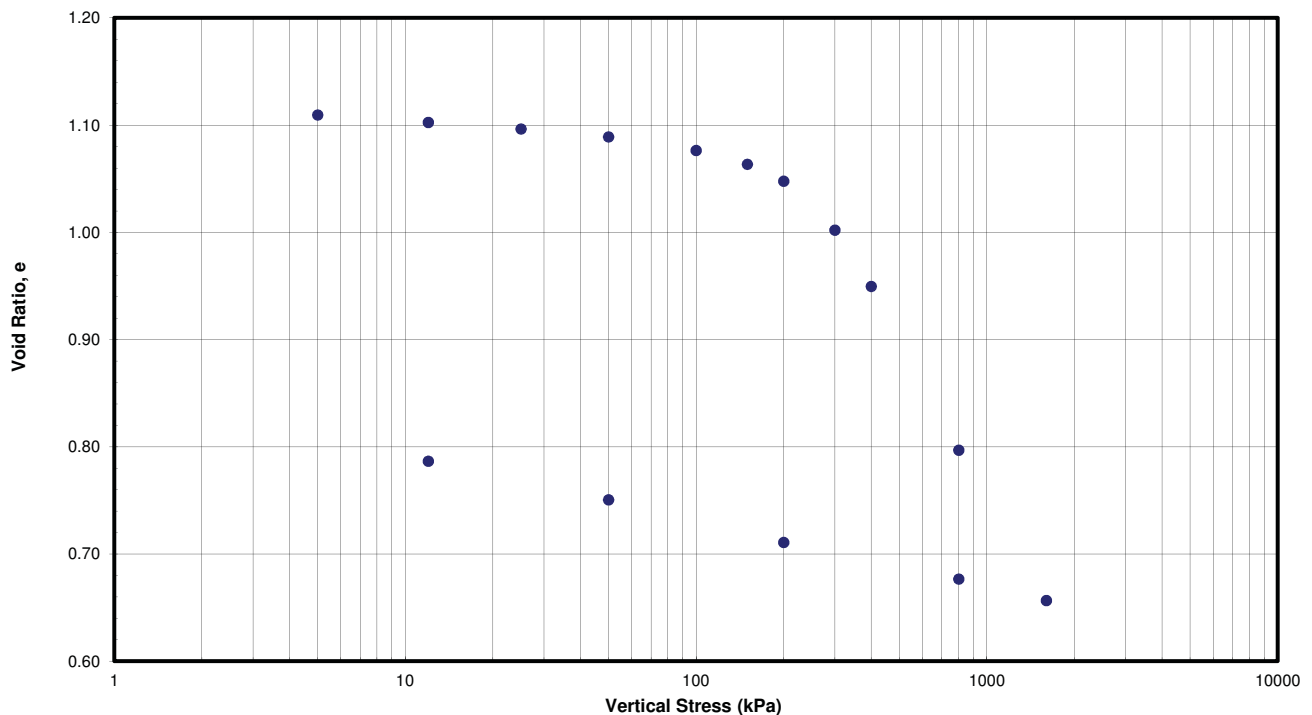
## One-Dimensional Consolidation (ASTM D 2435)



Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3'	Depth (m):	4.57

Weight of Ring (g):	212.25	Ring + Wet Weight (g):	354.64	Initial Void Ratio, e:	1.11
Initial Height (mm):	25.40	Ring + Dry Weight (g):	315.19	Height of Soil, Hs (mm):	12.04
Diameter of Ring (mm):	63.50	Water Content (%):	38.3	Height of Void, Hv (mm):	13.36
Unit Weight (kN/m <sup>3</sup> ):	17.37	Specific Gravity, Gs:	2.70		

Step No.	Vertical Stress (kPa)	Height of Sample (mm)	Vertical Strain (%)	Final Void Ratio e <sub>f</sub>	Change in Void Ratio e	Coefficient of Compressibility a <sub>v</sub> (m <sup>2</sup> /MN)	Coefficient of Volume Compressibility m <sub>v</sub> (m <sup>2</sup> /MN)
1	5	25.3975	0.0100	1.1096	0.00		
2	12	25.3136	0.3400	1.1026	0.01	0.9946	0.47
3	25	25.2400	0.6300	1.0965	0.01	0.4706	0.22
4	50	25.1511	0.9800	1.0891	0.01	0.2954	0.14
5	100	24.9987	1.5800	1.0764	0.01	0.2532	0.12
6	150	24.8437	2.1900	1.0636	0.01	0.2574	0.12
7	200	24.6532	2.9400	1.0478	0.02	0.3165	0.15
8	300	24.1046	5.1000	1.0022	0.05	0.4557	0.22
9	400	23.4728	7.5874	0.9497	0.05	0.5248	0.25
10	800	21.6340	14.8268	0.7970	0.15	0.3818	0.18
11	1600	19.9456	21.4740	0.6567	0.14	0.1753	0.08
12	800	20.1869	20.5240	0.6768	-0.02	0.0251	0.01
13	200	20.5976	18.9069	0.7109	-0.03	0.0569	0.03
14	50	21.0762	17.0229	0.7506	-0.04	0.2650	0.13
15	12	21.5097	15.3163	0.7866	-0.04	0.9475	0.45



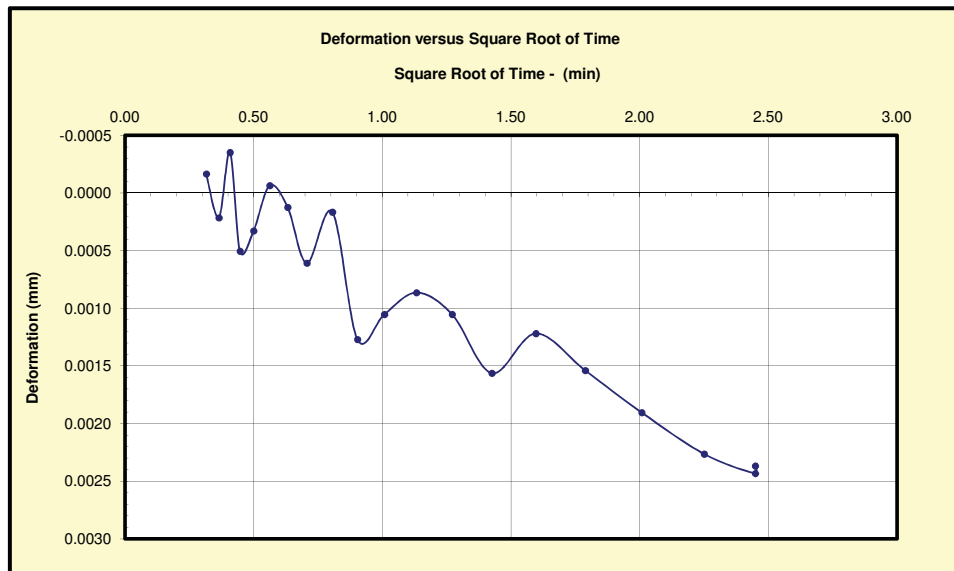
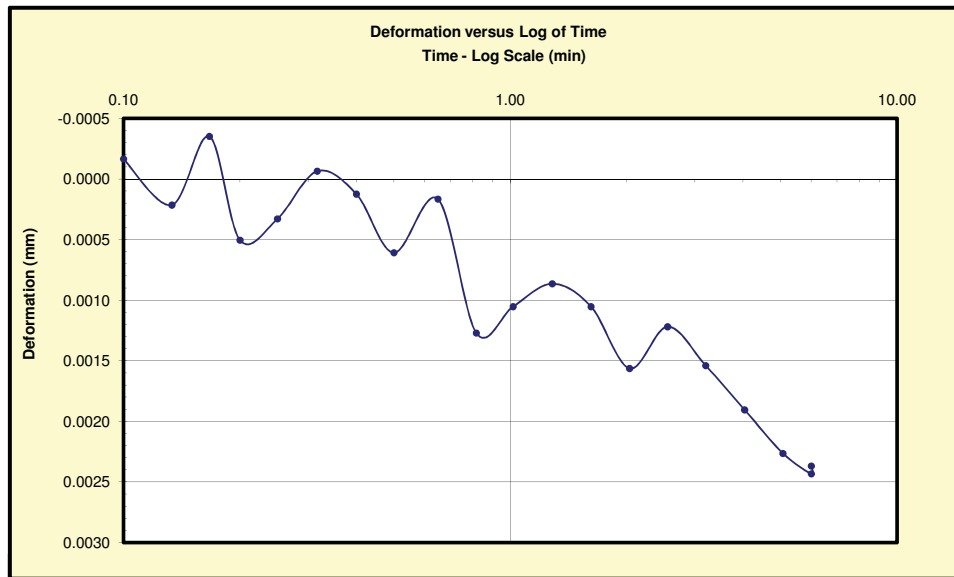
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

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## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	1	Vertical Stress (kPa):	5.0



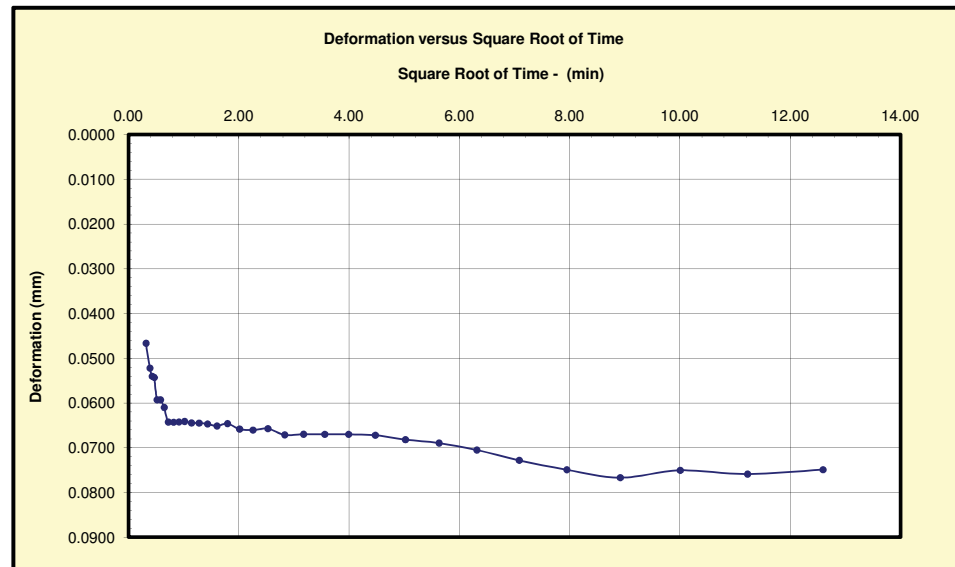
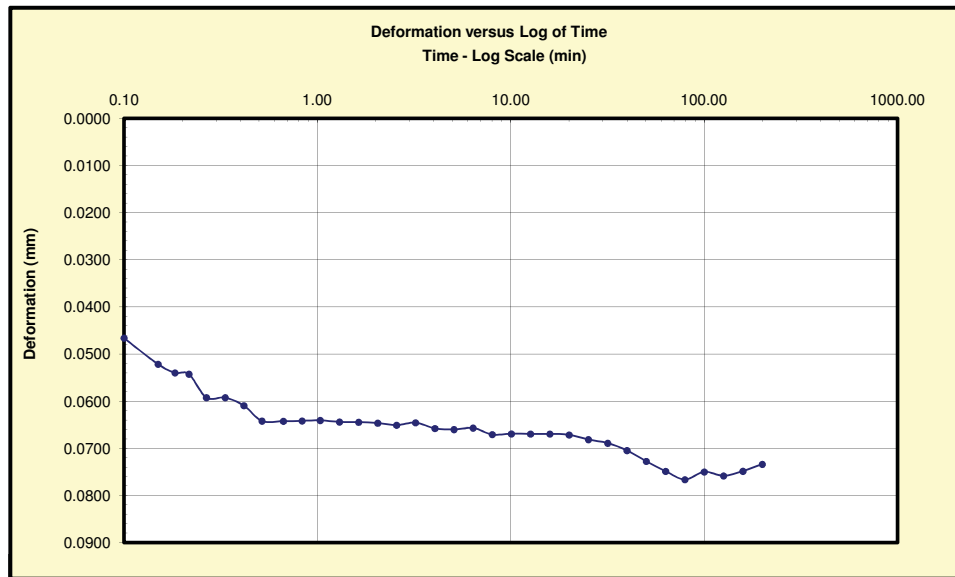
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	2	Vertical Stress (kPa):	12.0



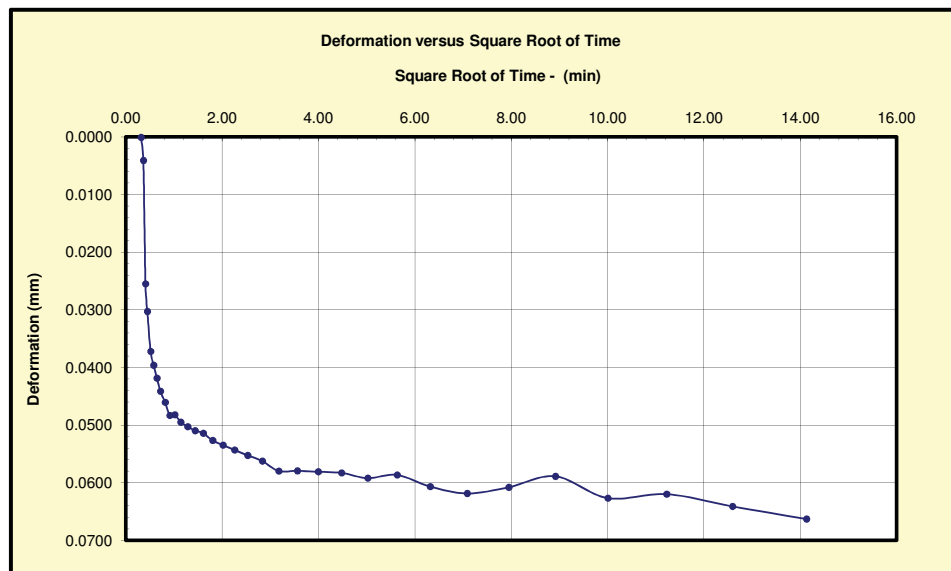
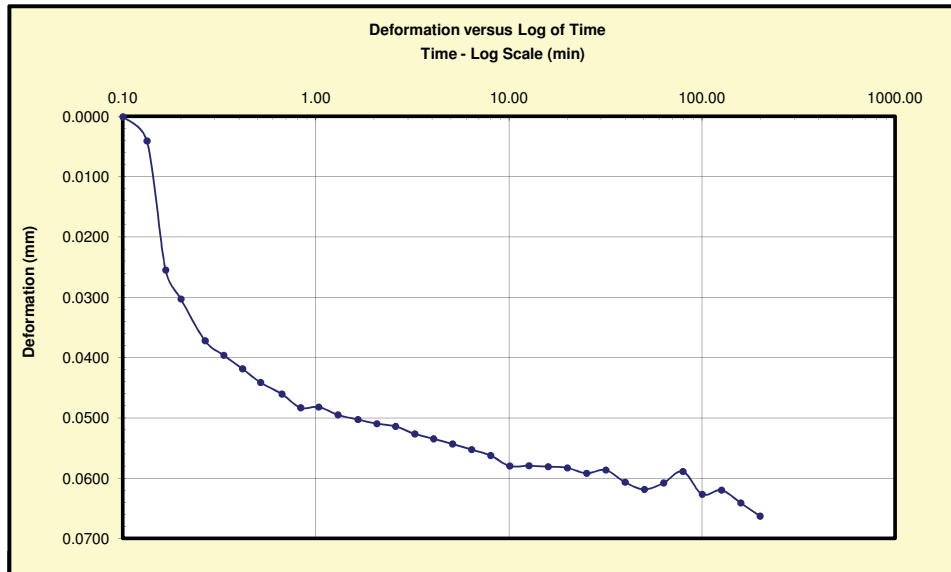
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	3	Vertical Stress (kPa):	25.0



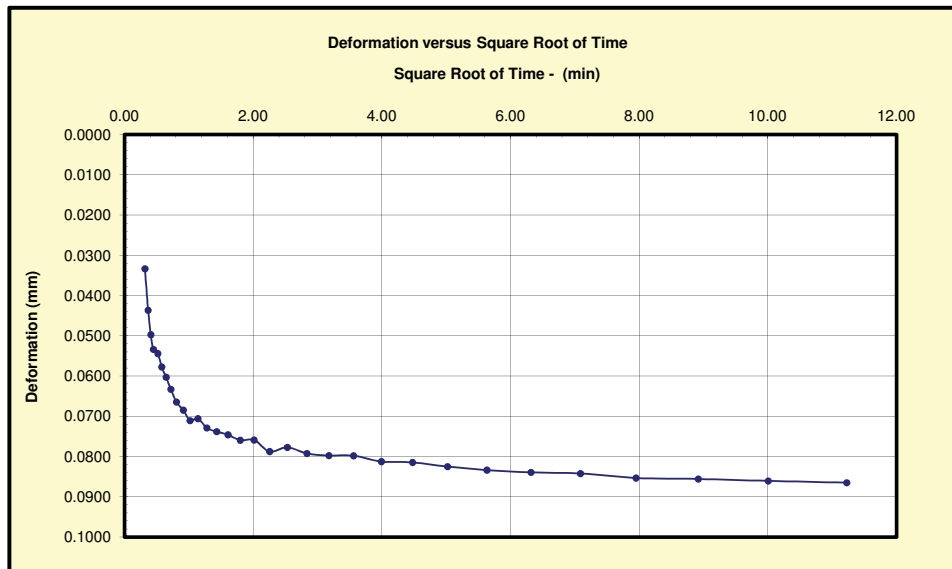
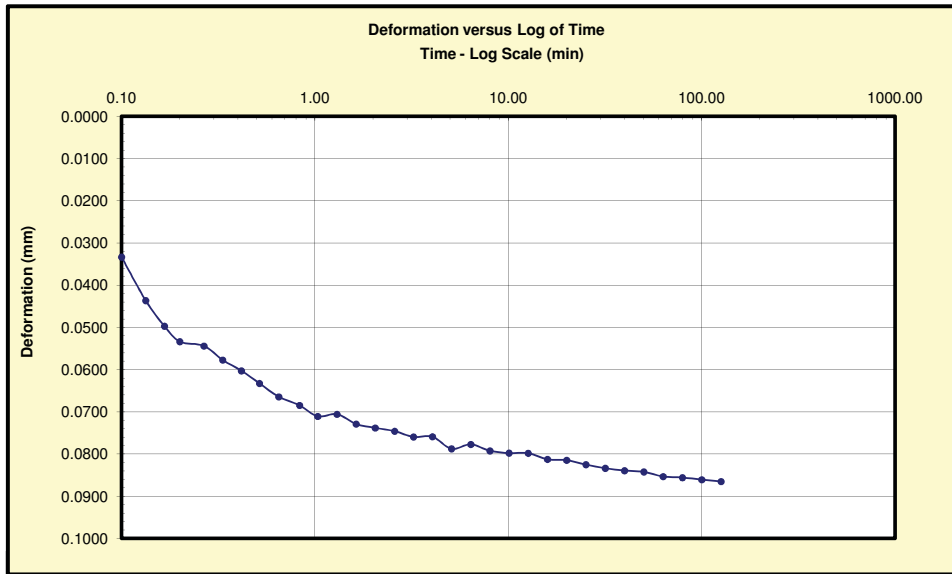
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	4	Vertical Stress (kPa):	50.0



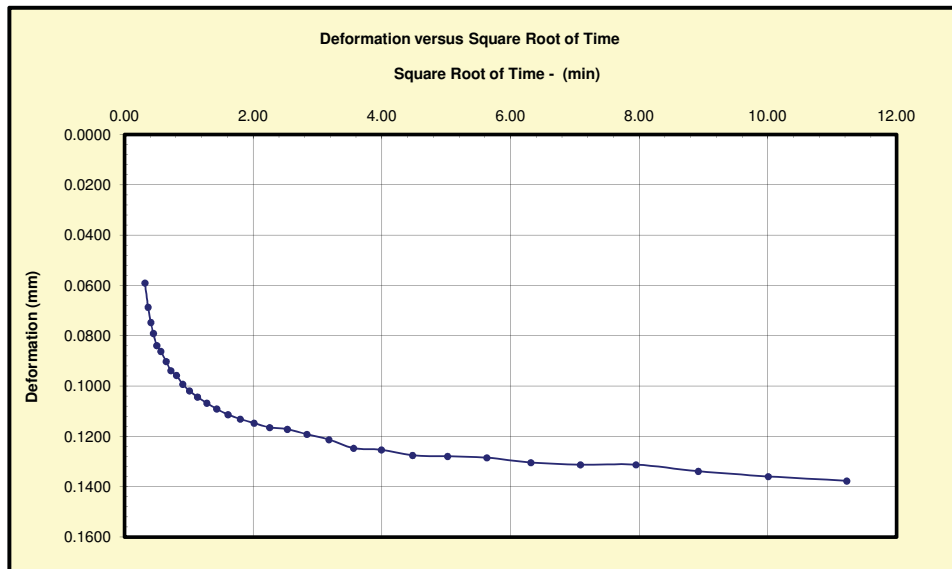
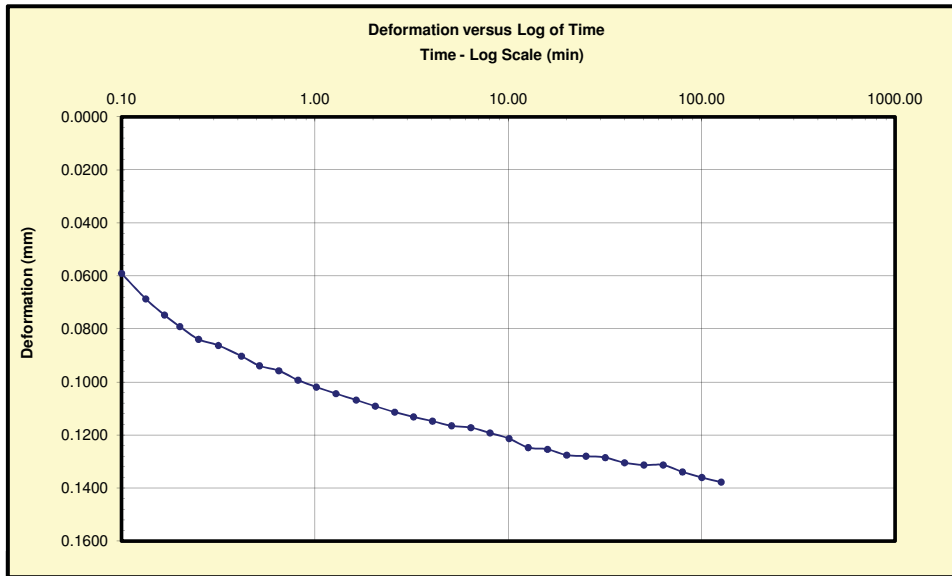
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	5	Vertical Stress (kPa):	100.0



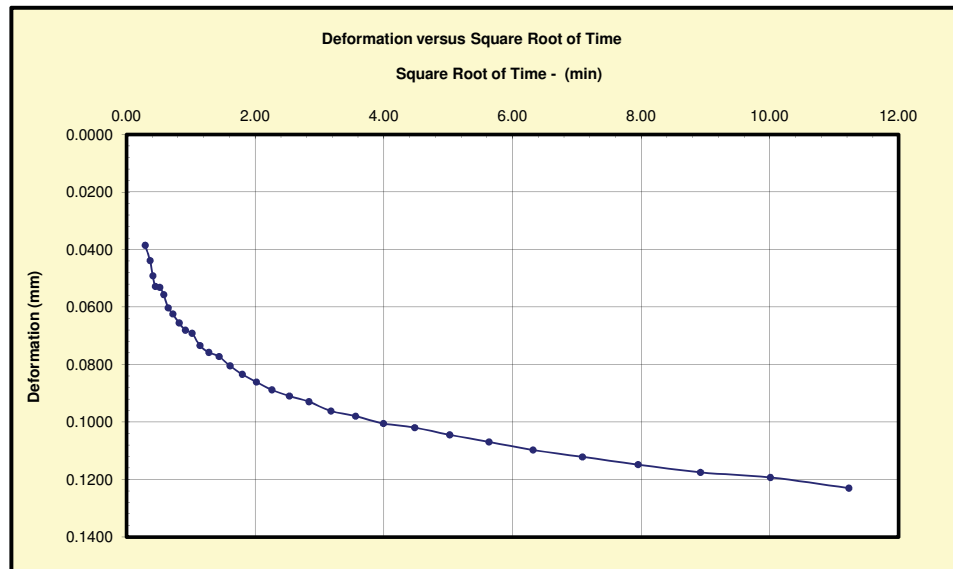
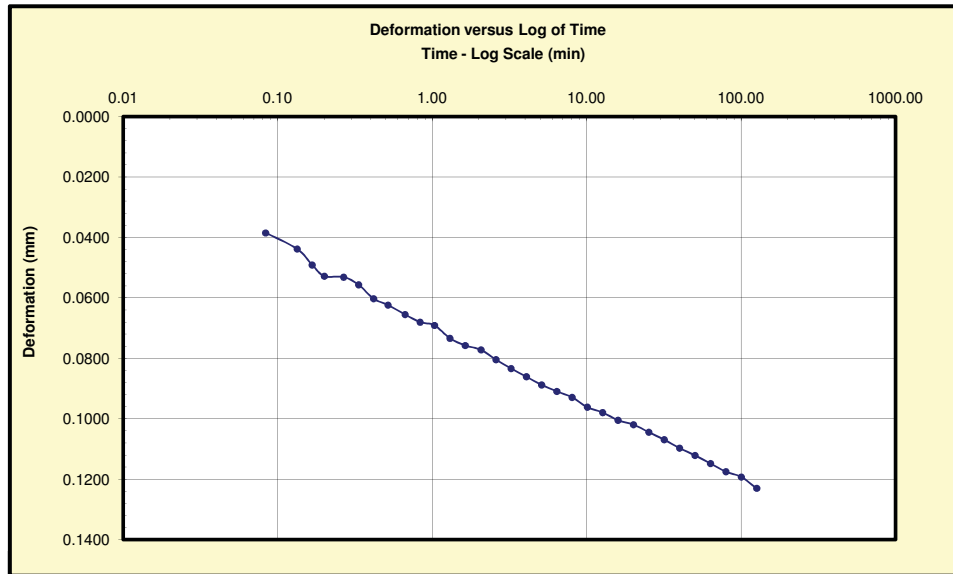
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	6	Vertical Stress (kPa):	150.0



Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

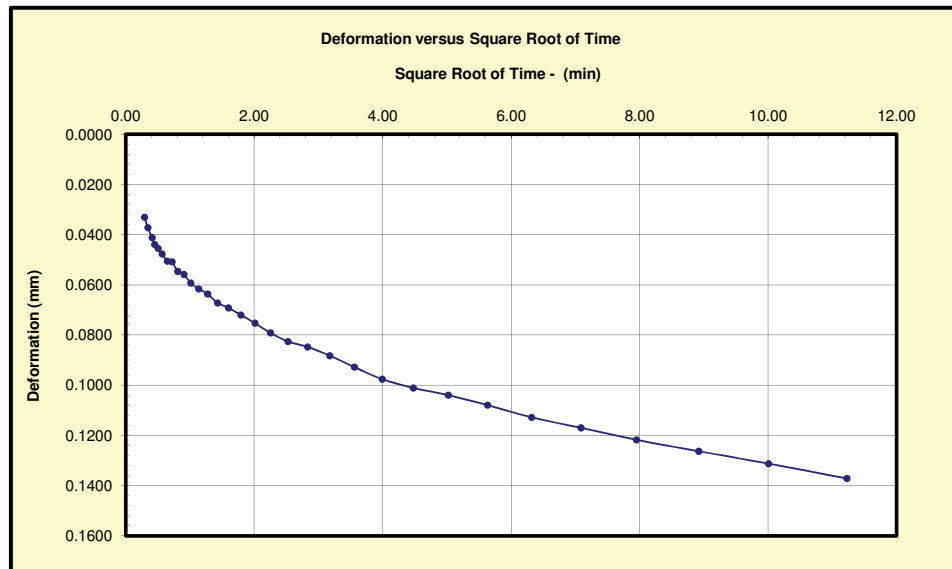
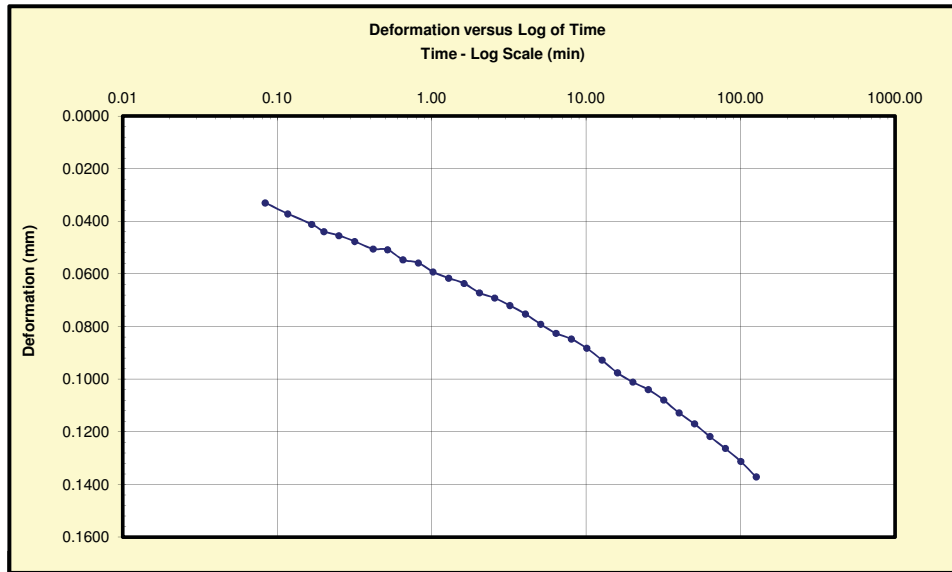


# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	7	Vertical Stress (kPa):	200.0



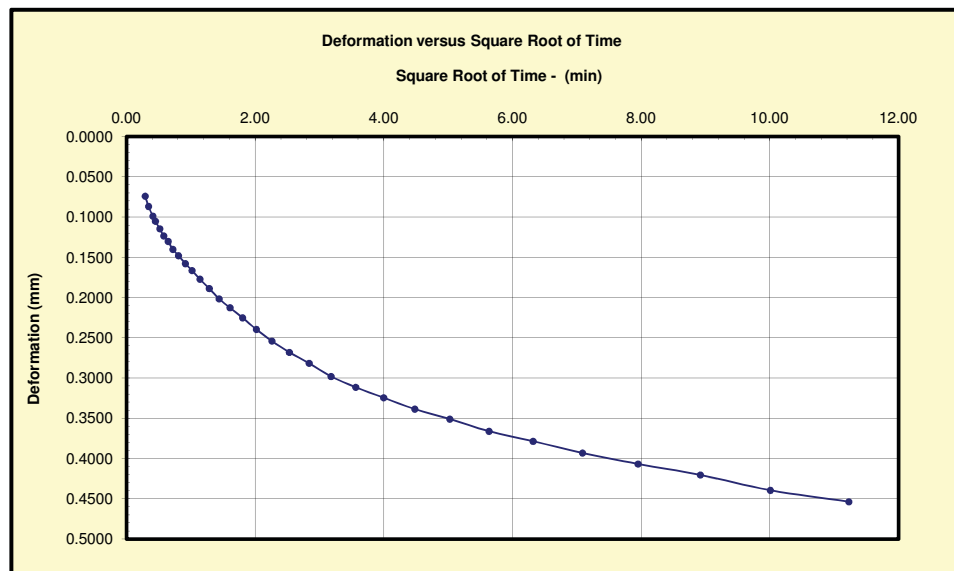
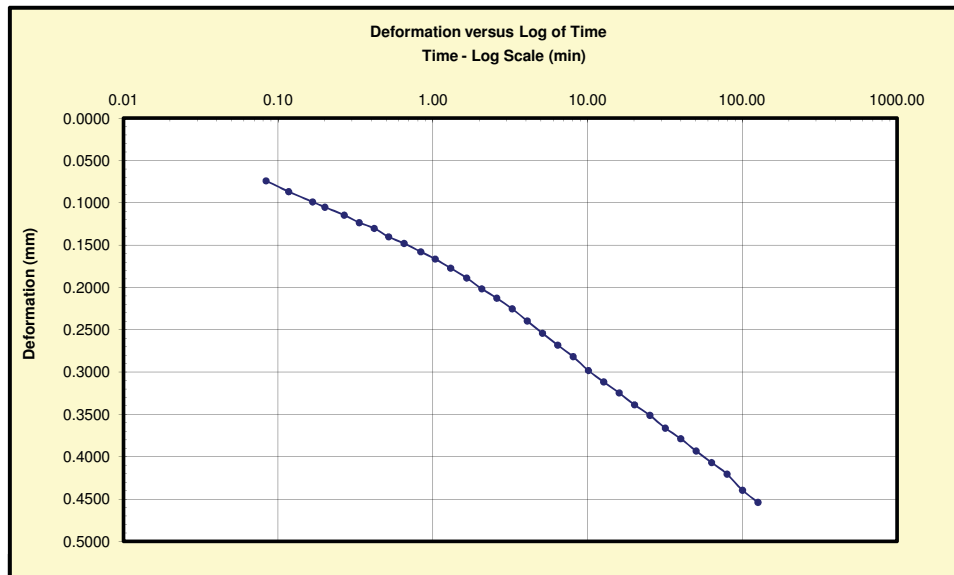
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	8	Vertical Stress (kPa):	300.0



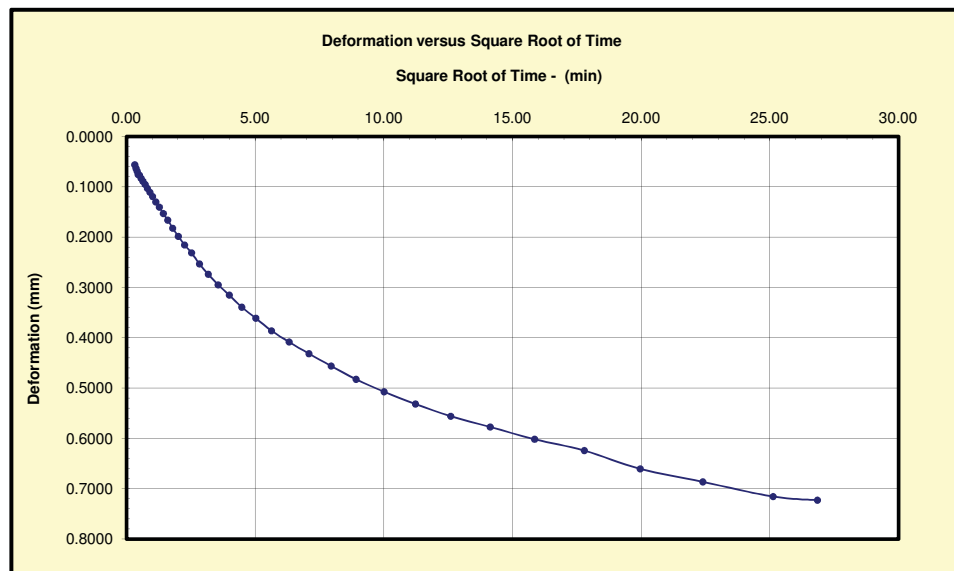
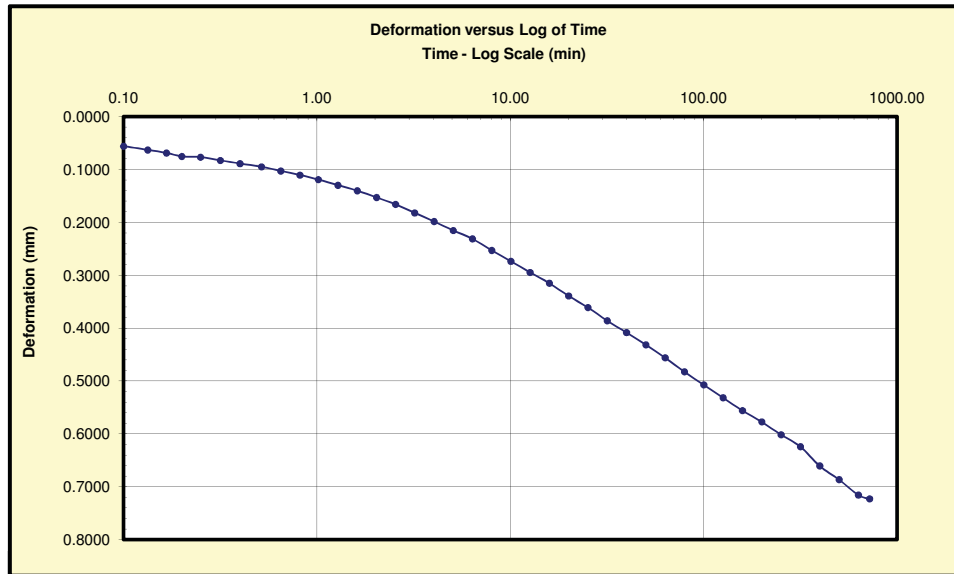
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	9	Vertical Stress (kPa):	400.0



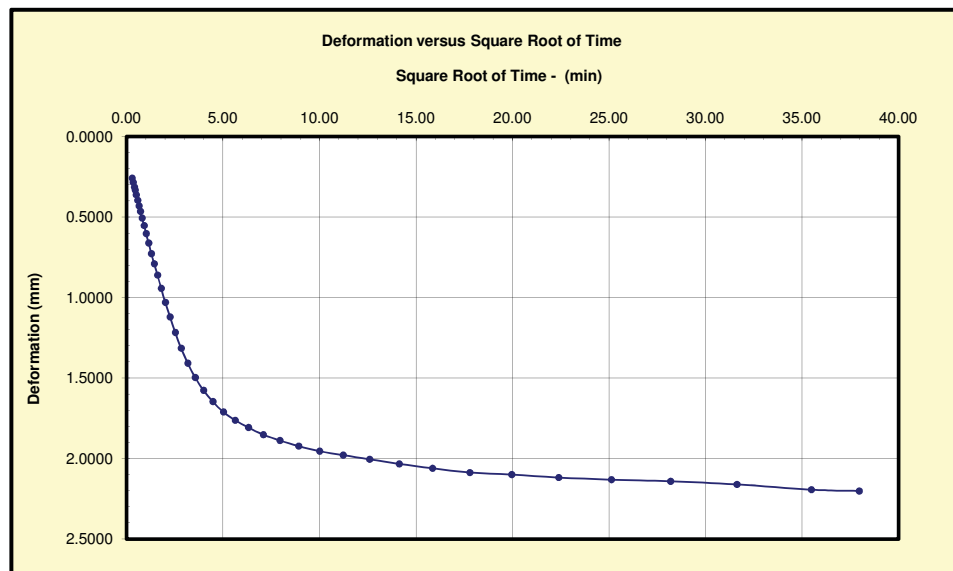
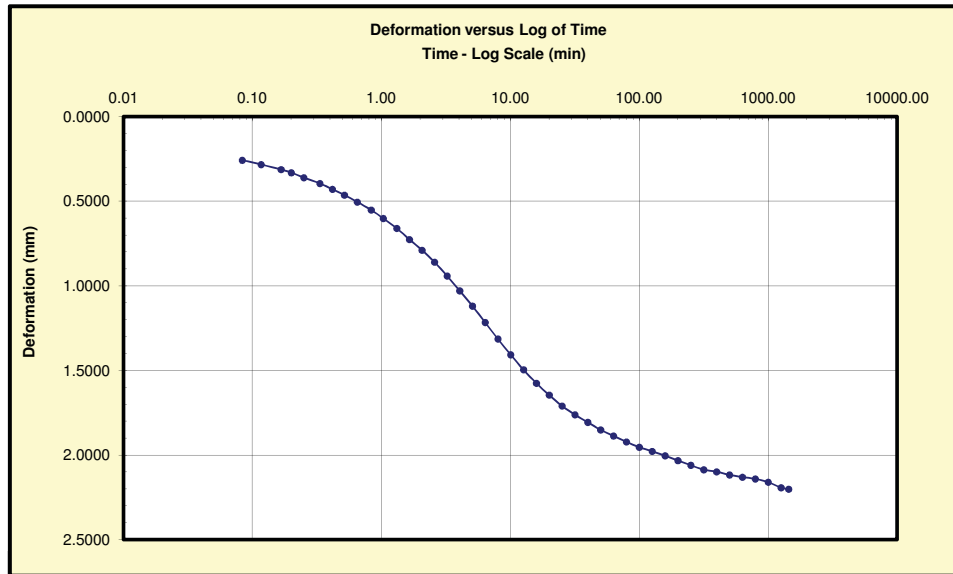
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	10	Vertical Stress (kPa):	800.0



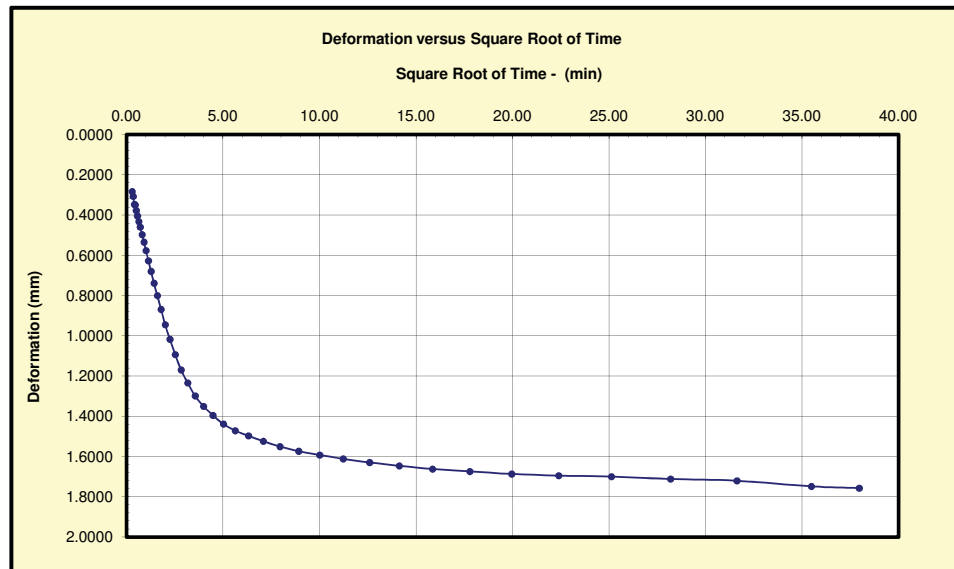
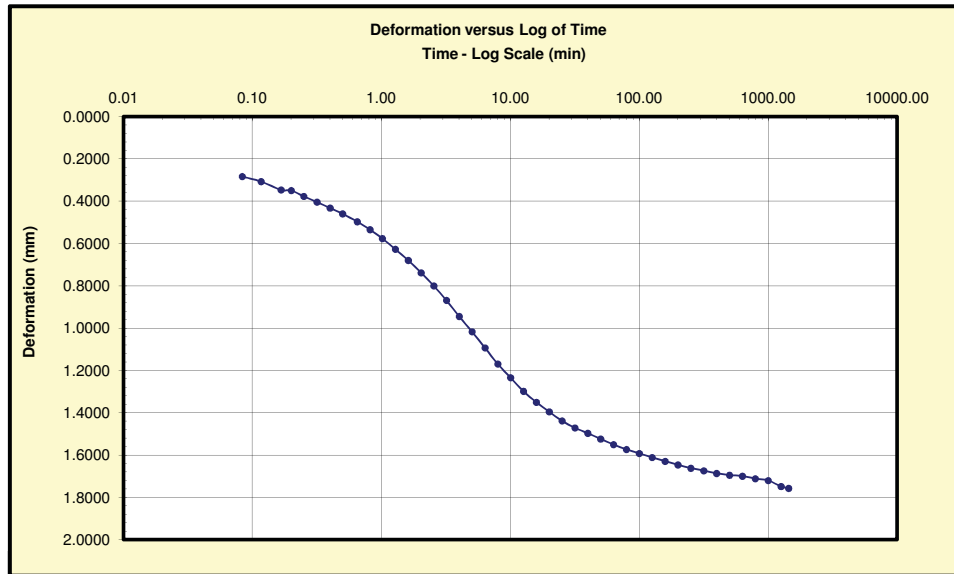
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	11	Vertical Stress (kPa):	1600.0



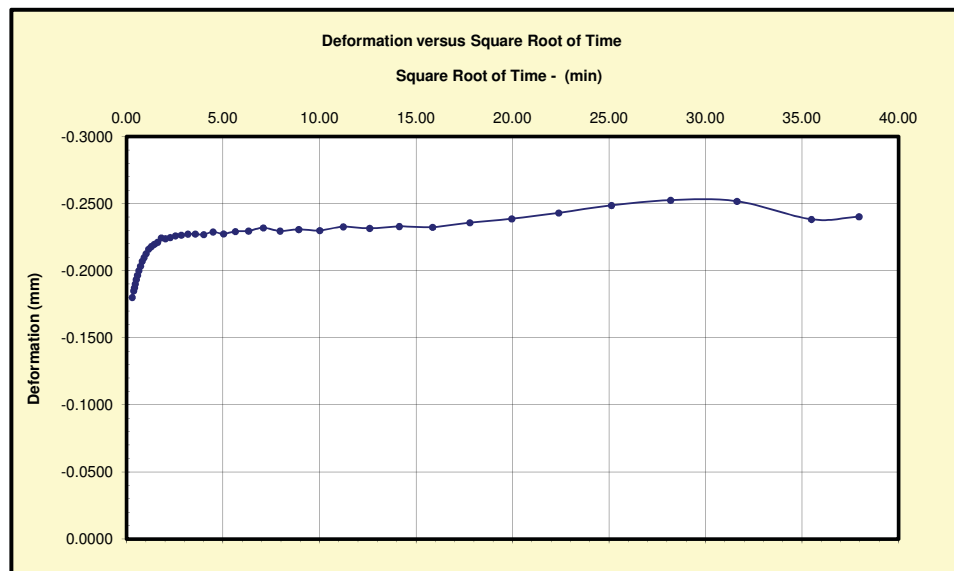
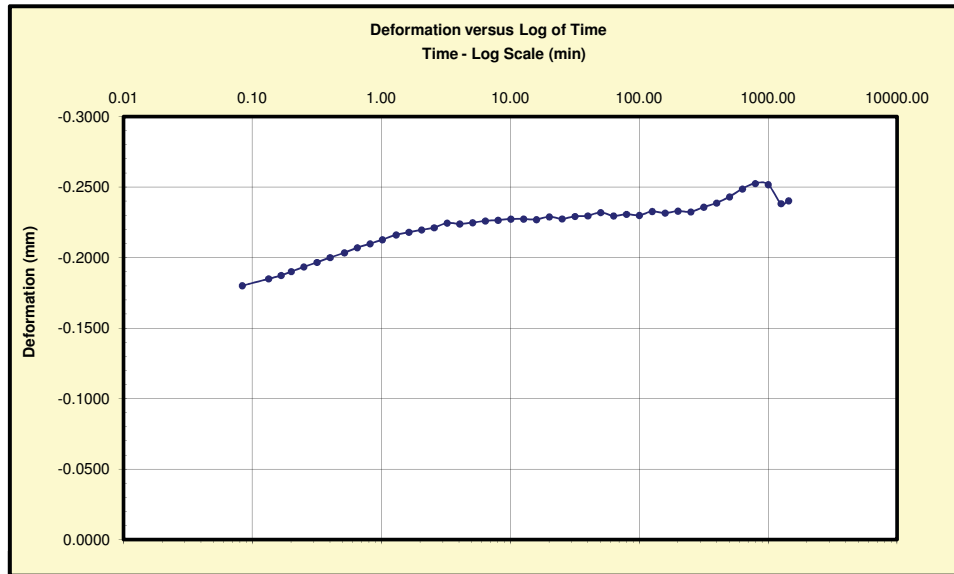
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	12	Vertical Stress (kPa):	800.0



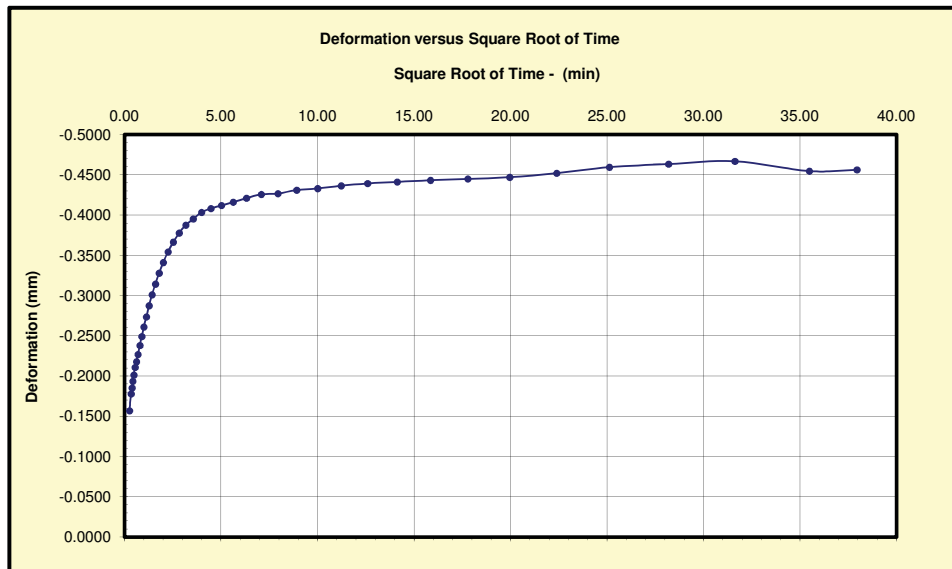
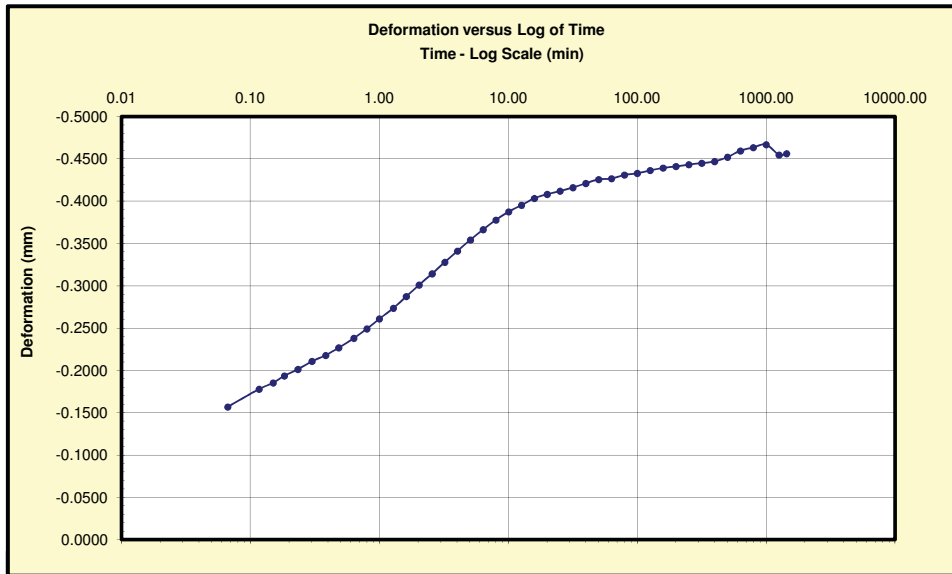
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	13	Vertical Stress (kPa):	200.0



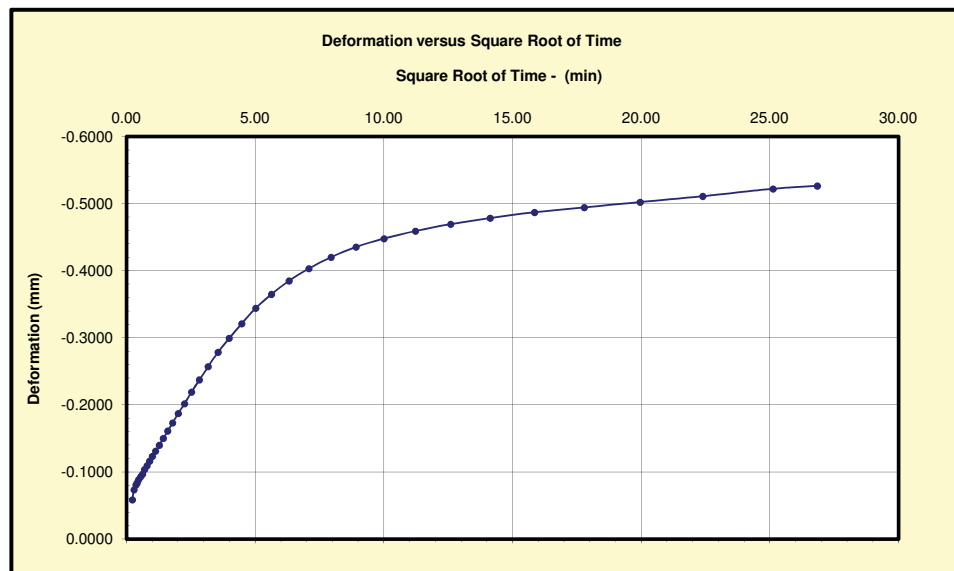
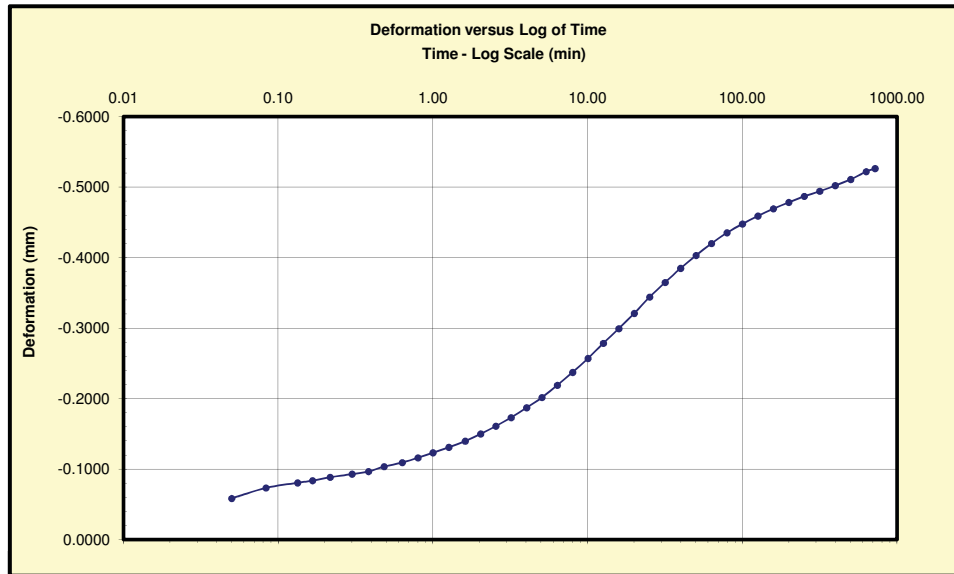
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	14	Vertical Stress (kPa):	50.0



Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

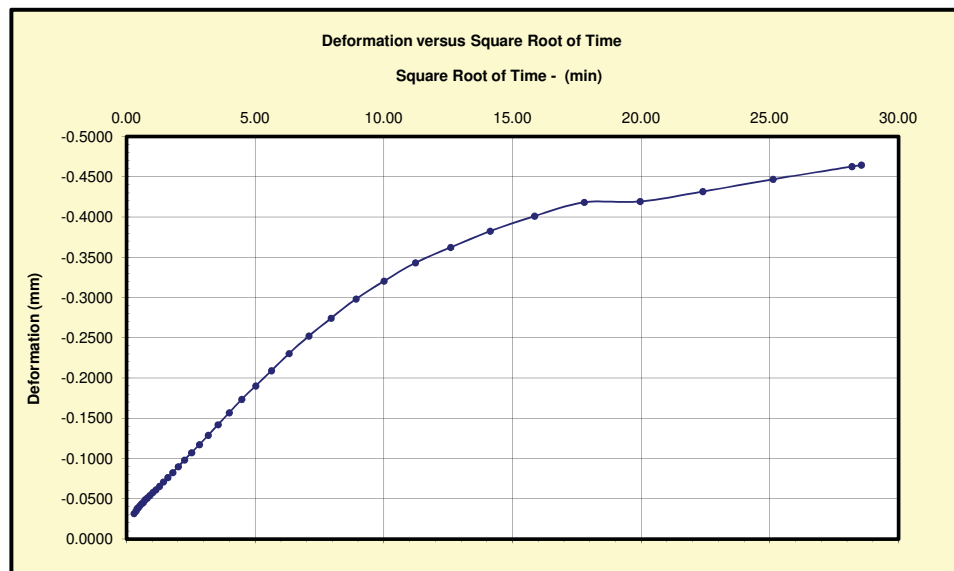
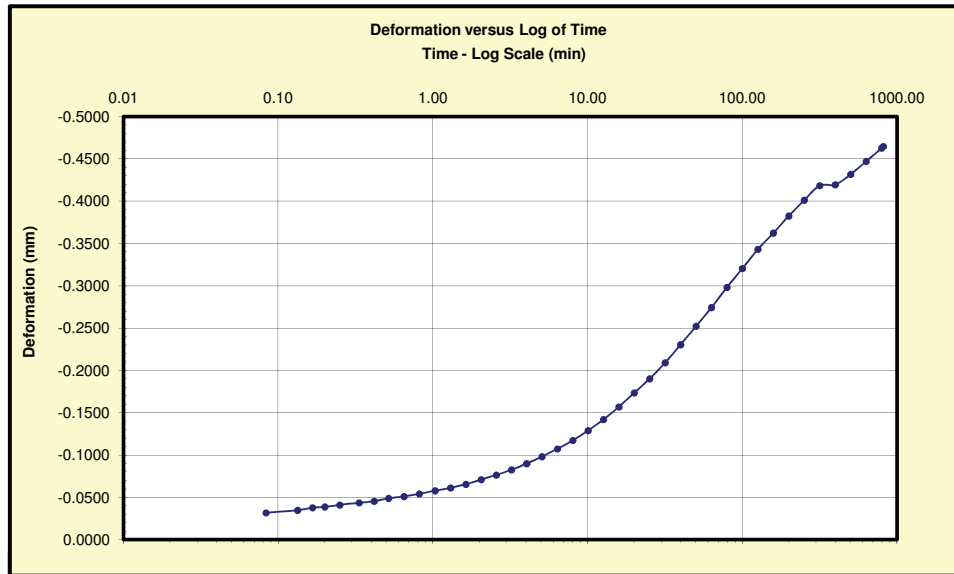


# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)


Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-01	Station:	Station 1
Sample No.:	13-15.3"	Depth (m):	4.57
Consolidation Step:	15	Vertical Stress (kPa):	12.0

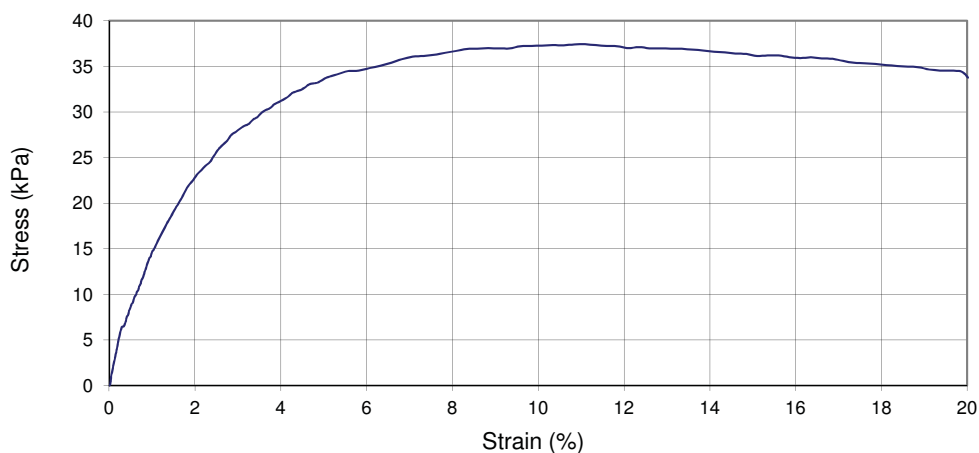


Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

**Unconsolidated-Undrained Triaxial Compression Test  
(ASTM D 2850)**

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-02	Station:	UU
Sample No.:	18-20.3'	Depth (m):	5.98

Sample Data		<div>Sample Failure</div> 
Diameter (mm)	72.46	
Height (mm)	178.48	
Weight of container + sample (g)	1561.62	
Weight of container (g)	0.00	
Cell Pressure (kPa)	100.00	
Strain rate (%/min)	1	
Total Unit Weight (kN/m <sup>3</sup> )	20.81	
Water Content		
Tin No.	77	
Weight of tin (g)	33.83	
Tin + Wet weight (g)	88.75	
Tin + Dry weight (g)	79.44	
Water Content (%)	20.4	
Sample Properties		
Shear Strength (kPa)	17.3	
Strain at Failure (%)	10.96	
Total Unit Weight (kN/m <sup>3</sup> )	20.81	
Dry Unit Weight (kN/m <sup>3</sup> )	17.28	
Water Content (%)	20.4	



Observations:

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Performed By:	MF	Checked By:	PS	Approved By:	JPS
Date:	February 13, 2013	Date:	February 14, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

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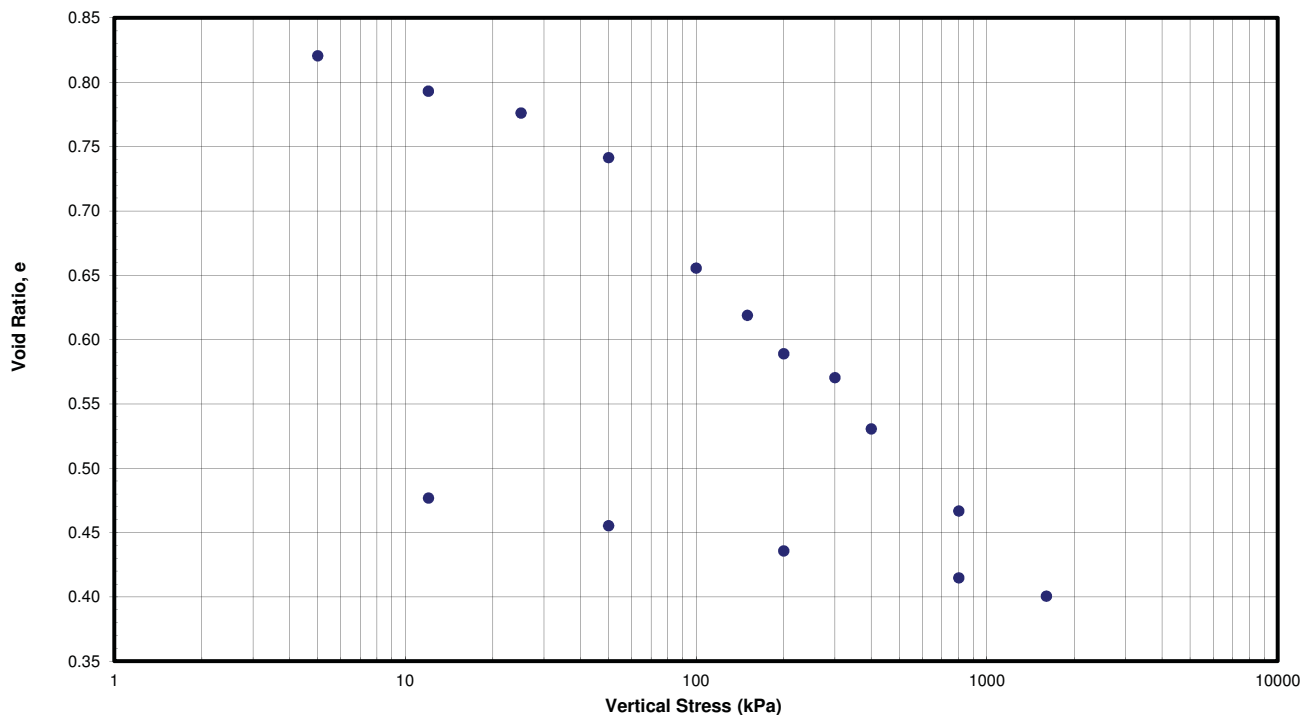
## One-Dimensional Consolidation (ASTM D 2435)



Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81

Weight of Ring (g):	211.64	Ring + Wet Weight (g):	365.12	Initial Void Ratio, e:	0.82
Initial Height (mm):	25.40	Ring + Dry Weight (g):	330.74	Height of Soil, Hs (mm):	13.93
Diameter of Ring (mm):	63.50	Water Content (%):	28.9	Height of Void, Hv (mm):	11.47
Unit Weight (kN/m <sup>3</sup> ):	18.72	Specific Gravity, Gs:	2.70		

Step No.	Vertical Stress (kPa)	Height of Sample (mm)	Vertical Strain (%)	Final Void Ratio e <sub>f</sub>	Change in Void Ratio e	Coefficient of Compressibility a <sub>v</sub> (m <sup>2</sup> /MN)	Coefficient of Volume Compressibility m <sub>v</sub> (m <sup>2</sup> /MN)
1	5	25.3594	0.1600	0.8207	0.00		
2	12	24.9758	1.6700	0.7931	0.03	3.9337	2.16
3	25	24.7396	2.6000	0.7762	0.02	1.3046	0.72
4	50	24.2564	4.5022	0.7415	0.03	1.3876	0.76
5	100	23.0609	9.2090	0.6557	0.09	1.7167	0.94
6	150	22.5498	11.2214	0.6190	0.04	0.7339	0.40
7	200	22.1336	12.8600	0.5891	0.03	0.5976	0.33
8	300	21.8754	13.8764	0.5705	0.02	0.1854	0.10
9	400	21.3208	16.0600	0.5307	0.04	0.3982	0.22
10	800	20.4318	19.5600	0.4669	0.06	0.1596	0.09
11	1600	19.5097	23.1900	0.4007	0.07	0.0827	0.05
12	800	19.7079	22.4100	0.4149	-0.01	0.0178	0.01
13	200	20.0000	21.2600	0.4359	-0.02	0.0350	0.02
14	50	20.2717	20.1900	0.4554	-0.02	0.1301	0.07
15	12	20.5715	19.0100	0.4769	-0.02	0.5665	0.31



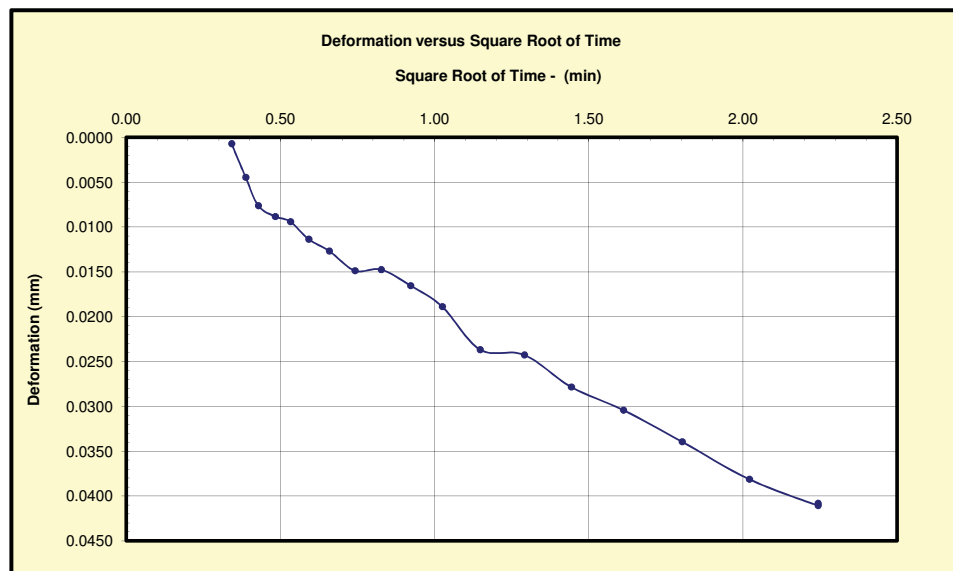
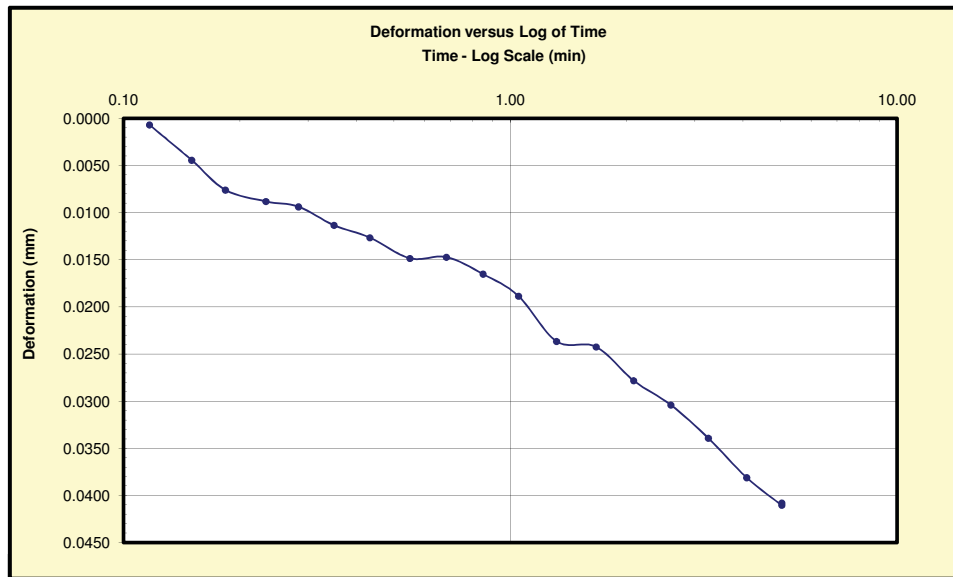
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

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## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	1	Vertical Stress (kPa):	5.0



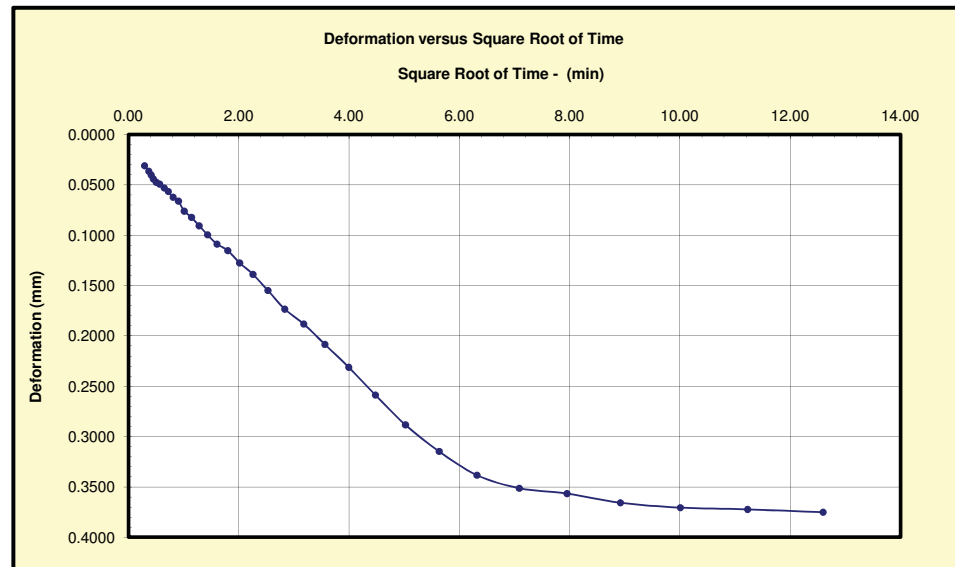
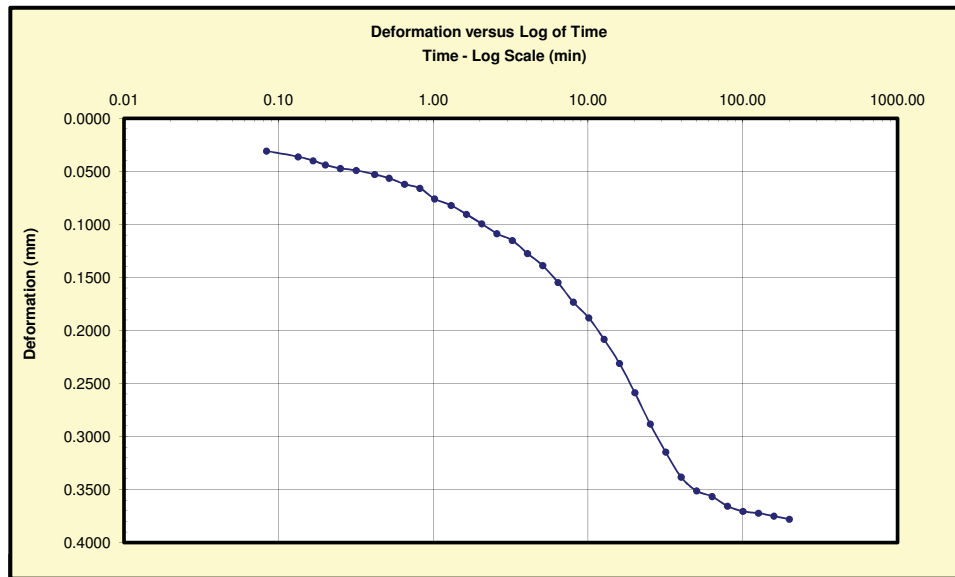
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	2	Vertical Stress (kPa):	12.0



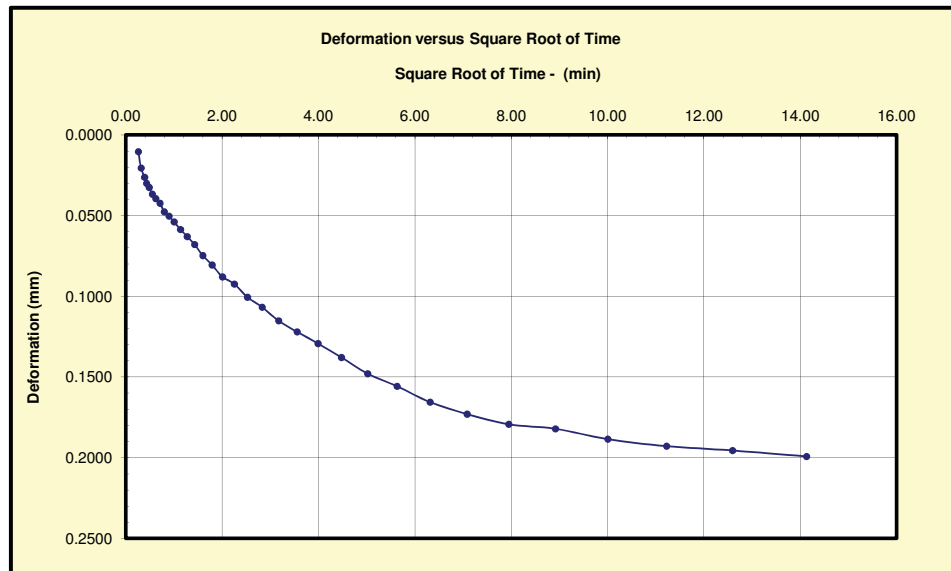
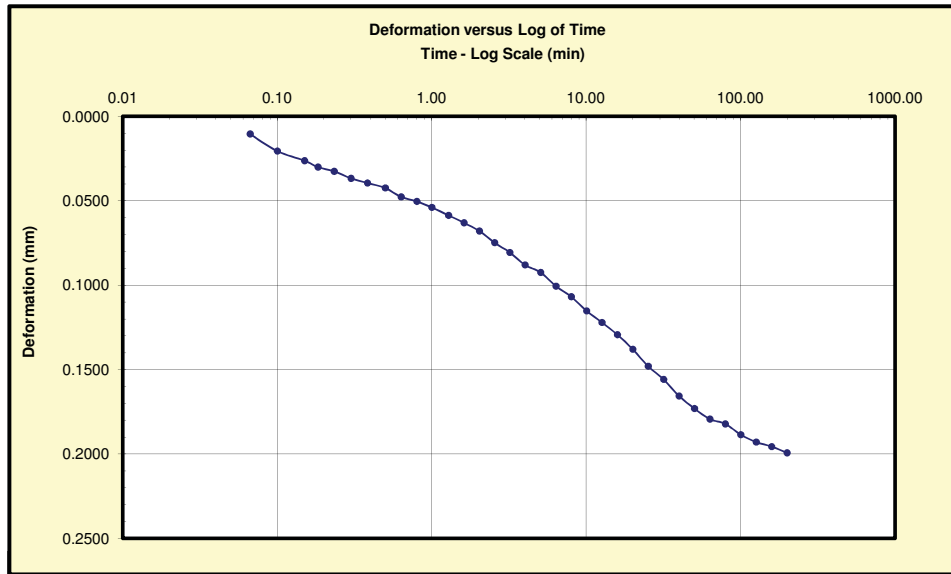
Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	3	Vertical Stress (kPa):	25.0



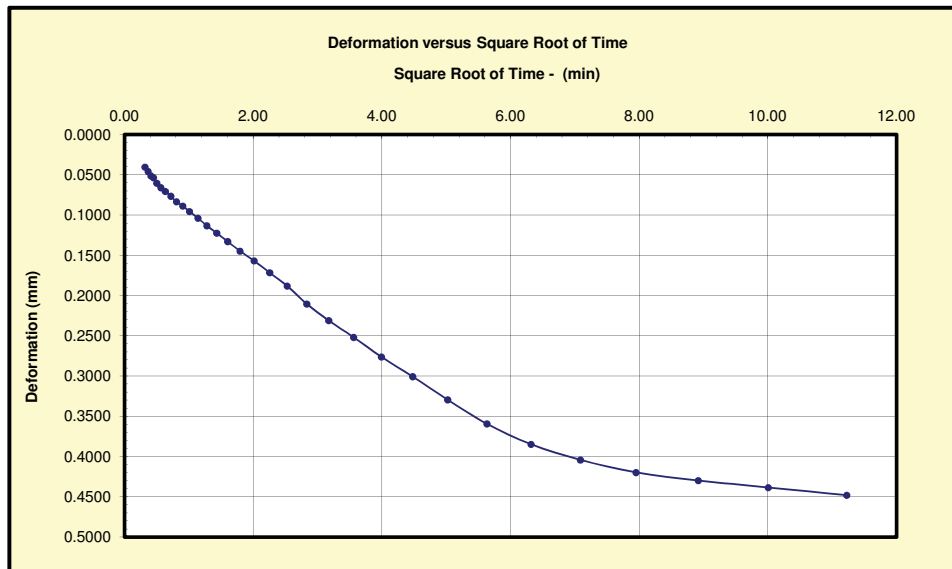
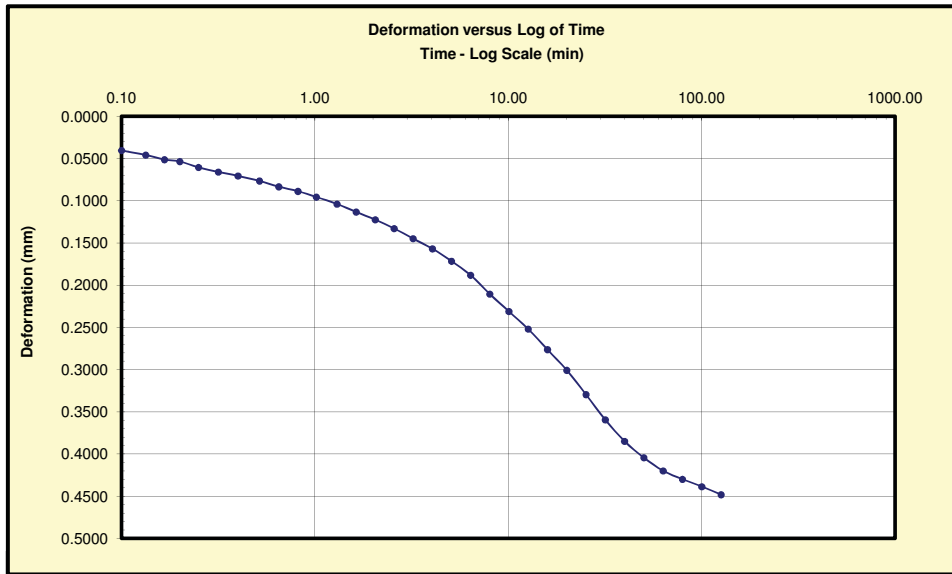
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Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	4	Vertical Stress (kPa):	50.0



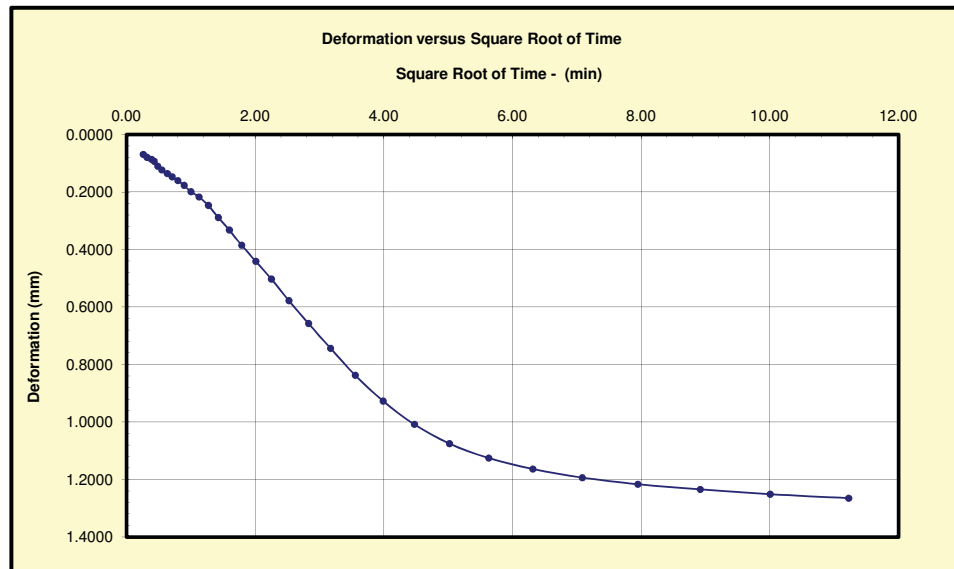
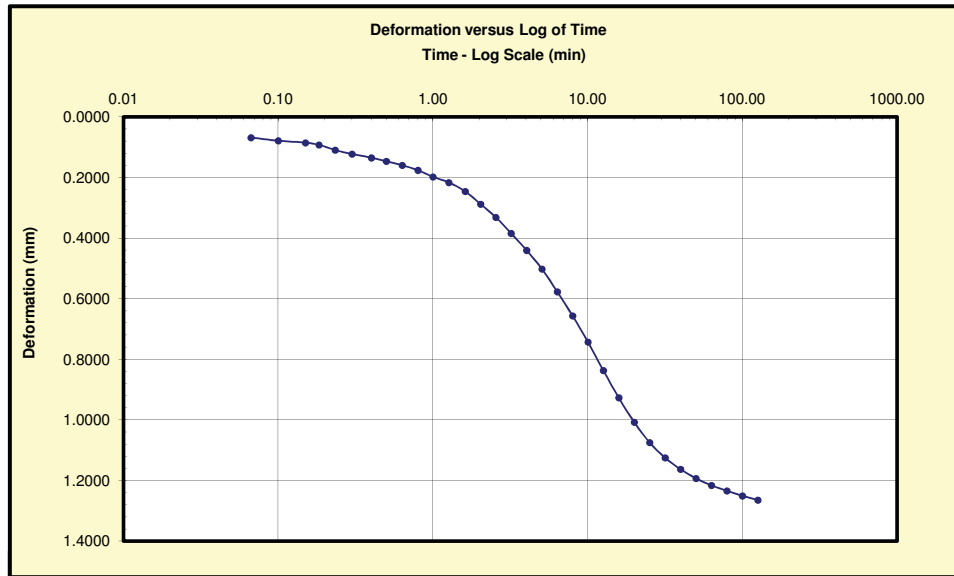
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Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

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## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	5	Vertical Stress (kPa):	100.0



Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

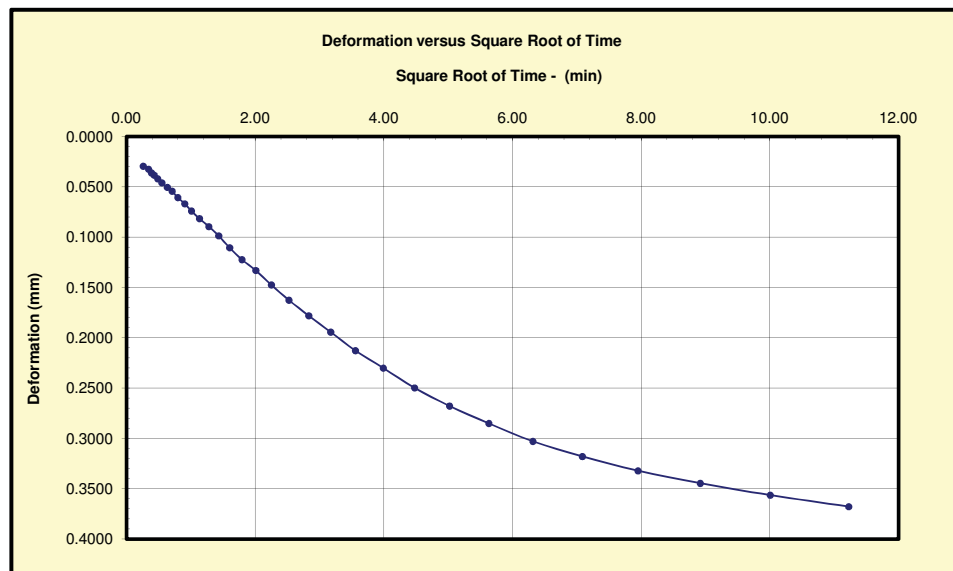
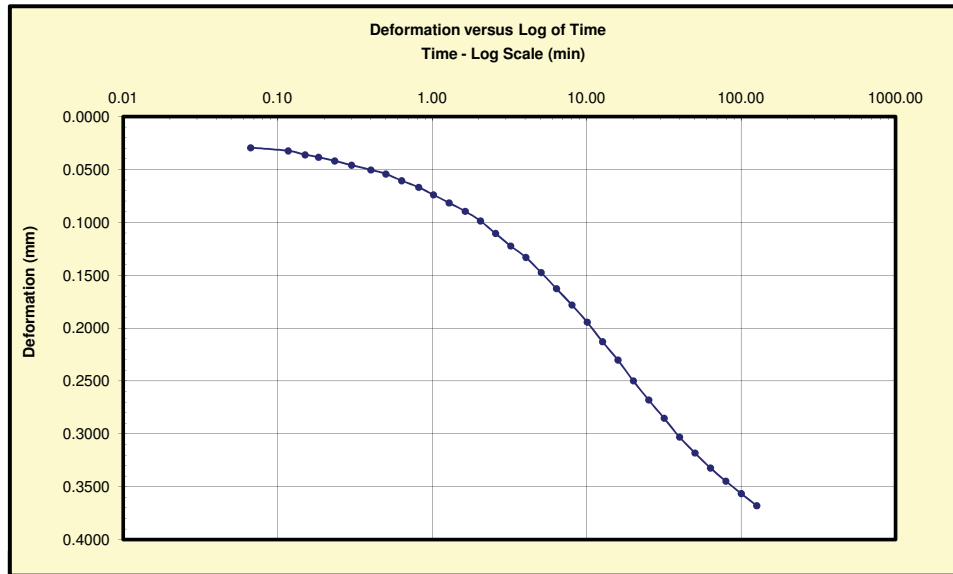


# MEG TECHNICAL SERVICES

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## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	6	Vertical Stress (kPa):	150.0



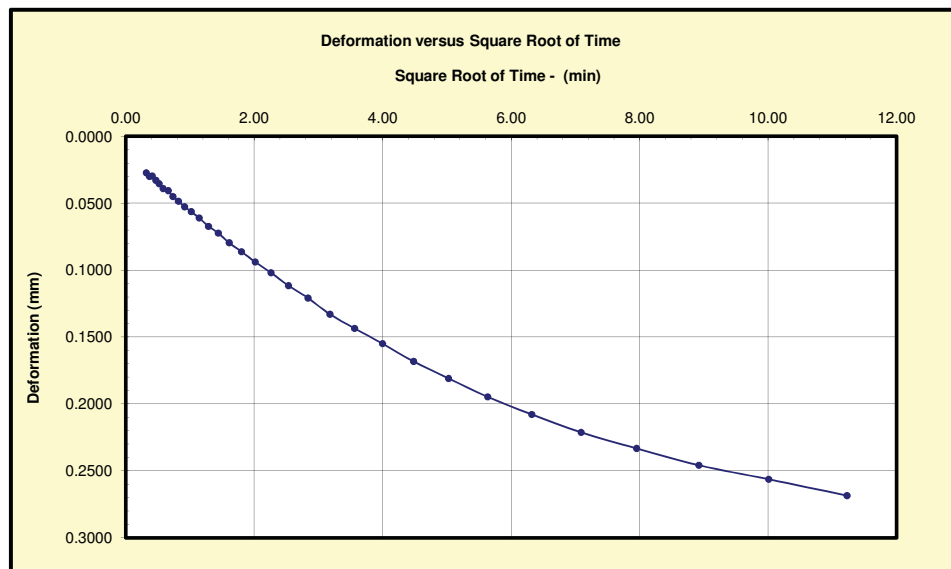
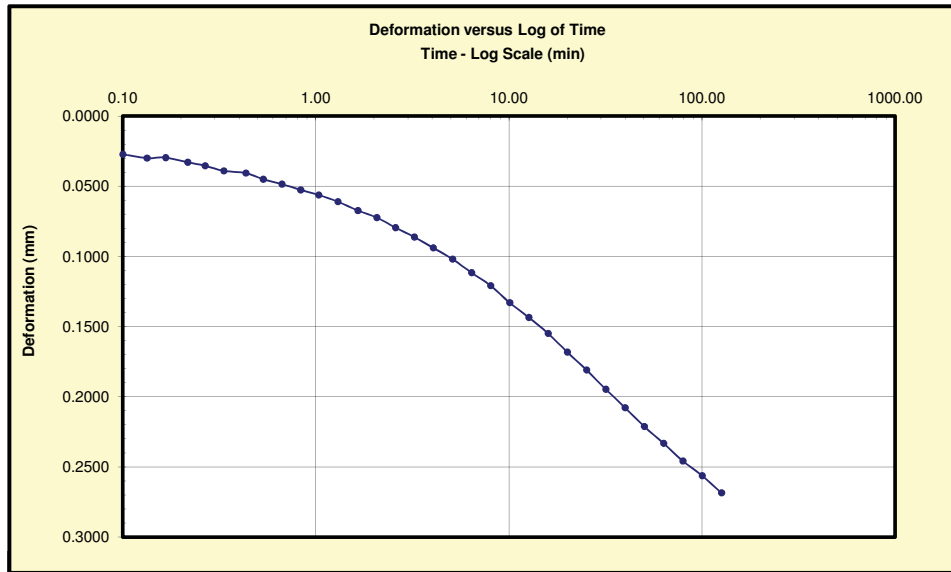
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Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	7	Vertical Stress (kPa):	200.0



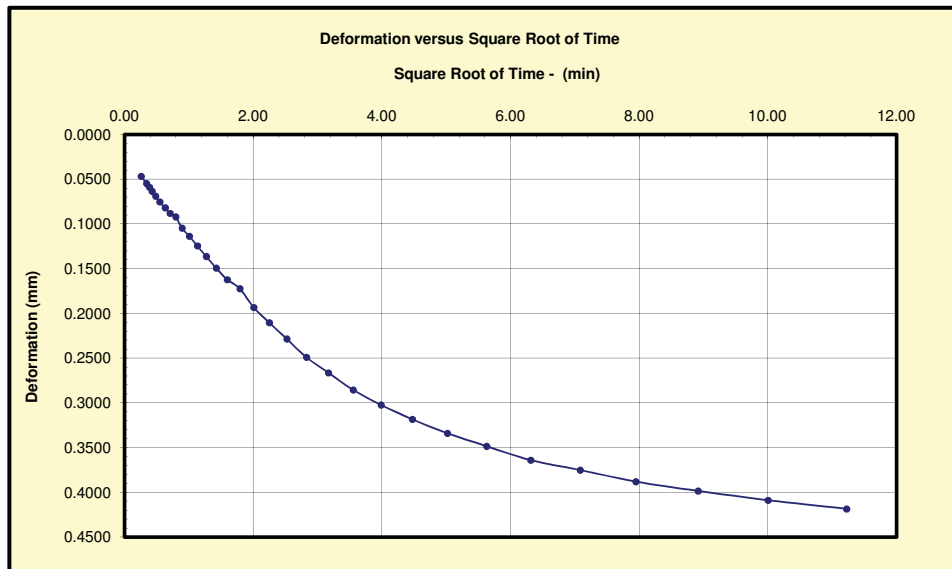
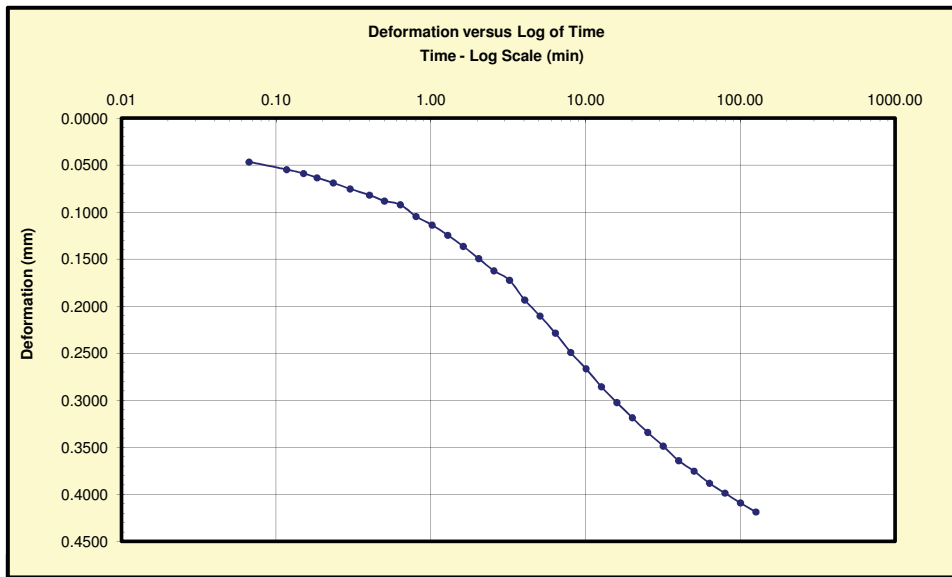
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# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	8	Vertical Stress (kPa):	300.0



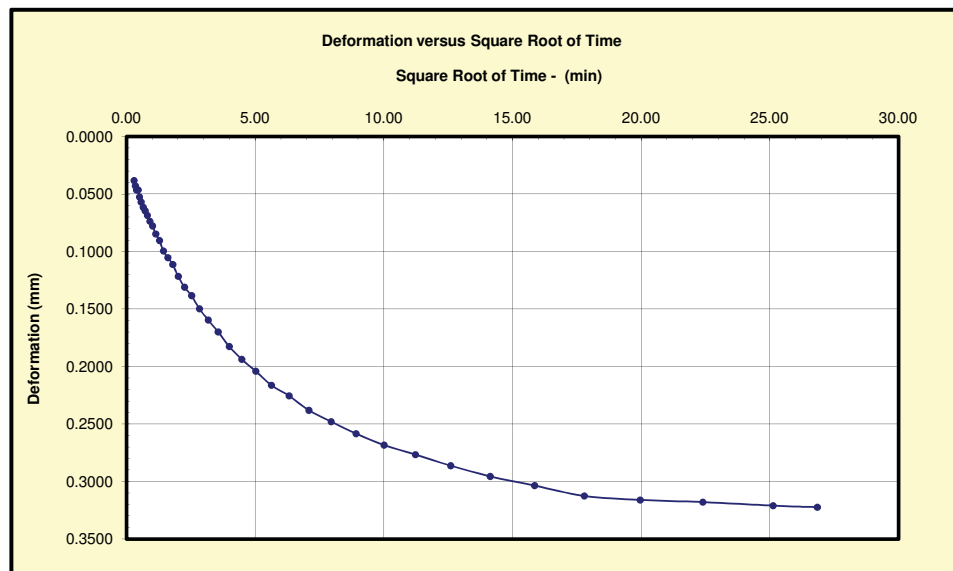
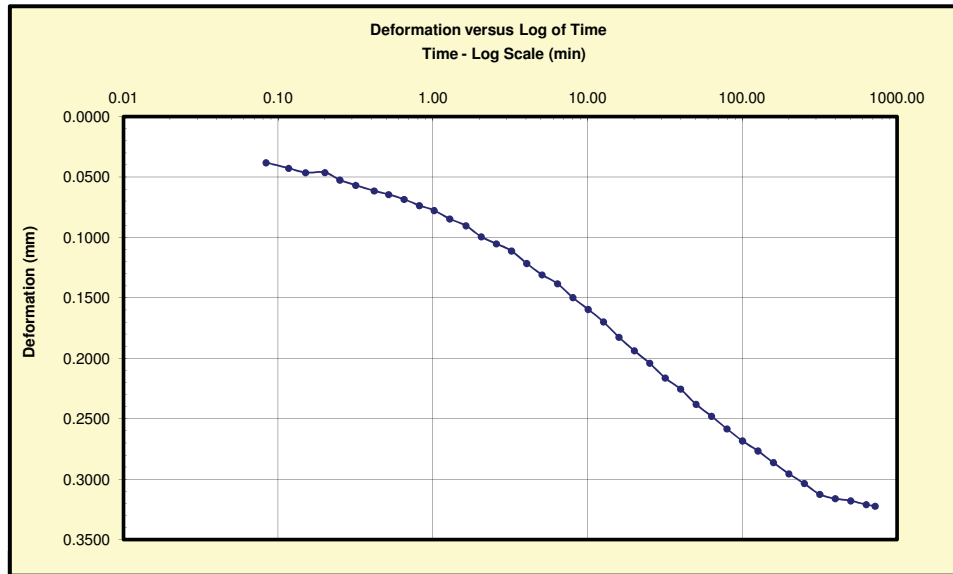
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# MEG TECHNICAL SERVICES

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## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	9	Vertical Stress (kPa):	400.0



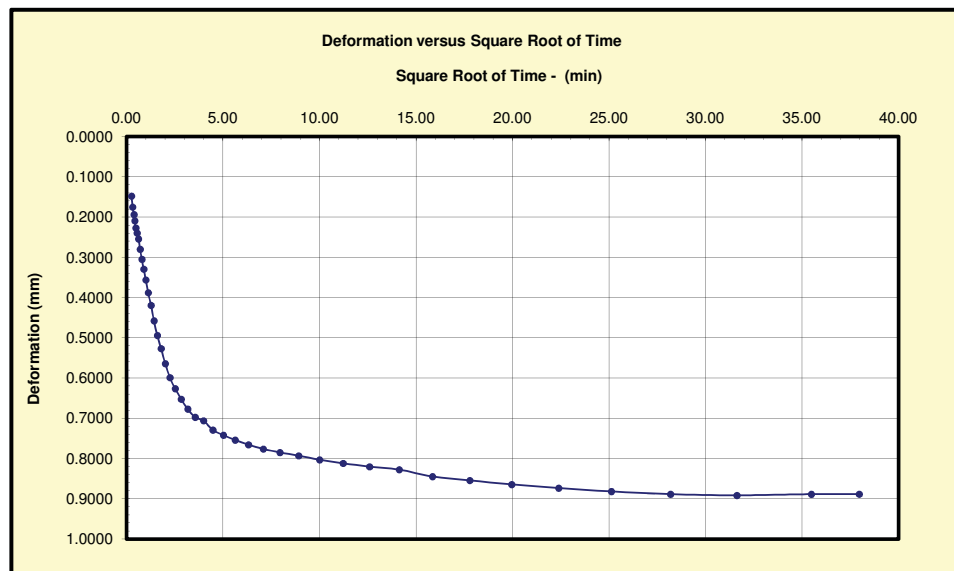
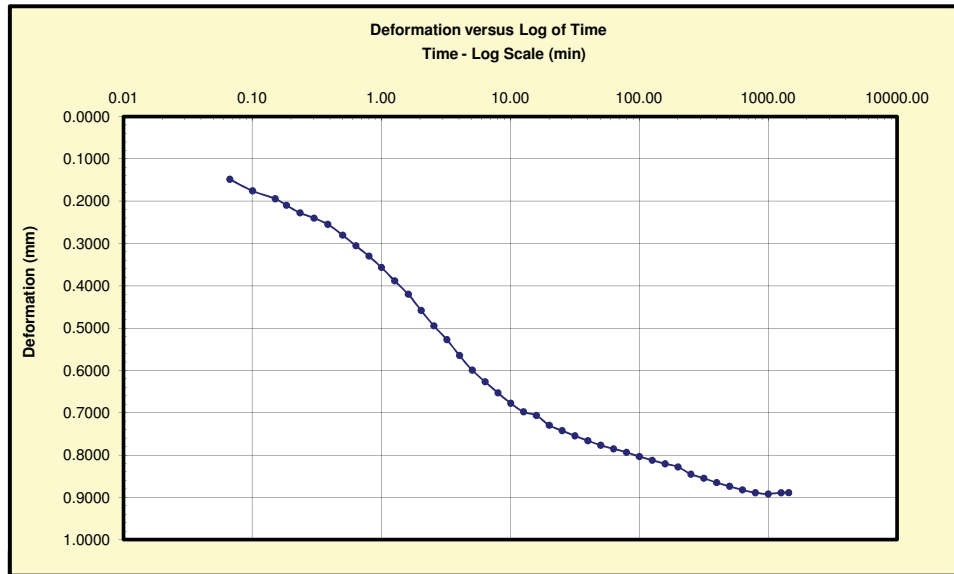
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(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	10	Vertical Stress (kPa):	800.0



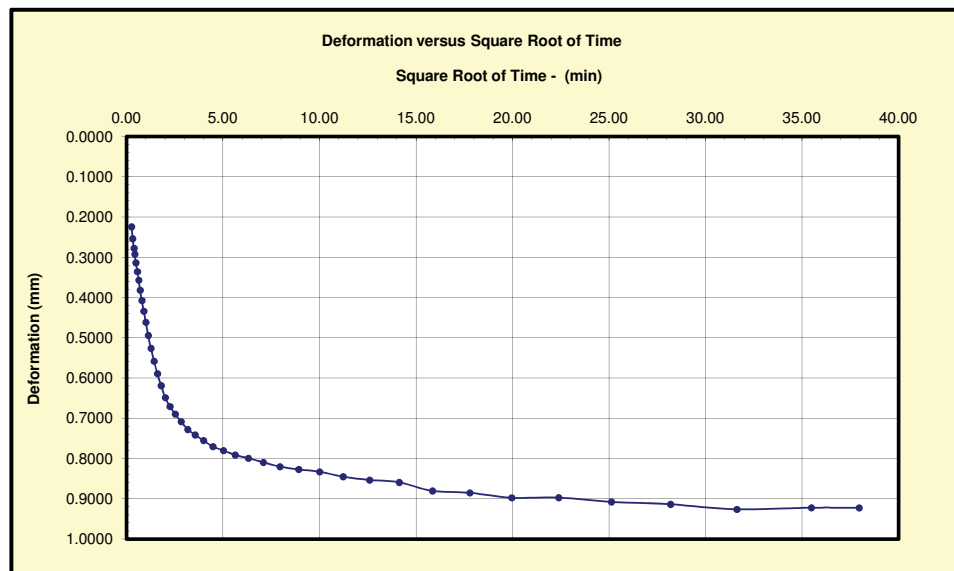
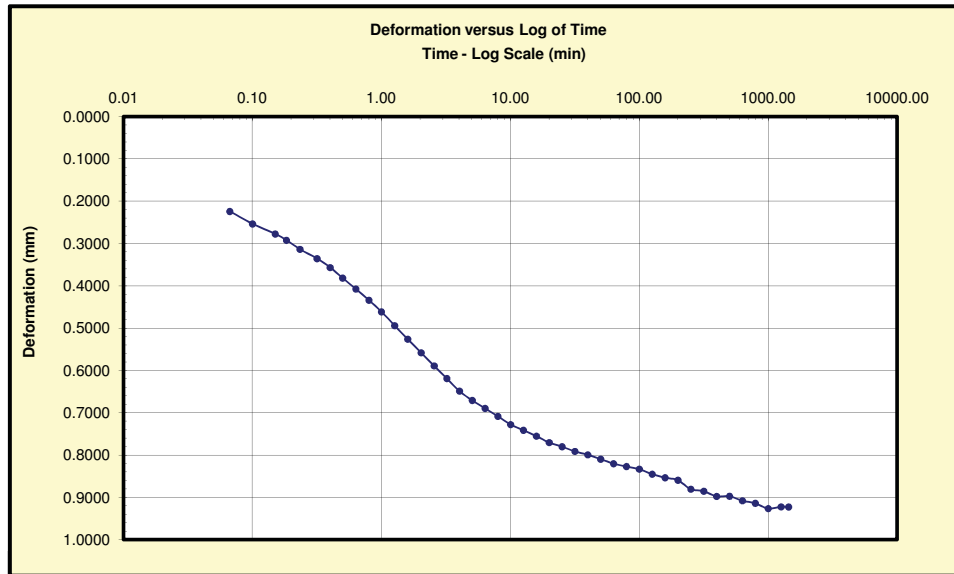
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# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	11	Vertical Stress (kPa):	1600.0



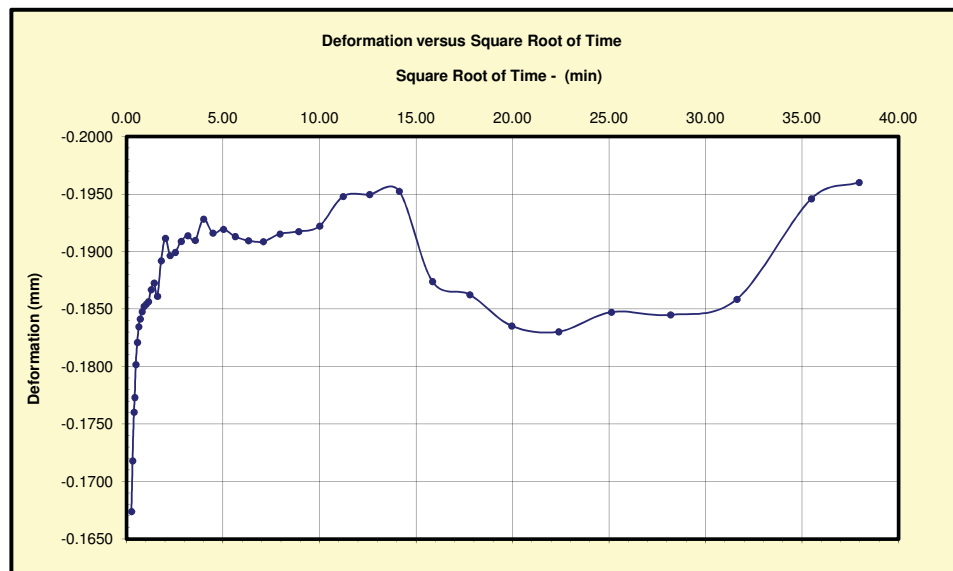
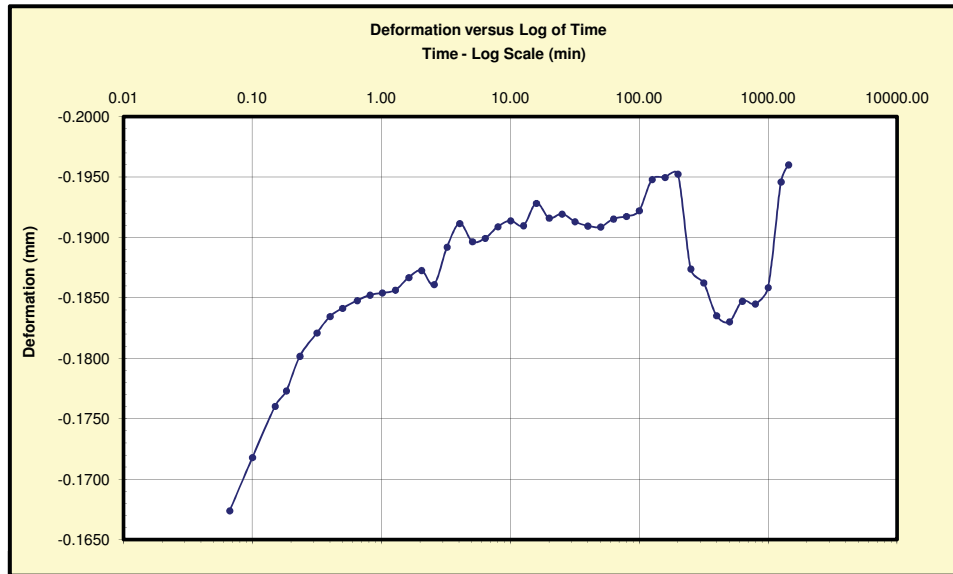
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# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	12	Vertical Stress (kPa):	800.0



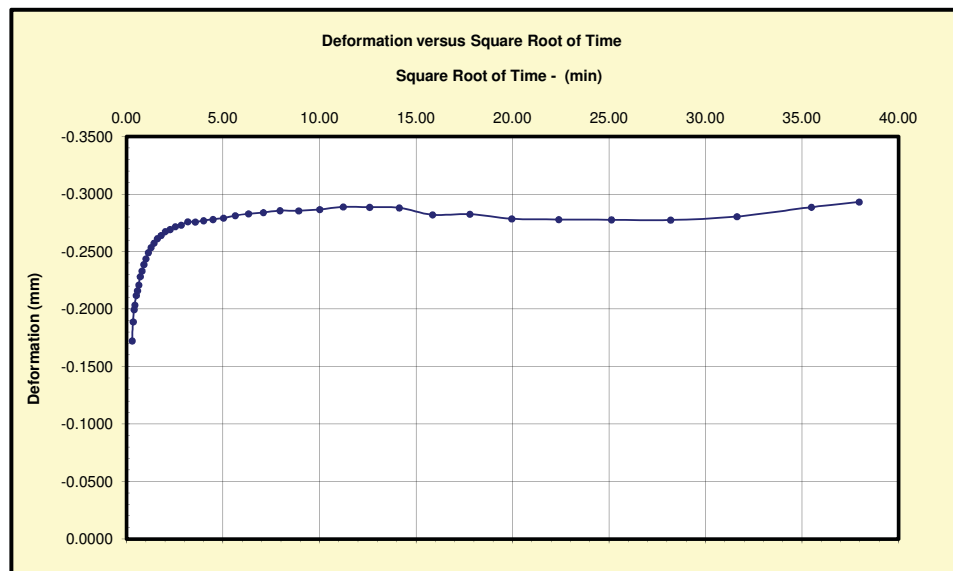
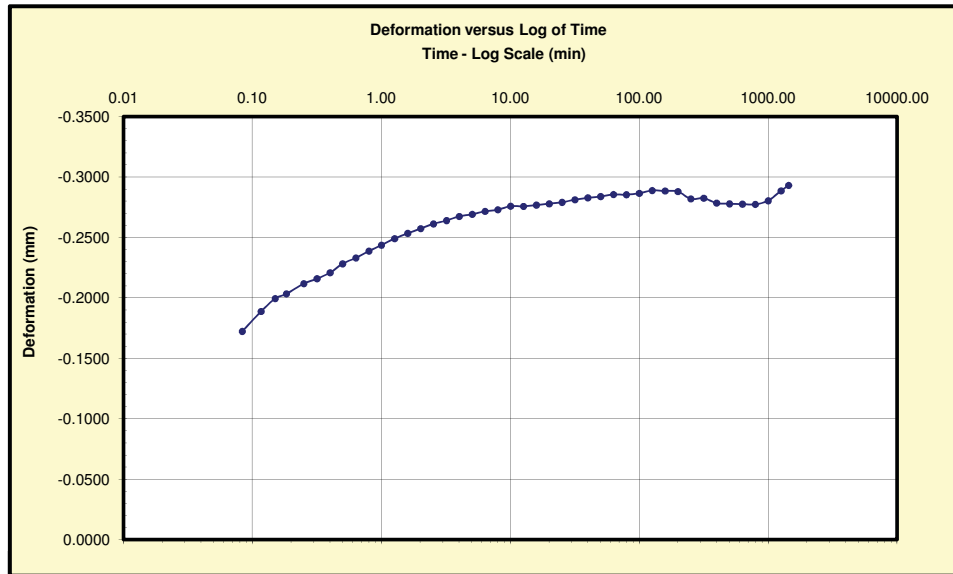
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Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

# MEG TECHNICAL SERVICES

(A Division of MEG Consulting Limited)

## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	13	Vertical Stress (kPa):	200.0



Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

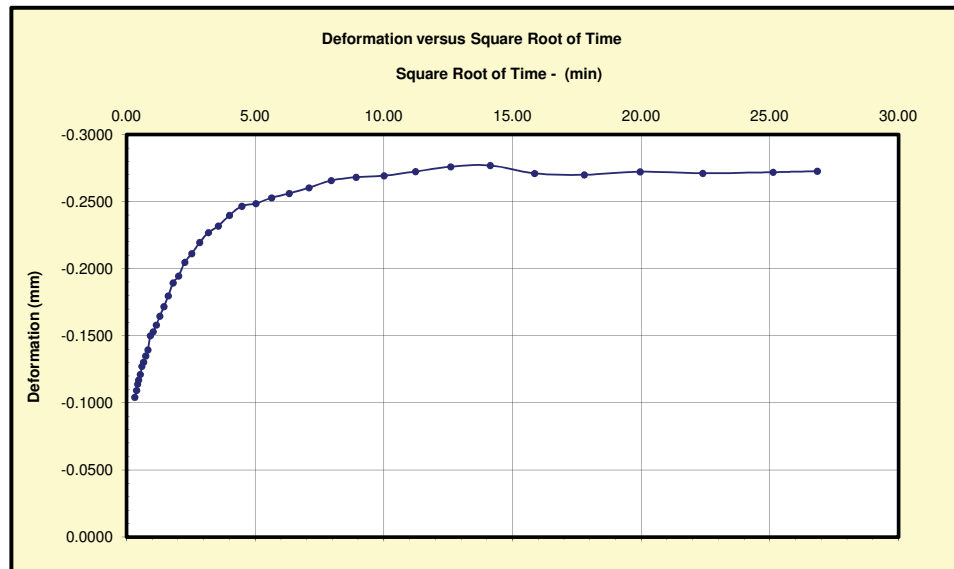
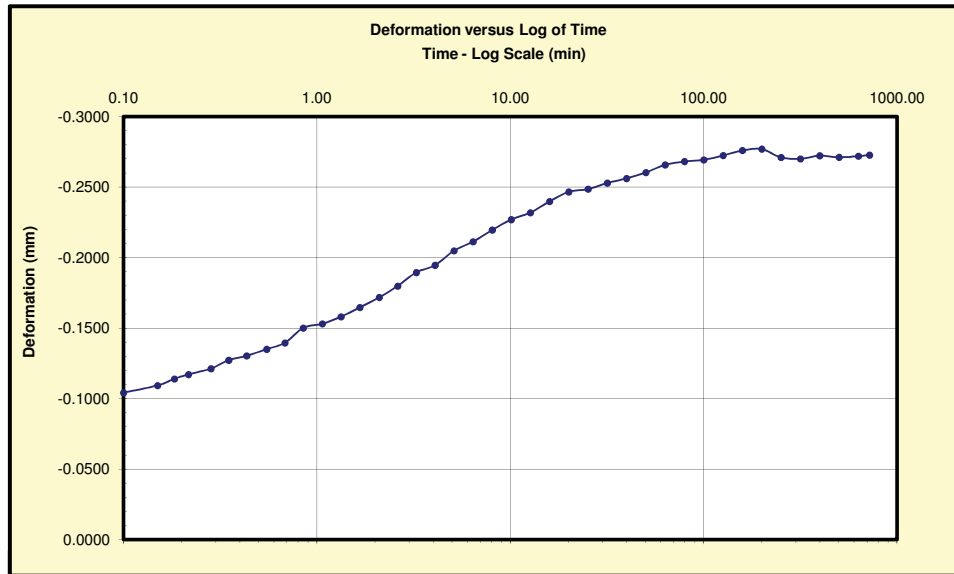


# MEG TECHNICAL SERVICES

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## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	14	Vertical Stress (kPa):	50.0



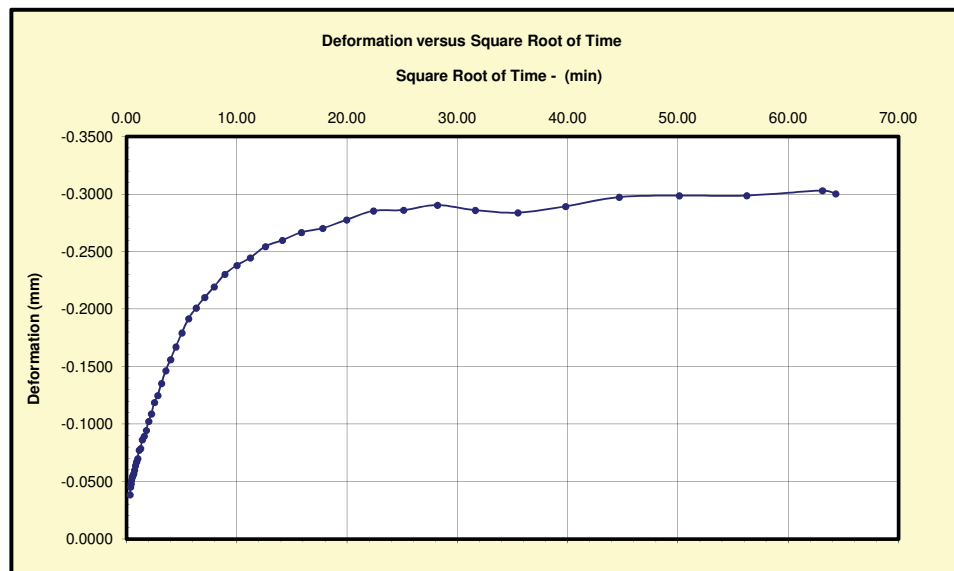
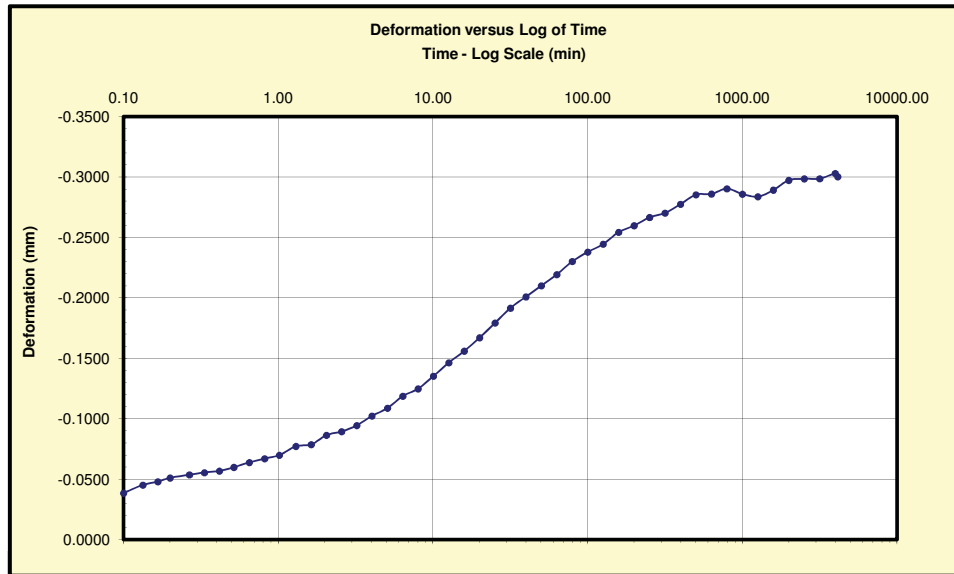
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# MEG TECHNICAL SERVICES

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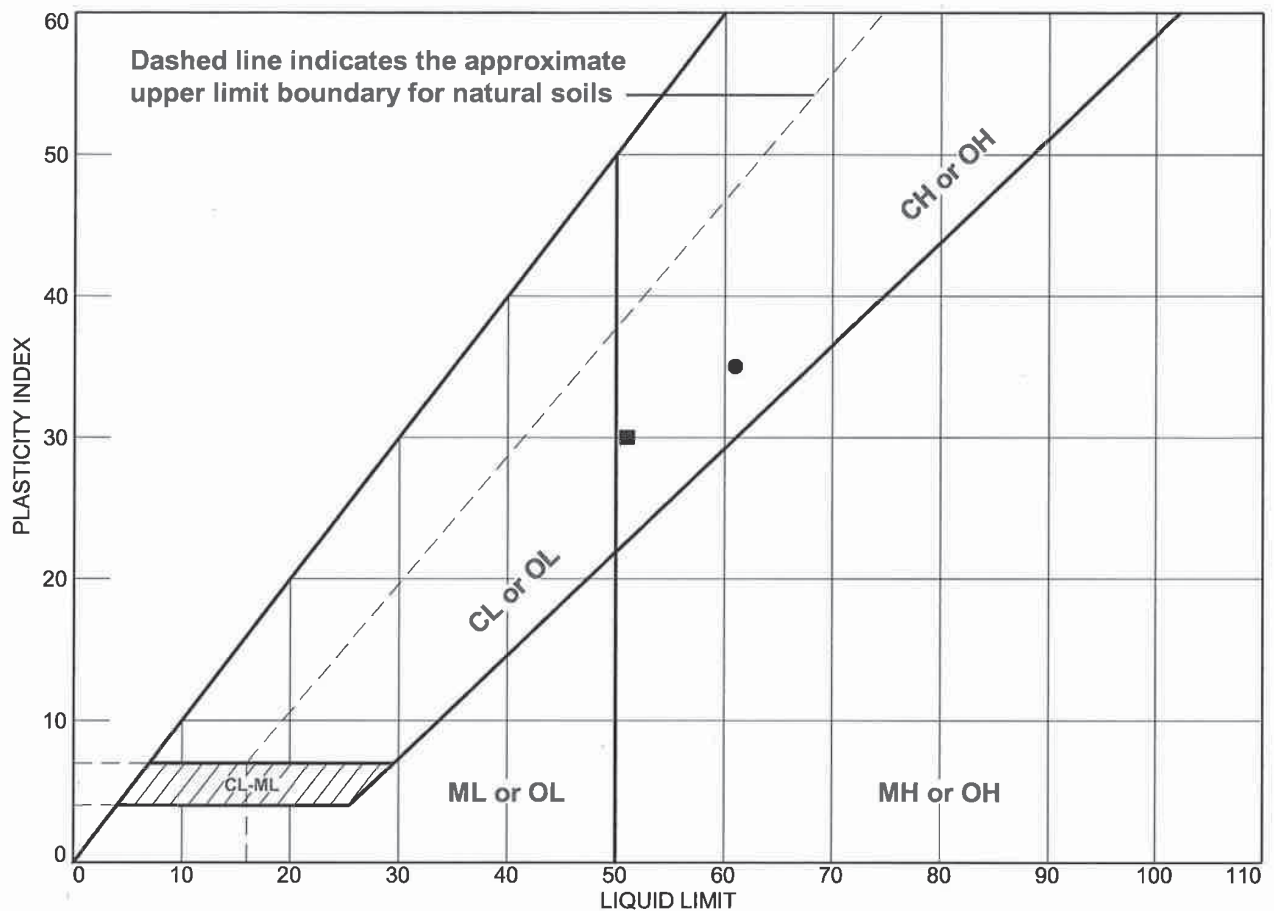
## One-Dimensional Consolidation (ASTM D 2435)

Project:	Pacific Crossing	Project No.:	13-MTS-006
Location:	BC	Date:	February 13, 2013
Borehole:	TH-13-02	Station:	Station 2
Sample No.:	18-20.33'	Depth (m):	5.81
Consolidation Step:	15	Vertical Stress (kPa):	12.0



Prepared By:	PC	Checked By:	PS	Approved By:	JPS
Date:	February 25, 2013	Date:	February 26, 2013	Date:	March 25, 2013

## LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	TH13-1	1-3	2.7m	39.9	26	61	35	CH
■	TH13-1	1-5	5.7m	45.9	21	51	30	CH

**Stantec Consulting, Ltd.**

**Burnaby, British Columbia**

**Client:** PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

**Project:** Pacific Border Crossing  
176A Street and 0 Avenue, Surrey, BC

**Project No.:** 123310945

**Figure**

**Tested By:** RI **Checked By:** TT

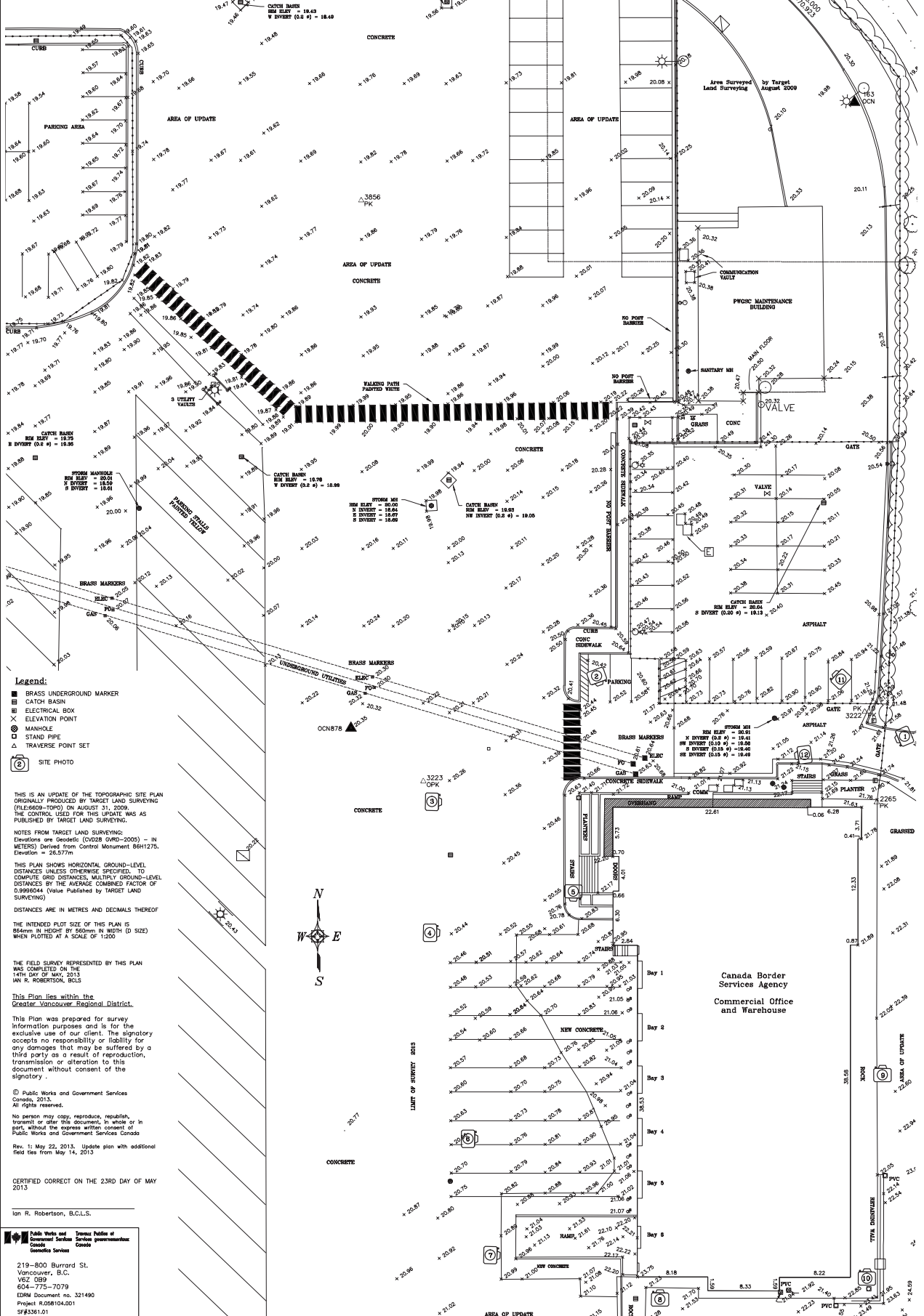
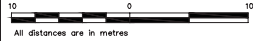
## **ATTACHMENT 3 to Annex A – Topographical Survey**

DRAFT

TOPOGRAPHIC SURVEY OVER PART OF  
THE REMAINDER LOT F PLAN 5749  
NEW WESTMINSTER DISTRICT  
PACIFIC HIGHWAY PORT OF ENTRY  
BRITISH COLUMBIA

BCGS 920.007

Scale 1:200



## **ATTACHMENT 4 to Annex A – Sample CMMS and AMS Forms**

DRAFT



Public Works and  
Government Services  
Canada

Travaux publics et  
Services gouvernementaux  
Canada

Canada

## SAMPLE CMMS AND AMS FORMS







Travaux publics et  
Services gouvernementaux  
Canada

Public Works and  
Government Services  
Canada

MMS Inventory Sheet #:

Reference To #:

Batiment/Building:

### General Information

Class:

☐ Equipment ☐ Component ☐ Assembly

Type:

☐ Normal ☐ Emergency ☐ Hazardous

#### Tag Reference

System Code:  Equipment Code:  Counter:

Life Support: ☐ Yes ☐ No

Floor:  Area:  Room:

In Use: ☐ Yes ☐ No

Function:

Condition: ☐ Unknown ☐ Warranty ☐ Fair ☐ Good ☐ Excellent

Item No.

Ozone Deleting  
Product: ☐ Yes ☐ No

#### Parent Equipment No.

QTY.(kg):

System Code:  Equipment Code:  Counter:

Type:

### Manufacturer Information

Manufacturer Name:

Model Number:  Serial #:

Frame:

Notes:

#### Electrical Specifications

Amperage:  Phase:  Primary Voltage:

Voltage:  HP:  Secondary Voltage:

RPM:  KVA:  Model Type:

KPA:  Size:

#### Other Info

Belt Size:  Belt Qty.  Filter Size:  Filter Qty.

Oil Type:  OIL Quantity:  BTU:

#### Warranty Info

Warrantor Name:

Under Warranty: ☐ Yes ☐ No

Phone #:  Contract #:

Term:

Start Date:  End Date:

Notes:



## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0005	Filter, Air	<input checked="" type="checkbox"/>	001	Disposable Glass	<input checked="" type="checkbox"/>
			002	Disposable Poly Pad	<input checked="" type="checkbox"/>
			003	Disposable Bag	<input checked="" type="checkbox"/>
			004	Disposable Charcoal	<input checked="" type="checkbox"/>
			005	Disposable Roll	<input checked="" type="checkbox"/>
			006	Disposable Pleated	<input checked="" type="checkbox"/>
			007	HEPA	<input checked="" type="checkbox"/>
			008	Washable	<input checked="" type="checkbox"/>
			009	Electro Static	<input checked="" type="checkbox"/>
			010	Compressor	<input checked="" type="checkbox"/>
0007	Filter Water	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Resin	<input checked="" type="checkbox"/>
			002	Cartridge	<input checked="" type="checkbox"/>
			005	Charcoal	<input checked="" type="checkbox"/>
0008	Filter Oil	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Elimination	<input checked="" type="checkbox"/>
0009	Aerator / Blower	<input checked="" type="checkbox"/>	001	Surface Aerator	<input checked="" type="checkbox"/>
			002	Immersion Diffuser Aerator	<input checked="" type="checkbox"/>
0010	Air Compressor	<input checked="" type="checkbox"/>	001	Screw (Water Cooled)	<input checked="" type="checkbox"/>
			002	Screw (Air Cooled)	<input checked="" type="checkbox"/>
			003	Reciprocating (Water Cooled)	<input checked="" type="checkbox"/>
			004	Reciprocating (Air Cooled)	<input checked="" type="checkbox"/>
			005	Reciprocating (Oilless)	<input checked="" type="checkbox"/>
			006	Special Purpose	<input checked="" type="checkbox"/>
			007	Portable	<input checked="" type="checkbox"/>
			008	High Pressure Compressor	<input checked="" type="checkbox"/>
0011	After Cooler/Inter Cooler	<input checked="" type="checkbox"/>	001	Air Cooled	<input checked="" type="checkbox"/>
			002	Water Cooled	<input checked="" type="checkbox"/>
0015	Vacuum Pump	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0016	Vacuum Cleaner	<input checked="" type="checkbox"/>	001	Central Vac	<input checked="" type="checkbox"/>
0025	Air Conditioner Unit (DX)	<input checked="" type="checkbox"/>	001	Roof Top	<input checked="" type="checkbox"/>
			002	Water Cooled	<input checked="" type="checkbox"/>
			003	Duct condenser	<input checked="" type="checkbox"/>
			004	Through the Wall	<input checked="" type="checkbox"/>
			005	Window	<input checked="" type="checkbox"/>
			006	Split System	<input checked="" type="checkbox"/>
			007	Portable	<input checked="" type="checkbox"/>
			008	Room	<input checked="" type="checkbox"/>
0050	Air Handling Unit	<input checked="" type="checkbox"/>	001	Heating Coil - Hot Water	<input checked="" type="checkbox"/>
			002	Heating Coil - Steam	<input checked="" type="checkbox"/>
			003	Heating Coil - Electric	<input checked="" type="checkbox"/>
			004	Cooling Coil - Chilled Water	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0050	Air Handling Unit	<input checked="" type="checkbox"/>	005	Heating & Cooling Coil	<input checked="" type="checkbox"/>
			006	Electric Heating & Cooling Coil	<input checked="" type="checkbox"/>
			007	Gas Heating	<input checked="" type="checkbox"/>
			008	Makeup Air Unit	<input checked="" type="checkbox"/>
			009	Air Handling Unit - (no coil)	<input checked="" type="checkbox"/>
0051	Air Distribution System	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Louvers & Screens	<input checked="" type="checkbox"/>
			002	Duct Work	<input checked="" type="checkbox"/>
			003	Difusers & Grilles	<input checked="" type="checkbox"/>
			005	Air Valve	<input checked="" type="checkbox"/>
			006	Silencer, Rectangular	<input checked="" type="checkbox"/>
			007	Silencer, Rectangular L Shape	<input checked="" type="checkbox"/>
			008	Silencer, Round	<input checked="" type="checkbox"/>
0052	Agitator	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Bio Waste	<input checked="" type="checkbox"/>
0053	Terminal units on air distribution systems	<input checked="" type="checkbox"/>	001	Variable air volume (VAV)	<input checked="" type="checkbox"/>
			002	Constant Volume	<input checked="" type="checkbox"/>
			003	Induction	<input checked="" type="checkbox"/>
			004	Mixing Box	<input checked="" type="checkbox"/>
			005	Dumping Box	<input checked="" type="checkbox"/>
0055	Trap/Vent	<input checked="" type="checkbox"/>	001	Automatic Air Vent	<input checked="" type="checkbox"/>
			002	Manual Air Vent	<input checked="" type="checkbox"/>
			003	Steam Trap	<input checked="" type="checkbox"/>
			004	Condensate Trap (Compressed Air)	<input checked="" type="checkbox"/>
			005	Automatic Oil Trap (Air)	<input checked="" type="checkbox"/>
			006	Automatic Water Trap	<input checked="" type="checkbox"/>
0057	Autoclave	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0058	Ash Removal	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0060	Battery and Charger	<input checked="" type="checkbox"/>	001	Batteries & Charger	<input checked="" type="checkbox"/>
0065	Backflow Preventer	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0070	Boiler Hot Water	<input checked="" type="checkbox"/>	001	Combination Gas, Oil, Electric	<input checked="" type="checkbox"/>
			002	Electric	<input checked="" type="checkbox"/>
			003	Oil Fired	<input checked="" type="checkbox"/>
			004	Gas Fired	<input checked="" type="checkbox"/>
0072	Environmental	<input checked="" type="checkbox"/>	000	Water Supply	<input checked="" type="checkbox"/>
0075	Boiler Steam	<input checked="" type="checkbox"/>	001	Oil Fired	<input checked="" type="checkbox"/>
			002	Gas Fired	<input checked="" type="checkbox"/>
			003	Electric	<input checked="" type="checkbox"/>
			004	Combination Gas, Oil, Electric	<input checked="" type="checkbox"/>
0077	Safety Relief Valve	<input checked="" type="checkbox"/>	001	Re-certification requirement: every 3 Year	<input checked="" type="checkbox"/>
			002	Re-certification requirement: every 5 years	<input checked="" type="checkbox"/>
0090	Burner	<input checked="" type="checkbox"/>	001	Oil	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0090	Burner	<input checked="" type="checkbox"/>	002	Gas/Propane	<input checked="" type="checkbox"/>
			003	Combination	<input checked="" type="checkbox"/>
0093	Bus Way	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0095	Bus Work Structure Insulators	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0096	Load Break Switch	<input checked="" type="checkbox"/>	001	Manual	<input checked="" type="checkbox"/>
			002	Automatic	<input checked="" type="checkbox"/>
0097	Cables Primary Secondary Feeders	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0100	Chiller	<input checked="" type="checkbox"/>	001	Absorption	<input checked="" type="checkbox"/>
			002	Centrifugal Low Pressure	<input checked="" type="checkbox"/>
			003	Centrifugal High Pressure	<input checked="" type="checkbox"/>
			004	Reciprocating	<input checked="" type="checkbox"/>
			005	Screw	<input checked="" type="checkbox"/>
			006	Cascading	<input checked="" type="checkbox"/>
			007	Hermetic, Air Cooled	<input checked="" type="checkbox"/>
			008	Scroll	<input checked="" type="checkbox"/>
0120	Circuit Breaker	<input checked="" type="checkbox"/>	001	Air	<input checked="" type="checkbox"/>
			002	Oil	<input checked="" type="checkbox"/>
			003	Vacuum	<input checked="" type="checkbox"/>
			004	Molded Case	<input checked="" type="checkbox"/>
			005	Gas	<input checked="" type="checkbox"/>
			006	Explosion Proof	<input checked="" type="checkbox"/>
0123	Excitor	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0124	DC Generator	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0125	Surge Protection/Transient Voltage Unit	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0128	Capacitor	<input checked="" type="checkbox"/>	001	Unit	<input checked="" type="checkbox"/>
			002	Capacitor Bank	<input checked="" type="checkbox"/>
0130	Coil	<input checked="" type="checkbox"/>	001	Chilled Water	<input checked="" type="checkbox"/>
			002	Evaporative Cooler	<input checked="" type="checkbox"/>
			003	Hot Water	<input checked="" type="checkbox"/>
			004	Direct Expansion	<input checked="" type="checkbox"/>
			005	Steam	<input checked="" type="checkbox"/>
			006	Heat Recovery Glycol	<input checked="" type="checkbox"/>
			007	Heat Recovery Refrigerant	<input checked="" type="checkbox"/>
			008	Extreme Density Cooling Coil	<input checked="" type="checkbox"/>
0137	Cold Room / Walk-In Refrigerator/Freezer	<input checked="" type="checkbox"/>	001	Cold Room	<input checked="" type="checkbox"/>
			002	Walk-In Refrigerator/Freezer	<input checked="" type="checkbox"/>
			003	Garbage Refrigerator	<input checked="" type="checkbox"/>
0140	Air Purifier	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0142	Condenser Evaporative	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0143	Evaporator	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
0144	Building Communication Systems	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Intercom System	<input checked="" type="checkbox"/>



## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0147	Compressed Air Dryer	<input checked="" type="checkbox"/>	001	Refrigerated Air Dryer	<input checked="" type="checkbox"/>
			002	Chemical Air Dryer	<input checked="" type="checkbox"/>
0148	Compressor Refrigeration	<input checked="" type="checkbox"/>	001	Reciprocating	<input checked="" type="checkbox"/>
			002	Rotary	<input checked="" type="checkbox"/>
0150	Condenser	<input checked="" type="checkbox"/>	001	Air Cooled	<input checked="" type="checkbox"/>
			002	Water or Glycol Cooled	<input checked="" type="checkbox"/>
0152	Controls, Boilers	<input checked="" type="checkbox"/>	001	Various Boiler Controls	<input checked="" type="checkbox"/>
			002	Analyser	<input checked="" type="checkbox"/>
			003	Combustion Management	<input checked="" type="checkbox"/>
			004	Boiler Furnace	<input checked="" type="checkbox"/>
0153	Controls Electric Electronic (30 volts and less)	<input checked="" type="checkbox"/>	001	Panel	<input checked="" type="checkbox"/>
			002	Link Panel	<input checked="" type="checkbox"/>
			003	Communication Panel (DDC)	<input checked="" type="checkbox"/>
			004	Controller	<input checked="" type="checkbox"/>
			005	Input/Output Card	<input checked="" type="checkbox"/>
			006	Extension Card	<input checked="" type="checkbox"/>
			007	Computer / Monitor	<input checked="" type="checkbox"/>
			008	Printer	<input checked="" type="checkbox"/>
			009	Thermostat	<input checked="" type="checkbox"/>
			010	Portable Command Unit	<input checked="" type="checkbox"/>
			011	Control Valve Assembly With or Without Positioner	<input checked="" type="checkbox"/>
			012	Temperature Transmitter	<input checked="" type="checkbox"/>
			013	Humidity Transmitter	<input checked="" type="checkbox"/>
			014	Level Transmitter	<input checked="" type="checkbox"/>
			015	Pressure Transmitter	<input checked="" type="checkbox"/>
			016	Flow Transmitter	<input checked="" type="checkbox"/>
			017	Relay	<input checked="" type="checkbox"/>
			018	Contact	<input checked="" type="checkbox"/>
			019	Timers	<input checked="" type="checkbox"/>
			020	Current or Voltage Detecting Relay	<input checked="" type="checkbox"/>
			021	LED	<input checked="" type="checkbox"/>
			022	Transducer	<input checked="" type="checkbox"/>
			023	Gas Detector Monitor CO2	<input checked="" type="checkbox"/>
			024	Gas Monitor (portable for confined spaces)	<input checked="" type="checkbox"/>
			025	Carbon monoxide detector (fixed)	<input checked="" type="checkbox"/>
			026	Transformer	<input checked="" type="checkbox"/>
			027	Actuator with or without positioner	<input checked="" type="checkbox"/>
			028	Analog Input/Output	<input checked="" type="checkbox"/>
			029	Numeric Input/Output	<input checked="" type="checkbox"/>
			030	Differential Pressure Transmitter	<input checked="" type="checkbox"/>
			031	Refrigerant Leak Detector	<input checked="" type="checkbox"/>
			032	Natural Gas Monitor (CH4)	<input checked="" type="checkbox"/>

Report ID 23019



## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0153	Controls Electric Electronic (30 volts and less)	<input checked="" type="checkbox"/>	033	Building Automation Controls System	<input checked="" type="checkbox"/>
0154	Controls, Pneumatic	<input checked="" type="checkbox"/>	001	Panel	<input checked="" type="checkbox"/>
			002	Thermostat	<input checked="" type="checkbox"/>
			003	Controller	<input checked="" type="checkbox"/>
			004	Actuator With or Without Positioner	<input checked="" type="checkbox"/>
			005	Control Valve Assembly With or Without Positioner	<input checked="" type="checkbox"/>
			006	Temperature Transmitter	<input checked="" type="checkbox"/>
			007	Humidity Transmitter	<input checked="" type="checkbox"/>
			008	Level Transmitter	<input checked="" type="checkbox"/>
			009	Pressure Transmitter	<input checked="" type="checkbox"/>
			010	Flow Transmitter	<input checked="" type="checkbox"/>
			011	Relay (inverting or not)	<input checked="" type="checkbox"/>
			012	E/P or P/E	<input checked="" type="checkbox"/>
			013	I to P or I/P	<input checked="" type="checkbox"/>
			014	Transducer	<input checked="" type="checkbox"/>
			015	Differential pressure indicator (Magnehelic)	<input checked="" type="checkbox"/>
0155	Controls, Electric (31 Volts and more)	<input checked="" type="checkbox"/>	001	Thermostat	<input checked="" type="checkbox"/>
			002	Electric Actuator	<input checked="" type="checkbox"/>
			003	Relay	<input checked="" type="checkbox"/>
			004	Contact	<input checked="" type="checkbox"/>
			005	Current or Voltage Detecting Relay	<input checked="" type="checkbox"/>
			006	SCR	<input checked="" type="checkbox"/>
			007	Timer	<input checked="" type="checkbox"/>
			008	Limits (start/stop, end of line, proximity, etc)	<input checked="" type="checkbox"/>
			009	Remote Control Station	<input checked="" type="checkbox"/>
			010	Cathodic Protection	<input checked="" type="checkbox"/>
0156	Metering and Recording	<input checked="" type="checkbox"/>	001	Water Meter	<input checked="" type="checkbox"/>
			002	HTHW Meter	<input checked="" type="checkbox"/>
			003	Chilled Water Meter	<input checked="" type="checkbox"/>
			004	Steam Meter	<input checked="" type="checkbox"/>
			005	Gas Meter	<input checked="" type="checkbox"/>
			006	Combined Meter	<input checked="" type="checkbox"/>
			007	Electric Meter	<input checked="" type="checkbox"/>
			008	Ph Meter	<input checked="" type="checkbox"/>
			009	Conductivity Meter	<input checked="" type="checkbox"/>
			010	Chart Recorder	<input checked="" type="checkbox"/>
			011	Electronic Recorder or Counter	<input checked="" type="checkbox"/>
			012	Thermometer	<input checked="" type="checkbox"/>
			013	Water level indicator	<input checked="" type="checkbox"/>
			075	Special Equipment	<input checked="" type="checkbox"/>
0160	Convactor	<input checked="" type="checkbox"/>	001	Hot Water	<input checked="" type="checkbox"/>
			002	Steam	<input checked="" type="checkbox"/>

Report ID 23019



## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0160	Convactor	<input checked="" type="checkbox"/>	003	Freon	<input checked="" type="checkbox"/>
			004	Glycol	<input checked="" type="checkbox"/>
0170	Converter	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			075	Special Purpose	<input checked="" type="checkbox"/>
0172	Conveyor	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0180	Cooling Tower	<input checked="" type="checkbox"/>	001	Forced Flow	<input checked="" type="checkbox"/>
			002	Induced Draft (Cross Flow)	<input checked="" type="checkbox"/>
			003	Natural Draft	<input checked="" type="checkbox"/>
			004	Fan - Cooling Tower	<input checked="" type="checkbox"/>
0185	Dust Collector System	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0186	Dampers	<input checked="" type="checkbox"/>	001	Parallel, Pneumatic Operated	<input checked="" type="checkbox"/>
			002	Parallel, Electric Operate	<input checked="" type="checkbox"/>
			003	Opposed, Pneumatic Operated	<input checked="" type="checkbox"/>
			004	Opposed, Electric Operated	<input checked="" type="checkbox"/>
0190	Deaerator	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0195	Dehumidifier	<input checked="" type="checkbox"/>	001	Mechanical (DX)	<input checked="" type="checkbox"/>
			002	Chemical	<input checked="" type="checkbox"/>
			003	Mechanical, Chilled Water	<input checked="" type="checkbox"/>
0199	Desuperheater	<input checked="" type="checkbox"/>	001	Spray	<input checked="" type="checkbox"/>
			002	Indirect Contact	<input checked="" type="checkbox"/>
0200	Disconnects	<input checked="" type="checkbox"/>	001	Fusible Disconnect	<input checked="" type="checkbox"/>
			002	Non Fusible Disconnect	<input checked="" type="checkbox"/>
			003	Bus Duct	<input checked="" type="checkbox"/>
			004	Isolating	<input checked="" type="checkbox"/>
			005	Main Disconnect	<input checked="" type="checkbox"/>
			006	Explosion Proof Disconnect	<input checked="" type="checkbox"/>
0201	Electrical Devices Miscellaneous	<input checked="" type="checkbox"/>	000	Non-Categorized	<input checked="" type="checkbox"/>
			001	Modular Wiring	<input checked="" type="checkbox"/>
			002	Electromagnetic	<input checked="" type="checkbox"/>
			003	Hand Dryer	<input checked="" type="checkbox"/>
			004	Irradiator	<input checked="" type="checkbox"/>
			005	Voltage Regulator	<input checked="" type="checkbox"/>
			006	Magnetic Synthesizer	<input checked="" type="checkbox"/>
			007	Photocell	<input checked="" type="checkbox"/>
			008	Power Conditioner	<input checked="" type="checkbox"/>
			009	Emergency Stop Button	<input checked="" type="checkbox"/>
			010	Surge Pack	<input checked="" type="checkbox"/>
			011	Voltmeter Ammeter	<input checked="" type="checkbox"/>
			012	Dimmer	<input checked="" type="checkbox"/>
0212	Panelboard	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Explosion Proof	<input checked="" type="checkbox"/>
0215	Distribution Splitter Trough	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>



## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0220	Distribution Switchboard	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0223	Sump Pit (Interior)	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0230	Dock Load Leveler	<input checked="" type="checkbox"/>	001	All	<input checked="" type="checkbox"/>
0235	Drains	<input checked="" type="checkbox"/>	001	Floor	<input checked="" type="checkbox"/>
			002	Roof	<input checked="" type="checkbox"/>
			003	Trap Seal Primer	<input checked="" type="checkbox"/>
			004	Gutters	<input checked="" type="checkbox"/>
0239	Motor	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Gasoline	<input checked="" type="checkbox"/>
			002	Diesel	<input checked="" type="checkbox"/>
			200	Heating	<input checked="" type="checkbox"/>
			250	Cooling	<input checked="" type="checkbox"/>
			300	Ventilation	<input checked="" type="checkbox"/>
			400	Compressed Air	<input checked="" type="checkbox"/>
			500	Water Supply Domestic	<input checked="" type="checkbox"/>
			550	Plumbing Drain Sewage	<input checked="" type="checkbox"/>
			600	Fire	<input checked="" type="checkbox"/>
			650	Vertical Horizontal Transportation	<input checked="" type="checkbox"/>
			720	Environment	<input checked="" type="checkbox"/>
			750	Special Systems	<input checked="" type="checkbox"/>
			800	Architectural	<input checked="" type="checkbox"/>
			850	Grounds	<input checked="" type="checkbox"/>
			900	Kitchen	<input checked="" type="checkbox"/>
0240	Vertical & Horizontal Transportation	<input checked="" type="checkbox"/>	001	Passenger Elevator Electric	<input checked="" type="checkbox"/>
			002	Passenger Elevator Hydraulic	<input checked="" type="checkbox"/>
			003	Freight Elevator Electric	<input checked="" type="checkbox"/>
			004	Freight Elevator Hydraulic	<input checked="" type="checkbox"/>
			005	Lift, Physical Disability	<input checked="" type="checkbox"/>
			007	Dumbwaiter	<input checked="" type="checkbox"/>
			008	Vehicle Lift	<input checked="" type="checkbox"/>
			009	Freight Platform Lift	<input checked="" type="checkbox"/>
			010	Escalator	<input checked="" type="checkbox"/>
			011	Escalators and Moving Walks	<input checked="" type="checkbox"/>
			012	Elevator Shaft	<input checked="" type="checkbox"/>
			013	Elevator, High rise building	<input checked="" type="checkbox"/>
			014	Freight Lift - Stariwell	<input checked="" type="checkbox"/>
0245	Economizer	<input checked="" type="checkbox"/>	001	Boiler Type	<input checked="" type="checkbox"/>
0250	Emergency Generator System	<input checked="" type="checkbox"/>	001	Diesel Generator Set	<input checked="" type="checkbox"/>
			002	Gasoline or Gas Generator Set	<input checked="" type="checkbox"/>
			003	Turbine Generator Set	<input checked="" type="checkbox"/>
			004	Steam Generator Set	<input checked="" type="checkbox"/>
			005	Alternator	<input checked="" type="checkbox"/>





## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0250	Emergency Generator System	<input checked="" type="checkbox"/>	006	Remote Radiator	<input checked="" type="checkbox"/>
			007	Float Switch Level Controls	<input checked="" type="checkbox"/>
			008	Generator - Natural Gas	<input checked="" type="checkbox"/>
0257	Heat Exchanger	<input checked="" type="checkbox"/>	001	Fluid to Fluid	<input checked="" type="checkbox"/>
			002	Air to Air	<input checked="" type="checkbox"/>
			003	Plate	<input checked="" type="checkbox"/>
			004	Thermal Wheel	<input checked="" type="checkbox"/>
			005	Liquid to Air	<input checked="" type="checkbox"/>
			006	Solar Panel	<input checked="" type="checkbox"/>
			007	Steam to Liquid	<input checked="" type="checkbox"/>
			008	Steam to Steam	<input checked="" type="checkbox"/>
			009	Liquid to Steam	<input checked="" type="checkbox"/>
			201	Fluid to Air Heating	<input checked="" type="checkbox"/>
			202	Fluid to Fluid Heating	<input checked="" type="checkbox"/>
			203	Air to Air Heating	<input checked="" type="checkbox"/>
			204	Plate Heating	<input checked="" type="checkbox"/>
			205	Thermal Wheel Heating	<input checked="" type="checkbox"/>
			206	Solar Heating	<input checked="" type="checkbox"/>
			207	Glycol Heating	<input checked="" type="checkbox"/>
			208	Heating steam to liquid	<input checked="" type="checkbox"/>
			252	Fluid to Fluid Cooling	<input checked="" type="checkbox"/>
			253	Air to Air Cooling	<input checked="" type="checkbox"/>
			254	Plate Cooling	<input checked="" type="checkbox"/>
			255	Thermal Wheel Cooling	<input checked="" type="checkbox"/>
			256	Solar Cooling	<input checked="" type="checkbox"/>
			257	Glycol to Air Cooling	<input checked="" type="checkbox"/>
0259	Expansion Joint Piping	<input checked="" type="checkbox"/>	001	Bellows Type	<input checked="" type="checkbox"/>
			002	Slip Type	<input checked="" type="checkbox"/>
			003	Flexible Type (Braded)	<input checked="" type="checkbox"/>
0260	Fan	<input checked="" type="checkbox"/>	001	Supply, Based Mounted	<input checked="" type="checkbox"/>
			002	Supply, In-Line	<input checked="" type="checkbox"/>
			003	Supply, Roof Mounted	<input checked="" type="checkbox"/>
			004	Supply, Wall Mounted	<input checked="" type="checkbox"/>
			005	Return, Based Mounted	<input checked="" type="checkbox"/>
			006	Return In-Line	<input checked="" type="checkbox"/>
			007	Return, Roof mounted	<input checked="" type="checkbox"/>
			008	Exhaust, Base Mounted	<input checked="" type="checkbox"/>
			009	Exhaust, In-Line	<input checked="" type="checkbox"/>
			010	Exhaust, Roof Mounted	<input checked="" type="checkbox"/>
			011	Exhaust, Wall Mounted	<input checked="" type="checkbox"/>
			012	Transfer, Base Mounted	<input checked="" type="checkbox"/>
			013	Transfer, In-Line (caisson)	<input checked="" type="checkbox"/>



## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0260	Fan	<input checked="" type="checkbox"/>	014	Pressurization, Base Mounted	<input checked="" type="checkbox"/>
			015	Pressurization, In-Line	<input checked="" type="checkbox"/>
			016	Pressurization, Roof Mounted	<input checked="" type="checkbox"/>
			017	Energy Recovery System	<input checked="" type="checkbox"/>
0261	Fan Ceiling Circulation	<input checked="" type="checkbox"/>	001	Ceiling Fan, Propeller	<input checked="" type="checkbox"/>
0265	Fan Combustion	<input checked="" type="checkbox"/>	001	Forced Draft	<input checked="" type="checkbox"/>
			002	Induced Draft	<input checked="" type="checkbox"/>
0270	Fan Exhaust	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Vault Exhaust	<input checked="" type="checkbox"/>
			003	Washroom	<input checked="" type="checkbox"/>
0271	Fan Exhaust Ash	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0273	Contaminants Extraction System	<input checked="" type="checkbox"/>	001	Laboratory Fume Hood assembly	<input checked="" type="checkbox"/>
			002	Chemical Extraction System	<input checked="" type="checkbox"/>
			003	Paint Booth Extraction System	<input checked="" type="checkbox"/>
			004	Automobile Exhaust Extraction System	<input checked="" type="checkbox"/>
			005	Welding Fume Extraction System	<input checked="" type="checkbox"/>
0274	Canopy Hood Assembly	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0275	Scrubber	<input checked="" type="checkbox"/>	001	Wet Collector	<input checked="" type="checkbox"/>
0280	Fan Coil Unit	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0290	Fire Alarm System	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Fire Alarm Voice Communication System Integrated	<input checked="" type="checkbox"/>
			002	Domestic Smoke Detector	<input checked="" type="checkbox"/>
			003	Heat Detector	<input checked="" type="checkbox"/>
			004	Smoke Detector	<input checked="" type="checkbox"/>
			005	Pull Station	<input checked="" type="checkbox"/>
			006	Combination Smoke and Heat Detector	<input checked="" type="checkbox"/>
			007	Annunciator Panel	<input checked="" type="checkbox"/>
			008	Bell	<input checked="" type="checkbox"/>
			009	Duct Smoke Detector	<input checked="" type="checkbox"/>
			010	Klaxton Horn	<input checked="" type="checkbox"/>
			011	Strobe Light	<input checked="" type="checkbox"/>
			012	Flow Switch	<input checked="" type="checkbox"/>
			013	Key	<input checked="" type="checkbox"/>
			014	Tamper Switch	<input checked="" type="checkbox"/>
			015	Pressure Switch	<input checked="" type="checkbox"/>
			016	Visual Alarm Device	<input checked="" type="checkbox"/>
			017	End of Line Resistor/Capacitor	<input checked="" type="checkbox"/>
			018	Alarm Valve	<input checked="" type="checkbox"/>
			019	Low Pressure Main Fire Protection	<input checked="" type="checkbox"/>
			020	Kitchen Hood	<input checked="" type="checkbox"/>
			021	Fire Pump, Test Header	<input checked="" type="checkbox"/>



## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0290	Fire Alarm System	<input checked="" type="checkbox"/>	022	Fire Pump, Running	<input checked="" type="checkbox"/>
			023	Fire Pump, Loss of Power	<input checked="" type="checkbox"/>
			024	Fire Pump, Tamper	<input checked="" type="checkbox"/>
			025	Low Pressure, Dry System	<input checked="" type="checkbox"/>
			026	Phase Reversal	<input checked="" type="checkbox"/>
			027	Fire Alarm End Devices	<input checked="" type="checkbox"/>
0300	Fire Dampers Fire Stop Flaps	<input checked="" type="checkbox"/>	001	Fire Dampers, Gravity	<input checked="" type="checkbox"/>
			002	Fire Dampers, Spring Loaded	<input checked="" type="checkbox"/>
			003	Fire Dampers, Motorized	<input checked="" type="checkbox"/>
			004	Fire Dampers, Opposed Blade	<input checked="" type="checkbox"/>
			005	Fire Flaps	<input checked="" type="checkbox"/>
			006	Fire Damper (with fusible link)	<input checked="" type="checkbox"/>
0310	Fire Extinguishers Portable	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Sodium Chloride	<input checked="" type="checkbox"/>
			002	Water (Pump & Pressurized)	<input checked="" type="checkbox"/>
			003	Dry Chemical	<input checked="" type="checkbox"/>
			004	CO2	<input checked="" type="checkbox"/>
			005	Halon	<input checked="" type="checkbox"/>
0311	Fire Suppression Systems	<input checked="" type="checkbox"/>	001	CO2	<input checked="" type="checkbox"/>
			002	Dry Chemical	<input checked="" type="checkbox"/>
			003	Halon	<input checked="" type="checkbox"/>
			004	Foam	<input checked="" type="checkbox"/>
			005	Water	<input checked="" type="checkbox"/>
			006	Wet Chemical	<input checked="" type="checkbox"/>
			007	Commercial Cooking Equipment	<input checked="" type="checkbox"/>
			008	Clean Agent	<input checked="" type="checkbox"/>
0315	Fire Hydrants	<input checked="" type="checkbox"/>	001	Fire Hydrant	<input checked="" type="checkbox"/>
			002	Siamese Connections	<input checked="" type="checkbox"/>
			003	Post indicator valve for hydrants	<input checked="" type="checkbox"/>
0325	Fire Pump Supply    Booster	<input checked="" type="checkbox"/>	001	Electric	<input checked="" type="checkbox"/>
			003	Diesel	<input checked="" type="checkbox"/>
0330	First Aid Kit	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0331	Eye wash & Emergency Shower	<input checked="" type="checkbox"/>	001	Combination Eye Wash & Shower	<input checked="" type="checkbox"/>
			002	Portable Station Eye Wash	<input checked="" type="checkbox"/>
			003	Eye Wash	<input checked="" type="checkbox"/>
			004	Emergency Shower	<input checked="" type="checkbox"/>
0332	Emergency Alarms Washrooms	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			011	Emergency Alarm, Handicapped Washroom	<input checked="" type="checkbox"/>
0335	Flash Tank	<input checked="" type="checkbox"/>	001	Condensate (High Pressure)	<input checked="" type="checkbox"/>
			002	Blow Down	<input checked="" type="checkbox"/>
0339	Furnace Warm Air	<input checked="" type="checkbox"/>	000	Filters	<input checked="" type="checkbox"/>
			001	Electric	<input checked="" type="checkbox"/>



## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0339	Furnace Warm Air	<input checked="" type="checkbox"/>	002	Gas (Natural & Propane)	<input checked="" type="checkbox"/>
			003	Oil	<input checked="" type="checkbox"/>
0341	Heater	<input checked="" type="checkbox"/>	001	Glycol Ramp	<input checked="" type="checkbox"/>
			002	Duct Electric	<input checked="" type="checkbox"/>
			003	Ramp electric	<input checked="" type="checkbox"/>
			004	Baseboard Electric	<input checked="" type="checkbox"/>
			005	Electric	<input checked="" type="checkbox"/>
			006	Cables Electric	<input checked="" type="checkbox"/>
0342	Radiant Infrared Heater	<input checked="" type="checkbox"/>	001	Electric	<input checked="" type="checkbox"/>
			002	Gas Fired Straight Tube Heater	<input checked="" type="checkbox"/>
			003	Gas Fired U Shape Tube Heater	<input checked="" type="checkbox"/>
			004	Gas Fired Panel Heater	<input checked="" type="checkbox"/>
0345	Hoisting Equipment	<input checked="" type="checkbox"/>	001	Travelling Bridge Crane Powered	<input checked="" type="checkbox"/>
			002	Travelling Bridge Crane Manual	<input checked="" type="checkbox"/>
			003	Overhead Chainfall Electric	<input checked="" type="checkbox"/>
			004	Overhead Chainfall Manual	<input checked="" type="checkbox"/>
			005	Wharf & Jetty Crane	<input checked="" type="checkbox"/>
			006	Pneumatic/Hydraulic	<input checked="" type="checkbox"/>
0350	Humidifier	<input checked="" type="checkbox"/>	001	Atomizing	<input checked="" type="checkbox"/>
			002	Drum Type	<input checked="" type="checkbox"/>
			003	Direct Steam Injection (Local)	<input checked="" type="checkbox"/>
			004	Electrolysis (electronic)	<input checked="" type="checkbox"/>
			005	Infra-red	<input checked="" type="checkbox"/>
			006	Gas	<input checked="" type="checkbox"/>
			007	Direct Steam Injection	<input checked="" type="checkbox"/>
0355	Incinerator	<input checked="" type="checkbox"/>	001	Oil Fired	<input checked="" type="checkbox"/>
			002	Gas Fired	<input checked="" type="checkbox"/>
0360	Induction Unit	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
0361	Sand Trap	<input checked="" type="checkbox"/>	000	Sand/Sediment	<input checked="" type="checkbox"/>
0362	Interceptor Grease or Oil	<input checked="" type="checkbox"/>	001	Oil Water Trap	<input checked="" type="checkbox"/>
			002	Oil Trap	<input checked="" type="checkbox"/>
			003	Grease Trap	<input checked="" type="checkbox"/>
0363	Sediment Trap	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0365	Irrigation System	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0370	Lighting	<input checked="" type="checkbox"/>	001	Emergency - Battery Wet Type	<input checked="" type="checkbox"/>
			002	Emergency - Battery Dry Type	<input checked="" type="checkbox"/>
			003	Emergency - Exit sign	<input checked="" type="checkbox"/>
			004	Emergency - On Emergency Power	<input checked="" type="checkbox"/>
			005	Interior - Fluorescent	<input checked="" type="checkbox"/>
			006	Interior - Incandescent	<input checked="" type="checkbox"/>
			007	Interior - Programmable Control	<input checked="" type="checkbox"/>
			008	Interior - Safety Light	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0370	Lighting	<input checked="" type="checkbox"/>	009	Exterior - Lamp Posts	<input checked="" type="checkbox"/>
			010	Exterior - Catenary	<input checked="" type="checkbox"/>
			011	Exterior - Wall Mounted	<input checked="" type="checkbox"/>
			012	Exterior - Position lights	<input checked="" type="checkbox"/>
			013	Exterior - Landing-Direction Lights	<input checked="" type="checkbox"/>
			014	Exterior - Pot	<input checked="" type="checkbox"/>
			015	Interior - Halogen	<input checked="" type="checkbox"/>
			016	Exterior - Weatherproof	<input checked="" type="checkbox"/>
			017	Interior Explosion Proof	<input checked="" type="checkbox"/>
			018	Interior Splash Proof	<input checked="" type="checkbox"/>
			020	Interior Sodium Vapour	<input checked="" type="checkbox"/>
			021	Interior Compact Fluorescent	<input checked="" type="checkbox"/>
			022	Exterior Metal Halide	<input checked="" type="checkbox"/>
0381	Lightning Rod	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0383	Master Clock	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0386	Motor Control Center (MCC)	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0387	Piping Systems	<input checked="" type="checkbox"/>	001	Compressed Air	<input checked="" type="checkbox"/>
			002	Condensate	<input checked="" type="checkbox"/>
			003	Sewage, Outdoor	<input checked="" type="checkbox"/>
			004	Sewage & Drainage, Indoor	<input checked="" type="checkbox"/>
			005	High Temperature Hot Water	<input checked="" type="checkbox"/>
			006	Domestic Water	<input checked="" type="checkbox"/>
			007	Chilled Water	<input checked="" type="checkbox"/>
			008	Glycol	<input checked="" type="checkbox"/>
			009	Steam	<input checked="" type="checkbox"/>
			010	Compressed Gases	<input checked="" type="checkbox"/>
			011	Natural Gas/Propane	<input checked="" type="checkbox"/>
			012	Gas/Fuel Oil/Oil	<input checked="" type="checkbox"/>
			013	Fuel Transfer	<input checked="" type="checkbox"/>
			014	Chemical Products	<input checked="" type="checkbox"/>
			015	Glass	<input checked="" type="checkbox"/>
			016	Stainless steel	<input checked="" type="checkbox"/>
			017	Valves - Non-Categorized	<input checked="" type="checkbox"/>
			018	Shallow Salt Water	<input checked="" type="checkbox"/>
			019	Deep Salt Water	<input checked="" type="checkbox"/>
			020	Salt Water Cooling	<input checked="" type="checkbox"/>
			021	General	<input checked="" type="checkbox"/>
			022	Steam Header	<input checked="" type="checkbox"/>
			023	Pot Feeder	<input checked="" type="checkbox"/>
			024	Sidestream Filter	<input checked="" type="checkbox"/>
			025	Balancing Valve	<input checked="" type="checkbox"/>
			026	Isolating Valve	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0388	Plumbing Fixtures	<input checked="" type="checkbox"/>	000	All Elements	<input checked="" type="checkbox"/>
			001	Sinks	<input checked="" type="checkbox"/>
			002	Water Closets (Toilets)	<input checked="" type="checkbox"/>
			003	Urinals	<input checked="" type="checkbox"/>
			004	Slop Sink	<input checked="" type="checkbox"/>
			005	Shower	<input checked="" type="checkbox"/>
			006	Bath	<input checked="" type="checkbox"/>
			007	Outdoor taps (freeze protection)	<input checked="" type="checkbox"/>
			008	Combination Lavatory	<input checked="" type="checkbox"/>
0391	PCB Storage Site	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0395	Preheater Oil	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0396	Pressure Regulating Valves	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Pressure Reducing Valves Steam	<input checked="" type="checkbox"/>
			002	Pressure relief valve	<input checked="" type="checkbox"/>
			003	Pressure & Temperature Relief Valve	<input checked="" type="checkbox"/>
			004	Pressure Reducing Valve Water	<input checked="" type="checkbox"/>
			005	Propane Gas	<input checked="" type="checkbox"/>
			006	Natural Gas Valve	<input checked="" type="checkbox"/>
0397	Projector Slide	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0399	Regulated Pressure Vessels (SCIP)	<input checked="" type="checkbox"/>	001	External 12 Internal 24	<input checked="" type="checkbox"/>
			002	External 12 Internal 12 (Boilers)	<input checked="" type="checkbox"/>
0400	Pump	<input checked="" type="checkbox"/>	000	non categorized	<input checked="" type="checkbox"/>
			001	Fuel Transfer	<input checked="" type="checkbox"/>
			002	Chemical Feed	<input checked="" type="checkbox"/>
			003	Hydraulic	<input checked="" type="checkbox"/>
			004	Circulator In-Line	<input checked="" type="checkbox"/>
			005	Circulator Base Mount	<input checked="" type="checkbox"/>
			006	Domestic Water (Well)	<input checked="" type="checkbox"/>
			007	Chlorine	<input checked="" type="checkbox"/>
			100	Chiller oil pump	<input checked="" type="checkbox"/>
			200	Heating In-Line	<input checked="" type="checkbox"/>
			201	Heating Base Mount	<input checked="" type="checkbox"/>
			202	Oil, Diesel & Turbine Generator	<input checked="" type="checkbox"/>
			203	Oil, Boiler	<input checked="" type="checkbox"/>
			204	Chemical (Heating)	<input checked="" type="checkbox"/>
			205	Condensate Base Mount	<input checked="" type="checkbox"/>
			206	Boiler Feed Steam	<input checked="" type="checkbox"/>
			207	Boiler Feed In-Line	<input checked="" type="checkbox"/>
			208	Boiler Feed Base Mount	<input checked="" type="checkbox"/>
			209	Condensate Transfer (Deaerator)	<input checked="" type="checkbox"/>
			250	Cooling Tower in-Line	<input checked="" type="checkbox"/>
			251	Cooling Tower Base Mount	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0400	Pump	<input checked="" type="checkbox"/>	252	Chilled Water or Glycol in-Line	<input checked="" type="checkbox"/>
			253	Chilled Water or Glycol Base Mount	<input checked="" type="checkbox"/>
			254	Refrigerant	<input checked="" type="checkbox"/>
			255	Chemical (Cooling)	<input checked="" type="checkbox"/>
			300	HVAC Chilled In-Line	<input checked="" type="checkbox"/>
			301	HVAC Chilled Base Mount	<input checked="" type="checkbox"/>
			302	HVAC Heating In-Line	<input checked="" type="checkbox"/>
			303	HVAC Heating Base Mount	<input checked="" type="checkbox"/>
			304	HVAC Heating Recovery In-Line	<input checked="" type="checkbox"/>
			305	HVAC Heat Recovery Base Mount	<input checked="" type="checkbox"/>
			306	HVAC Air Washer or Scrubber	<input checked="" type="checkbox"/>
			307	HVAC Spray (Humidifier)	<input checked="" type="checkbox"/>
			308	HVAC Chemical	<input checked="" type="checkbox"/>
			500	Potable Water In-Line Booster	<input checked="" type="checkbox"/>
			501	Potable Water Base Mount Booster	<input checked="" type="checkbox"/>
			502	Well Submersible	<input checked="" type="checkbox"/>
			503	Well Pump Base Mount	<input checked="" type="checkbox"/>
			504	Potable Hot Water Circulator In-Line	<input checked="" type="checkbox"/>
			505	Potable Hot Water Circulator Base Mount	<input checked="" type="checkbox"/>
			506	Chemical Domestic Water	<input checked="" type="checkbox"/>
			507	Pump House or Room	<input checked="" type="checkbox"/>
			508	Well pump turbine	<input checked="" type="checkbox"/>
			550	Sump Pump Submersible	<input checked="" type="checkbox"/>
			551	Sump Pump Float Type	<input checked="" type="checkbox"/>
			552	Duplex Sump Pump & Tank, Submersible	<input checked="" type="checkbox"/>
			553	Duplex Sump Pump & Tank, Float Type	<input checked="" type="checkbox"/>
			555	Salt Water Submersible	<input checked="" type="checkbox"/>
			600	Diesel Engine Driven (Fire)	<input checked="" type="checkbox"/>
			601	Electric Driven (Fire)	<input checked="" type="checkbox"/>
			602	Propane Engine Driven (Fire)	<input checked="" type="checkbox"/>
			603	Jockey (Fire)	<input checked="" type="checkbox"/>
			650	Hydraulic Elevating Devices	<input checked="" type="checkbox"/>
			720	Environmental Sewage Water and Oil	<input checked="" type="checkbox"/>
			750	Special Systems	<input checked="" type="checkbox"/>
			751	Grey Water	<input checked="" type="checkbox"/>
			850	Grounds (surface water)	<input checked="" type="checkbox"/>
			900	Kitchen (Grease Trap Vacuum)	<input checked="" type="checkbox"/>
			999	Pump, Impellers	<input checked="" type="checkbox"/>
0402	Pump condensate & Tank	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0407	Heat Pump	<input checked="" type="checkbox"/>	001	Packaged	<input checked="" type="checkbox"/>
			002	Split System	<input checked="" type="checkbox"/>
0412	Catch Basins	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0413	Manhole	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0420	Relay Panel	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0429	Scrubbers & Separators	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Air Separator	<input checked="" type="checkbox"/>
			002	Oil Separator	<input checked="" type="checkbox"/>
0430	Sewage Treatment/Waste Water	<input checked="" type="checkbox"/>	000	Plant	<input checked="" type="checkbox"/>
			001	Purifying Station Bio Discs	<input checked="" type="checkbox"/>
			002	Field Bed	<input checked="" type="checkbox"/>
			003	Settling Basin	<input checked="" type="checkbox"/>
			004	Detention Basin	<input checked="" type="checkbox"/>
			005	Sewage Pond Lagoon	<input checked="" type="checkbox"/>
			006	Pump, Sewage Station	<input checked="" type="checkbox"/>
0431	Solar Collector	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0432	Soot Blower	<input checked="" type="checkbox"/>	001	Fixed	<input checked="" type="checkbox"/>
			002	Movable	<input checked="" type="checkbox"/>
0433	Travelling Screen System	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0439	Smoke Control Systems	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0450	Sprinkler	<input checked="" type="checkbox"/>	001	Sprinkler Wet	<input checked="" type="checkbox"/>
			002	Sprinkler Dry	<input checked="" type="checkbox"/>
			003	Sprinkler Pre-Action/Deluge	<input checked="" type="checkbox"/>
			004	Tamper Switch	<input checked="" type="checkbox"/>
			005	Sprinkler Head	<input checked="" type="checkbox"/>
0460	Standpipe and Hoses	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0470	Starter Contactor	<input checked="" type="checkbox"/>	001	Magnetic Contactor	<input checked="" type="checkbox"/>
			002	Manual	<input checked="" type="checkbox"/>
			003	Lighting	<input checked="" type="checkbox"/>
			004	Electronic	<input checked="" type="checkbox"/>
0471	Starter Combination	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0472	Variable Speed Drive	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0475	Water Distiller	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0479	Superheater	<input checked="" type="checkbox"/>	001	Internal	<input checked="" type="checkbox"/>
			002	External	<input checked="" type="checkbox"/>
0480	Tank Storage Gravity	<input checked="" type="checkbox"/>	001	Condensate	<input checked="" type="checkbox"/>
			002	Glycol	<input checked="" type="checkbox"/>
			003	Domestic Water System	<input checked="" type="checkbox"/>
			004	Septic Tank	<input checked="" type="checkbox"/>
			005	Gravity Water Tank	<input checked="" type="checkbox"/>
			006	Water Tower (Fire)	<input checked="" type="checkbox"/>
			007	Blowdown	<input checked="" type="checkbox"/>
			008	Hydraulic Oil	<input checked="" type="checkbox"/>
			010	Salt Water Reservoir	<input checked="" type="checkbox"/>
0481	Tank Storage pressurized	<input checked="" type="checkbox"/>	001	Expansion/Cushion	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0481	Tank Storage pressurized	<input checked="" type="checkbox"/>	002	Compressed Air	<input checked="" type="checkbox"/>
			003	Propane Tank & Cylinder	<input checked="" type="checkbox"/>
			004	Refrigerant Tank and Cylinder	<input checked="" type="checkbox"/>
			005	Hot/Cold Water reservoir	<input checked="" type="checkbox"/>
			006	Vacuum	<input checked="" type="checkbox"/>
			007	Chilled Water Expansion Tank	<input checked="" type="checkbox"/>
			008	Grey Water Holding Tank	<input checked="" type="checkbox"/>
0482	Fuel Leak Detection	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0483	Tank Fuel Storage	<input checked="" type="checkbox"/>	001	Above Ground Outside	<input checked="" type="checkbox"/>
			002	Above Ground Inside	<input checked="" type="checkbox"/>
			003	Underground Steel	<input checked="" type="checkbox"/>
			004	Underground Fiberglass	<input checked="" type="checkbox"/>
			005	Day Tank	<input checked="" type="checkbox"/>
			006	Retention vessel	<input checked="" type="checkbox"/>
0484	Tank Chemical Holding	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0485	Glycol Makeup Tank	<input checked="" type="checkbox"/>	000	Glycol Makeup Tank	<input checked="" type="checkbox"/>
0487	Transfer Switch	<input checked="" type="checkbox"/>	000	Automatic	<input checked="" type="checkbox"/>
			001	Manual	<input checked="" type="checkbox"/>
			002	Water Base Fire Protection System	<input checked="" type="checkbox"/>
0490	Transformer	<input checked="" type="checkbox"/>	001	Oil Filled	<input checked="" type="checkbox"/>
			002	Dry Type	<input checked="" type="checkbox"/>
			003	Pole Mounted	<input checked="" type="checkbox"/>
0500	Transformer Vault	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			02	Pad Mount	<input checked="" type="checkbox"/>
0502	Gearbox	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Fluid drive	<input checked="" type="checkbox"/>
			002	Gearbox	<input checked="" type="checkbox"/>
			003	Direct Drive	<input checked="" type="checkbox"/>
			004	Variable Speed Drive	<input checked="" type="checkbox"/>
			005	Agitator	<input checked="" type="checkbox"/>
			006	Brake	<input checked="" type="checkbox"/>
0503	Turbine	<input checked="" type="checkbox"/>	001	Steam	<input checked="" type="checkbox"/>
			002	Gas	<input checked="" type="checkbox"/>
0504	Cyclone	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Dust	<input checked="" type="checkbox"/>
			002	Ash	<input checked="" type="checkbox"/>
0507	Turbocharger	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0510	Strainers	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0520	Unit Heaters	<input checked="" type="checkbox"/>	001	Steam	<input checked="" type="checkbox"/>
			002	Hot Water	<input checked="" type="checkbox"/>
			003	Gas	<input checked="" type="checkbox"/>
			004	Electric	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0521	Underground Electrical Services	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0522	Valves (Mixing-Tempering)	<input checked="" type="checkbox"/>	001	Tempering Valve	<input checked="" type="checkbox"/>
			002	Mixing Valve	<input checked="" type="checkbox"/>
			003	Emergency Gas Shut-Off Valve	<input checked="" type="checkbox"/>
0524	Uninterruptible Power System	<input checked="" type="checkbox"/>	001	Battery	<input checked="" type="checkbox"/>
			002	Rotary	<input checked="" type="checkbox"/>
0525	Seismic Shutoff Valves	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
0526	Valve Steam Pressure Reducing	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0530	Water Cooler & Fountain	<input checked="" type="checkbox"/>	001	Refrigerated Drinking Fountain	<input checked="" type="checkbox"/>
			002	Central Station	<input checked="" type="checkbox"/>
			003	Potable Water Fountain	<input checked="" type="checkbox"/>
			004	Potable Cooler & Bottle	<input checked="" type="checkbox"/>
0545	Water Softener & Demineralizer	<input checked="" type="checkbox"/>	001	Water Softener - Salt	<input checked="" type="checkbox"/>
			002	Water Filter - Sand	<input checked="" type="checkbox"/>
			003	Water Demineralizer - Reverse Osmosis	<input checked="" type="checkbox"/>
			004	Distiller	<input checked="" type="checkbox"/>
0550	Water Heater Domestic	<input checked="" type="checkbox"/>	001	Electric (Small under 205 litres)	<input checked="" type="checkbox"/>
			002	Electric (Large over 205 litres)	<input checked="" type="checkbox"/>
			003	Gas	<input checked="" type="checkbox"/>
			004	Oil	<input checked="" type="checkbox"/>
			005	Steam	<input checked="" type="checkbox"/>
			006	Instantaneous	<input checked="" type="checkbox"/>
			007	Hot Water Heated	<input checked="" type="checkbox"/>
0559	Recovery Systems - Precious Metals	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
0560	Water Treatment Systems	<input checked="" type="checkbox"/>	001	Hot Water Heating	<input checked="" type="checkbox"/>
			002	Steam (Boiler)	<input checked="" type="checkbox"/>
			003	Glycol Heating/Cooling	<input checked="" type="checkbox"/>
			004	Potable Water	<input checked="" type="checkbox"/>
			005	Condensate (Steam)	<input checked="" type="checkbox"/>
			006	Condensate (Cooling Tower)	<input checked="" type="checkbox"/>
			007	Chilled Water	<input checked="" type="checkbox"/>
			008	Laboratory Waste Water	<input checked="" type="checkbox"/>
			009	Process Water	<input checked="" type="checkbox"/>
			010	Well Water	<input checked="" type="checkbox"/>
			011	Humidifier	<input checked="" type="checkbox"/>
			012	Reverse Osmosis	<input checked="" type="checkbox"/>
0561	Mechanical Screen	<input checked="" type="checkbox"/>	001	Mechanically-Operated Rakes	<input checked="" type="checkbox"/>
			002	Rotating Screen	<input checked="" type="checkbox"/>
0562	Waste Water Treatment Basin	<input checked="" type="checkbox"/>	002	Detention Basin	<input checked="" type="checkbox"/>
0601	Overhead Electrical Distribution Exterior	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0602	Exterior Sub Station	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0603	Grounding System	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0605	Gas pump	<input checked="" type="checkbox"/>	001	Electrical	<input checked="" type="checkbox"/>
			002	Mechanical	<input checked="" type="checkbox"/>
0620	Safety Equipment	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Fire Blanket	<input checked="" type="checkbox"/>
			002	Rescue Retrieval System	<input checked="" type="checkbox"/>
			003	Strobe Light	<input checked="" type="checkbox"/>
			004	Safety Man Track	<input checked="" type="checkbox"/>
			005	Smoke Eliminator Portable	<input checked="" type="checkbox"/>
			006	Dome mirror	<input checked="" type="checkbox"/>
			007	Metal Detector	<input checked="" type="checkbox"/>
			008	Wheelchair	<input checked="" type="checkbox"/>
			009	Evacuation Chair	<input checked="" type="checkbox"/>
			010	Emergency Stretcher	<input checked="" type="checkbox"/>
0660	Special Equipment	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Laboratory	<input checked="" type="checkbox"/>
			002	Process	<input checked="" type="checkbox"/>
			003	Plot Markers	<input checked="" type="checkbox"/>
0700	Security	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Alarm Card	<input checked="" type="checkbox"/>
			002	Panic Buttons	<input checked="" type="checkbox"/>
			003	Emergency Alarm	<input checked="" type="checkbox"/>
			004	Building Equipment On Alarm	<input checked="" type="checkbox"/>
			005	Security Camera	<input checked="" type="checkbox"/>
			006	Closed Circuit TV Control System	<input checked="" type="checkbox"/>
			007	Security, Monitoring System	<input checked="" type="checkbox"/>
			008	Intrusion Alarm System	<input checked="" type="checkbox"/>
			009	Magnetic Card Acces System	<input checked="" type="checkbox"/>
			010	Video Recorder	<input checked="" type="checkbox"/>
			011	Guard tour (key/electronic)	<input checked="" type="checkbox"/>
			012	Motion Detector	<input checked="" type="checkbox"/>
			013	Glass Break Indicator	<input checked="" type="checkbox"/>
			014	Annunciator Panel	<input checked="" type="checkbox"/>
			015	Safety Signs	<input checked="" type="checkbox"/>
			016	Fire-Safety Plans	<input checked="" type="checkbox"/>
			019	Confined Space	<input checked="" type="checkbox"/>
0701	Self Contained Breathing Apparatus	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0702	Road Signings	<input checked="" type="checkbox"/>	001	Traffic Light	<input checked="" type="checkbox"/>
0710	Natural Gas/Propane Distribution Components	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
0755	Cryogenic Fluid Systems	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
0800	Building Interior General	<input checked="" type="checkbox"/>	000	All elements	<input checked="" type="checkbox"/>
			001	Blind/Draperies	<input checked="" type="checkbox"/>
			002	Shelving	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0800	Building Interior General	<input checked="" type="checkbox"/>	003	Operable Wall - Motorized	<input checked="" type="checkbox"/>
			004	Doors, Interior	<input checked="" type="checkbox"/>
0801	Building Exterior General	<input checked="" type="checkbox"/>	000	All elements	<input checked="" type="checkbox"/>
			001	Areaways	<input checked="" type="checkbox"/>
			002	Hangar	<input checked="" type="checkbox"/>
			003	Protective Plates	<input checked="" type="checkbox"/>
			004	Seasonal Lighting	<input checked="" type="checkbox"/>
			005	Walls, All Types	<input checked="" type="checkbox"/>
0803	Wall	<input checked="" type="checkbox"/>	001	Sprayed Fireproofing	<input checked="" type="checkbox"/>
			002	Blowout Panels Exploding Venting	<input checked="" type="checkbox"/>
0804	Antenna/Tower	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0806	Ladder	<input checked="" type="checkbox"/>	000	Fixed	<input checked="" type="checkbox"/>
			001	Portable	<input checked="" type="checkbox"/>
0808	Ornamental Fountains	<input checked="" type="checkbox"/>	001	All Types	<input checked="" type="checkbox"/>
0810	Chimneys Stacks	<input checked="" type="checkbox"/>	001	Bricks	<input checked="" type="checkbox"/>
			002	Metal	<input checked="" type="checkbox"/>
0814	Doors	<input checked="" type="checkbox"/>	001	Main entrance	<input checked="" type="checkbox"/>
			002	Emergency Exit	<input checked="" type="checkbox"/>
			003	Automatic Opening	<input checked="" type="checkbox"/>
			004	Power Door Operator	<input checked="" type="checkbox"/>
			005	Overhead Powered with Safety Device	<input checked="" type="checkbox"/>
			006	Overhead Powered	<input checked="" type="checkbox"/>
			007	Overhead Manual	<input checked="" type="checkbox"/>
			008	Horizontal Sliding Fire Door	<input checked="" type="checkbox"/>
			009	Fire Door	<input checked="" type="checkbox"/>
			010	Revolving	<input checked="" type="checkbox"/>
			011	Motorized Cell Door	<input checked="" type="checkbox"/>
			012	Emergency Exit Fire Door	<input checked="" type="checkbox"/>
			013	Operable Wall	<input checked="" type="checkbox"/>
			014	Access Hatch	<input checked="" type="checkbox"/>
0820	Exterior Stairs Railings	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0830	Foundations Footings Supports	<input checked="" type="checkbox"/>	001	Concrete	<input checked="" type="checkbox"/>
			002	Wood	<input checked="" type="checkbox"/>
0836	Fence	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0837	Barrier	<input checked="" type="checkbox"/>	001	Foot Traffic	<input checked="" type="checkbox"/>
			002	Berme	<input checked="" type="checkbox"/>
0838	Gate	<input checked="" type="checkbox"/>	001	Manual Sliding	<input checked="" type="checkbox"/>
			002	Electro-mechanical Sliding	<input checked="" type="checkbox"/>
			003	Manual Flap	<input checked="" type="checkbox"/>
			004	Parking Access (lift style)	<input checked="" type="checkbox"/>
0840	Flag Poles	<input checked="" type="checkbox"/>	001	Free Standing	<input checked="" type="checkbox"/>
			002	Mounted to building	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0840	Flag Poles	<input checked="" type="checkbox"/>	003	Halliard	<input checked="" type="checkbox"/>
0850	Grounds	<input checked="" type="checkbox"/>	001	Grounds	<input checked="" type="checkbox"/>
			002	Trees/Schrubs/Bushes	<input checked="" type="checkbox"/>
			003	Lagoon	<input checked="" type="checkbox"/>
			004	Fire Pond Lagoon	<input checked="" type="checkbox"/>
			006	Decorative Pond	<input checked="" type="checkbox"/>
			007	Trench	<input checked="" type="checkbox"/>
			008	Well (Artisienne)	<input checked="" type="checkbox"/>
			009	Playground and Equipment	<input checked="" type="checkbox"/>
0851	Roads/Parking Areas	<input checked="" type="checkbox"/>	001	Paved Road	<input checked="" type="checkbox"/>
			002	Unpaved Road	<input checked="" type="checkbox"/>
			003	Paved Parking Lots	<input checked="" type="checkbox"/>
			004	Unpaved Parking Lots	<input checked="" type="checkbox"/>
0852	RCMP Grounds	<input checked="" type="checkbox"/>	001	Lawn	<input checked="" type="checkbox"/>
			002	Flowers	<input checked="" type="checkbox"/>
			003	Trees	<input checked="" type="checkbox"/>
			004	Roads	<input checked="" type="checkbox"/>
			005	Spraying	<input checked="" type="checkbox"/>
			006	Compost	<input checked="" type="checkbox"/>
			007	Streets	<input checked="" type="checkbox"/>
			008	Sidewalks	<input checked="" type="checkbox"/>
			009	Greenhouse	<input checked="" type="checkbox"/>
			010	Horse Coral	<input checked="" type="checkbox"/>
			011	Outdoor Rink	<input checked="" type="checkbox"/>
0857	Protective Plates	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
0869	Truss	<input checked="" type="checkbox"/>	001	Wood	<input checked="" type="checkbox"/>
			002	Steel	<input checked="" type="checkbox"/>
			003	Concrete	<input checked="" type="checkbox"/>
0870	Roof/Canopy	<input checked="" type="checkbox"/>	002	Asphalt Shingle	<input checked="" type="checkbox"/>
			003	Asphalt Roll	<input checked="" type="checkbox"/>
			004	Built-up	<input checked="" type="checkbox"/>
			006	Steel/Metal	<input checked="" type="checkbox"/>
			010	SBS Regular	<input checked="" type="checkbox"/>
			011	SBS Inverted	<input checked="" type="checkbox"/>
			012	EPDM Inverted	<input checked="" type="checkbox"/>
0871	Anchor Points/Permanently Installed Suspended Platforms	<input checked="" type="checkbox"/>	001	Anchors and Platform	<input checked="" type="checkbox"/>
			002	Anchors only	<input checked="" type="checkbox"/>
0880	Dam	<input checked="" type="checkbox"/>	001	Concrete	<input checked="" type="checkbox"/>
			002	Earthen	<input checked="" type="checkbox"/>
			003	Wood	<input checked="" type="checkbox"/>
			004	Sluice Gate	<input checked="" type="checkbox"/>
0881	Bridge	<input checked="" type="checkbox"/>	001	Concrete	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0881	Bridge	<input checked="" type="checkbox"/>	002	Steel	<input checked="" type="checkbox"/>
			003	Wood	<input checked="" type="checkbox"/>
			004	Suspension	<input checked="" type="checkbox"/>
0882	Tunnel	<input checked="" type="checkbox"/>	001	Tunnel and Underground Structure	<input checked="" type="checkbox"/>
0883	Wharves/Jetties/Piers	<input checked="" type="checkbox"/>	001	Wood	<input checked="" type="checkbox"/>
			002	Concrete	<input checked="" type="checkbox"/>
			003	Steel	<input checked="" type="checkbox"/>
			004	Infill	<input checked="" type="checkbox"/>
			005	Seawall & Breakwater	<input checked="" type="checkbox"/>
			006	Ladder	<input checked="" type="checkbox"/>
0884	Wind Turbine	<input checked="" type="checkbox"/>	001	Vertical Axis	<input checked="" type="checkbox"/>
			002	Horizontal Axis	<input checked="" type="checkbox"/>
0890	Storm Drainage System	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Catch Basin	<input checked="" type="checkbox"/>
0900	Cafeteria Kitchen Appliances General	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
			001	Washing Machines	<input checked="" type="checkbox"/>
			002	Vending Machine	<input checked="" type="checkbox"/>
			003	Range Fridge Combination Package	<input checked="" type="checkbox"/>
			004	Microwave	<input checked="" type="checkbox"/>
			005	Bun Divider	<input checked="" type="checkbox"/>
			006	Pie Machine	<input checked="" type="checkbox"/>
			007	Potato Peeler	<input checked="" type="checkbox"/>
			008	Table (not heated )	<input checked="" type="checkbox"/>
			009	Sterilizer	<input checked="" type="checkbox"/>
			010	High Pressure Washer	<input checked="" type="checkbox"/>
			011	Coffee Grinder Mill	<input checked="" type="checkbox"/>
			012	Kitchen	<input checked="" type="checkbox"/>
			013	Toaster	<input checked="" type="checkbox"/>
			014	Saute pan	<input checked="" type="checkbox"/>
			015	Food Warmer	<input checked="" type="checkbox"/>
			016	Food Chopper	<input checked="" type="checkbox"/>
			017	Dryer	<input checked="" type="checkbox"/>
			018	Coffee Maker	<input checked="" type="checkbox"/>
			019	Dilacerator	<input checked="" type="checkbox"/>
			020	Coffee Urn	<input checked="" type="checkbox"/>
			021	Counter	<input checked="" type="checkbox"/>
			022	Blender	<input checked="" type="checkbox"/>
			023	Bread Slicer	<input checked="" type="checkbox"/>
			024	Grinder	<input checked="" type="checkbox"/>
			025	Exhaust Hood	<input checked="" type="checkbox"/>
			027	Pressure Washer	<input checked="" type="checkbox"/>
			028	Juice Press	<input checked="" type="checkbox"/>



## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0900	Cafeteria Kitchen Appliances General	<input checked="" type="checkbox"/>	029	Steam Kettle	<input checked="" type="checkbox"/>
			032	Pressure Cooker	<input checked="" type="checkbox"/>
			033	Pot Cooker	<input checked="" type="checkbox"/>
			034	Bainmarie Double Boiler	<input checked="" type="checkbox"/>
			037	Display Case	<input checked="" type="checkbox"/>
			039	Blender	<input checked="" type="checkbox"/>
			040	Mixer	<input checked="" type="checkbox"/>
			041	Slicer	<input checked="" type="checkbox"/>
			044	Heating Table	<input checked="" type="checkbox"/>
			045	Steam Table	<input checked="" type="checkbox"/>
			058	Fryer	<input checked="" type="checkbox"/>
			059	Deep Fryer	<input checked="" type="checkbox"/>
			062	Square Cooker	<input checked="" type="checkbox"/>
			063	Skillet Electric	<input checked="" type="checkbox"/>
			064	Stove	<input checked="" type="checkbox"/>
			065	Refrigerated Table	<input checked="" type="checkbox"/>
0901	Garbage Compactor	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0902	Waste Disposal Unit	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0903	Refrigerator/Freezer	<input checked="" type="checkbox"/>	001	Horizontal Domestic Refrigerator/Freezer	<input checked="" type="checkbox"/>
			002	Vertical Domestic Refrigerator/Freezer	<input checked="" type="checkbox"/>
			003	Commercial or Laboratory Refrigerator	<input checked="" type="checkbox"/>
			004	Commercial or Laboratory Freezer	<input checked="" type="checkbox"/>
0908	Dishwasher	<input checked="" type="checkbox"/>	001	Conveyor	<input checked="" type="checkbox"/>
			002	Commercial	<input checked="" type="checkbox"/>
0910	Kitchen Range Hood Commercial	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0912	Ovens Commercial Gas Electric Steam	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0915	Steam Kettle	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0918	Pressure Cooker Steam	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0925	Garbage Can Washer	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0930	Ice Cream Cabinet	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0935	Ice Cube Maker	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0940	Food Mixer	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0941	Meat Slicer Saw	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0944	Patty Machine	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0955	Serving Table Heated	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0960	Reach In Pass Through Refrigerator	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0965	Beverage Dispenser	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0970	Vegetable Peeler	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
0985	Roof Top Units	<input checked="" type="checkbox"/>	000	Heating/Cooling Unit - Gas Fired	<input checked="" type="checkbox"/>
0990	Tools	<input checked="" type="checkbox"/>	001	Electric	<input checked="" type="checkbox"/>
			002	Hydraulic	<input checked="" type="checkbox"/>
			003	Pneumatic	<input checked="" type="checkbox"/>

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## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
0990	Tools	<input checked="" type="checkbox"/>	004	IAQ Meter	<input checked="" type="checkbox"/>
			005	Particle Meter	<input checked="" type="checkbox"/>
			006	Light Meter	<input checked="" type="checkbox"/>
			007	VOC Meter	<input checked="" type="checkbox"/>
			008	Multimeter	<input checked="" type="checkbox"/>
			009	General	<input checked="" type="checkbox"/>
0991	Infrared Equipment	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
0992	Controllable Assets	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
0995	Special Equipment	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
			002	Steam Press	<input checked="" type="checkbox"/>
			003	Pant Topper	<input checked="" type="checkbox"/>
			004	Form Finisher	<input checked="" type="checkbox"/>
0996	Security	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
0997	Tools	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
0998	Firing Range Equipment	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
0999	Mobile Equipment	<input checked="" type="checkbox"/>	001	Bobcat	<input checked="" type="checkbox"/>
			002	Forklift	<input checked="" type="checkbox"/>
1000	Cleaning	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
1001	Structures	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
1004	Infrared Heater	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
1005	Water Distiller	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
1007	Fuel Leak Detection	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
1008	Tunnel	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
1009	Infrared Equipment	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
1010	Parts	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
1025	Insulation	<input checked="" type="checkbox"/>	001	Asbestos	<input checked="" type="checkbox"/>
Bear	Bearings	<input checked="" type="checkbox"/>	011	General	<input checked="" type="checkbox"/>
Belt	Belt	<input checked="" type="checkbox"/>	013	General	<input checked="" type="checkbox"/>
CLEA	Cleaning	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
CWD	Chilled Water Distribution	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
DHW	Domestic Hot Water System	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
Dorm	Dorm Inventory (RCMP)	<input checked="" type="checkbox"/>	000	Mechanical	<input checked="" type="checkbox"/>
			001	Carpentry	<input checked="" type="checkbox"/>
			002	Plumbing	<input checked="" type="checkbox"/>
			003	Electrical	<input checked="" type="checkbox"/>
			004	Painting	<input checked="" type="checkbox"/>
E	Electrical	<input checked="" type="checkbox"/>	0	General	<input checked="" type="checkbox"/>
			001	Ground Fault Circuit Interrupter	<input checked="" type="checkbox"/>
			002	Tracer Cables	<input checked="" type="checkbox"/>
FRE	Firing Range Equipment	<input checked="" type="checkbox"/>	000	Firing Range Bullet Trap	<input checked="" type="checkbox"/>
			001	Firing Range Shooters Booth	<input checked="" type="checkbox"/>
			002	Firing Range Target System	<input checked="" type="checkbox"/>





## Equipment Class/Type Index

Class			Type		
Code	Description	Active	Code	Description	Active
FRE	Firing Range Equipment	<input checked="" type="checkbox"/>	003	Firing Range Line	<input checked="" type="checkbox"/>
Fuse	Fuse	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
HVP	High Voltage Physical	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
Mech	Mechanical Insp	<input checked="" type="checkbox"/>	000	Main	<input checked="" type="checkbox"/>
MecR	Mechanical Room Cleaning	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
Patrols	Patrols Western Region	<input checked="" type="checkbox"/>	000	Building Patrol - Various Items	<input checked="" type="checkbox"/>
			001	Out Buildings - Various Items	<input checked="" type="checkbox"/>
			002	Garage Doors	<input checked="" type="checkbox"/>
			003	Water & Glycol Tests	<input checked="" type="checkbox"/>
			004	Monthly Fire Alarm Test	<input checked="" type="checkbox"/>
			005	Walk Through Doors	<input checked="" type="checkbox"/>
Pull	Pulley	<input checked="" type="checkbox"/>	012	General	<input checked="" type="checkbox"/>
Pumphous	Pumphouse Equipment	<input checked="" type="checkbox"/>	001	General	<input checked="" type="checkbox"/>
Seal	Seal	<input checked="" type="checkbox"/>	014	General	<input checked="" type="checkbox"/>
Slee	Sleeve	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
SRV	Safety Relief Valve	<input checked="" type="checkbox"/>	000	General	<input checked="" type="checkbox"/>
WS	Water Supply	<input checked="" type="checkbox"/>	000	Main Supply	<input checked="" type="checkbox"/>
			001	Tap Supply	<input checked="" type="checkbox"/>

983 records

### Report Criteria

Equipment Class Active: Yes

Equipment Type Active: Yes



## **ATTACHMENT 5 to Annex A – Environmental Effects Assessment Mitigation**

DRAFT



## ENVIRONMENTAL EFFECTS ASSESSMENT (EEA)

### MITIGATIONS MEASURES

#### THE FOLLOWING SECTIONS MUST BE USED BY ENVIRONMENTAL OPERATIONS DIVISION

#### ENVIRONMENTAL EFFECTS ASSESSMENT MITIGATIONS MEASURES

COMPONENT	POTENTIAL EFFECT	MITIGATIONS MEASURES
Soils	<ul style="list-style-type: none"><li>• Soil movement may create erosion or expose contaminated soils</li><li>• Spills during project activities could affect soils</li></ul>	<ul style="list-style-type: none"><li>* Confine construction activities to the immediate project area to minimize the potential for soil compaction</li><li>* Cover stockpiled soil with tarps to prevent wind and water erosion</li><li>* Use erosion control measures such as silt fences, hay bales, etc. to prevent sediment-laden run-off from accessing the drainage ditches that may lead to natural water bodies</li><li>* If a heavy rainfall event occurs during excavations, cease operations until rainfall subsides to minimize erosion</li><li>* Spill Contingency Plan must be prepared by the contractor prior to the start of the project</li><li>* Equipment shall be maintained in good working order and inspected regularly to minimize the chance of fuel/oil spills</li><li>* Refuelling of heavy machinery shall be supervised at all times</li><li>* Report any accidental leaks and spills</li><li>* Emergency spill kits shall be readily available</li><li>* Hazardous materials used or stored for the purpose of the project shall be handled in accordance with WHMIS guidelines (such as having material safety data sheets)</li></ul>
Ground water	<ul style="list-style-type: none"><li>• Spills during project activities could affect ground water</li></ul>	<ul style="list-style-type: none"><li>* When digging footings and trenches, dig to shallowest depth possible.</li><li>* Spill Contingency Plan must be prepared by the contractor prior to the start of the project</li><li>- Refer to mitigation measures outlined above for <b>Soils</b></li><li>- Refer to mitigation measures outlined below for <b>Hazardous materials</b></li></ul>



## ENVIRONMENTAL EFFECTS ASSESSMENT (EEA)

### MITIGATIONS MEASURES

#### THE FOLLOWING SECTIONS MUST BE USED BY ENVIRONMENTAL OPERATIONS DIVISION

#### ENVIRONMENTAL EFFECTS ASSESSMENT MITIGATIONS MEASURES

COMPONENT	POTENTIAL EFFECT	MITIGATIONS MEASURES
<b>Air Quality</b>	<ul style="list-style-type: none"><li>• Fugitive dust associated with project activities</li><li>• Increased exhaust associate with diesel machinery on site</li><li>• Emission of greenhouse gases (GHG) with project activities</li><li>• Queuing of idling vehicles at the border</li></ul>	<ul style="list-style-type: none"><li>* Employ non-toxic dust control measures as required (water)</li><li>* Maintain equipment in good working order, fitted with fully functional emissions control systems (i.e. mufflers, exhaust system, etc.)</li><li>* Avoid unnecessary idling of vehicles and/or heavy machinery</li></ul>
<b>Vegetation</b>	<ul style="list-style-type: none"><li>• Land clearing and removal of vegetation as part of project activities</li></ul>	<ul style="list-style-type: none"><li>* Confine construction equipment/vehicles to the project area</li><li>* Clearing limits should be delineated to ensure that only vegetation that interferes with project activities is cleared</li><li>* Re-vegetate areas disturbed by project activities</li><li>* New trees should be planted in place of the ones that had to be removed</li></ul>
<b>Terrestrial Habitat and Wildlife</b>	<ul style="list-style-type: none"><li>• Land clearing and removal of vegetation as part of project activities</li><li>• Sensory disturbance of wildlife species</li><li>• Physical disturbance</li></ul>	<ul style="list-style-type: none"><li>* Avoid vegetation clearing during sensitive times of the year for local wildlife, such as spring and early summer</li><li>* Ensure that trees and shrubs to be cleared do not support active bird nests</li><li>* Conduct vegetation clearing such that existing connections to adjacent areas of natural habitat are maintained until the final stage of clearing,</li><li>* Ensure that perimeter fencing, if used, does not prevent wildlife from leaving the site during vegetation clearing. Once the work area has been cleared, it can be securely fenced to keep wildlife from returning.</li><li>* Contractors and other on-site workers should be briefed on appropriate measures to reduce human-wildlife conflict during the work (e.g., waste management, no feeding wildlife, no deliberate harm to wildlife, safe relocation techniques to get wildlife to leave the site).</li></ul>



# ENVIRONMENTAL EFFECTS ASSESSMENT (EEA)

## MITIGATIONS MEASURES

### THE FOLLOWING SECTIONS MUST BE USED BY ENVIRONMENTAL OPERATIONS DIVISION

#### ENVIRONMENTAL EFFECTS ASSESSMENT MITIGATIONS MEASURES

COMPONENT	POTENTIAL EFFECT	MITIGATIONS MEASURES
Species at risk	<ul style="list-style-type: none"><li>• Sensory disturbance of species at risk</li><li>• Degradation or loss of habitat for species at risk</li></ul>	<ul style="list-style-type: none"><li>* Material storage, handling and waste management plan should minimize human-animal conflicts</li><li>* Ensure that trees and shrubs to be cleared does not support active bird nests</li><li>* Revegetate disturbed areas as quickly as possible</li><li>* Refer to mitigation measures outlined above for <b>Vegetation, Terrestrial Habitat, Terrestrial Wildlife, Aquatic Habitat and Aquatic Species</b></li></ul>
Migratory birds	<ul style="list-style-type: none"><li>• Sensory disturbance of migratory birds</li><li>• Degradation or loss of habitat for Migratory birds</li></ul>	<ul style="list-style-type: none"><li>* Clearing of trees should take place before April 15th or after July 31st, as this is the nesting season for migratory birds (EC).</li><li>* If clearing must take place between April 15th - July 31st, a bird survey shall be carried out in the spring by a qualified biologist with bird expertise to confirm that there are no active nests in the area within seven days of the clearing commencing (EC).</li><li>* If active nests are discovered in trees slated for removal, nests must be protected until the young have fledged</li><li>* Clearing activities shall be carried out in compliance with the Migratory Birds Convention Act and Regulations (i.e. no person shall disturb, destroy or take a nest, egg etc. except under authority of a permit).</li></ul>



## ENVIRONMENTAL EFFECTS ASSESSMENT (EEA)

### MITIGATIONS MEASURES

#### THE FOLLOWING SECTIONS MUST BE USED BY ENVIRONMENTAL OPERATIONS DIVISION

#### ENVIRONMENTAL EFFECTS ASSESSMENT MITIGATIONS MEASURES

COMPONENT	POTENTIAL EFFECT	MITIGATIONS MEASURES
<b>Hazardous Materials (HAZMAT)</b>	<ul style="list-style-type: none"><li>• Production or use of hazardous material on-site during project activities</li></ul>	<ul style="list-style-type: none"><li>* Contractor to provide a project-specific health and safety plan prior to the start of the project</li><li>* During demolition activities hazardous materials must be safely contained, treated or removed in accordance with federal and provincial regulations (Asbestos, lead, mercury, PCBs, ect.)</li><li>* Any hazardous materials used or stored for the purpose of the project shall be handled in accordance with WHMIS guidelines (MSDS)</li><li>* Worker must wear protective gear in accordance with applicable regulations</li><li>* An Environmental and Emergency Response Plan should be developed and should include measures to prevent, prepare for, respond to and recover from any emergency that has the potential to negatively impact the environment and or human health</li></ul>
<b>Noise</b>	<ul style="list-style-type: none"><li>• Project activities could result in elevated noise levels</li></ul>	<ul style="list-style-type: none"><li>* Limit activities to daylight hours (i.e. 07h00 am to 07h00 pm)</li><li>* Ensure all equipment are maintained in good working condition with noise control devices (mufflers)</li><li>* Provide ear protection as required</li><li>* Avoid unnecessary idling of vehicles and heavy machinery</li></ul>
<b>Vibrations</b>	<ul style="list-style-type: none"><li>• Project activities could result in elevated vibrations levels</li></ul>	<ul style="list-style-type: none"><li>* Phase demolition, earth-moving and ground-impacting operations so as not to occur in the same time period.</li><li>* Limit activities to daylight hours (i.e. 07h00 am to 07h00 pm)</li><li>* Operate earth-moving equipment on the construction lot as far away from vibration-sensitive sites as possible.</li><li>* Select demolition methods not involving impact, where possible</li></ul>



## ENVIRONMENTAL EFFECTS ASSESSMENT (EEA)

### MITIGATIONS MEASURES

#### THE FOLLOWING SECTIONS MUST BE USED BY ENVIRONMENTAL OPERATIONS DIVISION

#### ENVIRONMENTAL EFFECTS ASSESSMENT MITIGATIONS MEASURES

COMPONENT	POTENTIAL EFFECT	MITIGATIONS MEASURES
Radiations	<ul style="list-style-type: none"><li>• Installation of radiating equipment (VACCIS) (Please refer to attached email from Christine Thomas/Charles Evans - Information related to radiations)</li></ul>	<ul style="list-style-type: none"><li>* Ensure all emissions will remain well below approved release limits</li><li>* Doses to workers and the public are within regulatory limits and consistent with ALARA (As Low As Reasonably Achievable)</li></ul>
Cultural and Heritage	<ul style="list-style-type: none"><li>• Disturbance or removal of archaeological sites</li><li>• Disturbance of removal of historical buildings</li><li>• interference with asserted traditional territory overlapping the project lands</li></ul>	<ul style="list-style-type: none"><li>* Ensure contractors are aware of appropriate actions to undertake upon discovery of an archaeological site</li><li>* Employ avoidance, data recovery (excavation), and or monitoring to mitigate effects on archaeological sites</li><li>* Submit a list of buildings to be demolished to Parks Canada for review by the FHBRO</li></ul>
Health and Safety	<ul style="list-style-type: none"><li>• Potential for personal injury during project activities due to the operation of light duty machinery and presence of construction work spaces</li></ul>	<ul style="list-style-type: none"><li>* Safety measures ( warning signage, speed restrictions, road closures, truck lighting, safety fencing around trenches or work spaces (as necessary) and traffic direction)</li><li>* Additional safety measures to be determined by the site contractor and safety crews during construction</li></ul>



## **ANNEX B Claim for Progress Payment**

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## Claim for Progress Payment Demande de paiement progressif

If necessary, use form PWGSC-TPSGC 1112 to record detail costs

Si nécessaire, utiliser le formulaire PWGSC-TPSGC 1112 pour inscrire les coûts détaillés

Contractor's Name and Address Nom et adresse de l'entrepreneur	Claim No. N° de la demande	Date YYYY-MM-DD / AAAA-MM-JJ	Contract Price - Prix contractuel
	File No. - N° du dossier		Contract Serial No. N° de série du contrat
Contractor's Procurement Business Number (PBN) Numéro d'entreprise-appvisionnement (NEA) de l'entrepreneur		Financial Code(s) - Code(s) financier(s)	

Contractor's Report of Work Progress (if needed, use additional sheets)

Compte rendu de l'avancement des travaux par l'entrepreneur (si nécessaire, utiliser des feuilles supplémentaires)

Period of work covered by the claim Période des travaux visée par la demande ▶	Current Claim Demande courante		Previous Claims Demandes précédentes		Total to Date Total à date (A + B)
	(A)	Tax Rate Taux de taxe	(B)	Tax Rate Taux de taxe	
<b>Description:</b> (Expenditures must be claimed in accordance with the basis and/or method of payment of the contract) <b>Description :</b> (Les dépenses doivent être réclamées conformément à la base de paiement et (ou) à la méthode de paiement du contrat).		%		%	
		%		%	
		%		%	
		%		%	
		%		%	
		%		%	
		%		%	
		%		%	
		%		%	
		%		%	
		%		%	
		%		%	
Contractor's GST No. N° de TPS de l'entrepreneur	Subtotal Sous-total				
Contractor's QST No. No. de TVQ de l'entrepreneur	Applicable taxes Taxes applicables				
	Total				
Less holdbacks on expenditures only (Applicable taxes excluded) Moins les retenues sur les dépenses uniquement (Taxes applicables en sus)					

Total Amount of Claim (including applicable taxes)  
Montant total de la demande (incluant les taxes applicables)

Percentage of the work completed Pourcentage des travaux achevés	%	Current Claim Demande courante	▶	Amount due Montant dû
---	---	-----------------------------------	---	--------------------------

Claim No.  
N° de la demande

Contract Serial No.  
N° de série du contrat

## CERTIFICATE OF CONTRACTOR

### I certify that:

- All authorizations required under the contract have been obtained. The claim is consistent with the progress of the work and is in accordance with the contract.
- Indirect costs have been paid for or accrued in the accounts.
- Direct materials and the subcontracted work have been received, accepted and either paid for or accrued in the accounts following receipt of invoice from supplier/subcontractor, and have been or will be used exclusively for the purpose of the contract.
- All direct labour costs have been paid for or accrued in the accounts and all such costs were incurred exclusively for the purpose of the contract;
- All other direct costs have been paid for or accrued in the accounts following receipt of applicable invoice or expense voucher and all such costs were incurred exclusively for the purpose of the contract; and
- No liens, encumbrances, charges or other claims exist against the work except those which may arise by operation of law such as a lien in the nature of an unpaid contractor's lien and in respect of which a progress payment and/or advance payment has been or will be made by Canada.

Contractor's Signature - Signature de l'entrepreneur

Check the box if the claim is being made with respect to advance payment provisions included in the basis of payment of the contract.

☐

This claim, or a portion of this claim, is for an advance payment.

### I certify that:

- The funds received will be used solely for the purpose of the contract and attached is a complete description of the purpose to which the advance payment will be applied.
- The amount of the payment is established in accordance with the conditions of the contract.
- The contractor is not in default of its obligations under the contract.
- The payment is related to an identifiable part of the contractual work.

Contractor's Signature - Signature de l'entrepreneur

## CERTIFICATES OF DEPARTMENTAL REPRESENTATIVES

**Scientific/Project/Inspection Authority:** I certify that the work meets the quality standards required under the contract, and its progress is in accordance with the conditions of the contract.

**Inspection Authority (all other contracts):** I certify that the quality of the work performed is in accordance with the standards required under the contract.

Signature of Scientific / Project / Inspection Authority  
Signature de l'autorité scientifique ou responsable du projet / de l'inspection

**PWGSC Contracting Authority:** I certify that, to the best of my knowledge, the claim is consistent with the progress of the work and is in accordance with the contract. This claim, however, may be subject to further verification and any necessary adjustment before final settlement.

Contracting Authority Signature de l'autorité contractante

**Client's Authorized Signing Officer - (must sign the interim claim):** I certify that the claim is in accordance with the contract.

Client Signature du client

**Client's Authorized Signing Officer - (must sign the final claim):** I certify that all goods have been received and all services have been rendered, that the work has been properly performed and that the claim is in accordance with the contract.

Client Signature du client

## ATTESTATION DE L'ENTREPRENEUR

### J'atteste que :

- Toutes les autorisations exigées en vertu du contrat ont été obtenues. La demande correspond à l'avancement des travaux et est conforme au contrat.
- Les coûts indirects ont été réglés ou portés aux livres.
- Les matières directes et les travaux de sous-traitance ont été reçus, et le tout a été accepté et payé, ou encore porté aux livres après réception de factures envoyées par le fournisseur ou le sous-traitant; ces matières et ces travaux ont été ou seront utilisés exclusivement aux fins du contrat.
- Tous les coûts de la main-d'œuvre directe ont été réglés ou portés aux livres et tous ces coûts ont été engagés exclusivement aux fins du contrat.
- Tous les autres coûts indirects ont été réglés ou portés aux livres après réception des factures ou pièces justificatives pertinentes et tous ces coûts ont été engagés exclusivement aux fins du contrat.
- Il n'existe aucun privilège ni demande ou imputation à l'égard de ces travaux sauf ceux qui pourraient survenir par effet de la loi, notamment le privilège d'un entrepreneur non payé à l'égard duquel un paiement progressif et/ou un paiement anticipé a été ou sera effectué par le Canada.

Title - Titre

Date (YYYY-MM-DD / AAAA-MM-JJ)

Cocher la case si la demande est faite en rapport avec les dispositions relatives aux paiements anticipés qui se trouvent dans la base de paiement du contrat.

Cette demande, ou une partie de cette demande, est pour un paiement anticipé.

### J'atteste que :

- Les fonds reçus ne serviront uniquement qu'aux fins du contrat; ci-joint est une description complète des fins auxquelles le paiement anticipé sera utilisé.
- Le montant du paiement est établi conformément aux conditions du contrat.
- L'entrepreneur n'a pas manqué à ses obligations en vertu du contrat.
- Le paiement porte sur une partie identifiable des travaux précisés dans le contrat.

Title - Titre

Date (YYYY-MM-DD / AAAA-MM-JJ)

## ATTESTATIONS DES REPRÉSENTANTS DU MINISTÈRE

### Autorité scientifique ou responsable du projet / de l'inspection :

J'atteste que les travaux sont conformes aux normes de qualité exigées en vertu du contrat et que leur avancement est conforme aux conditions du contrat.

**Responsable de l'inspection (tous les autres contrats) :** J'atteste que la qualité des travaux exécutés est conforme aux normes exigées en vertu du contrat.

Date (YYYY-MM-DD / AAAA-MM-JJ)

**Autorité contractante de TPSGC :** J'atteste, au meilleur de ma connaissance, que la demande correspond à l'avancement des travaux et est conforme au contrat. Toutefois, cette demande pourrait faire l'objet d'une autre vérification et de tout rajustement nécessaire avant le règlement final.

Title - Titre

Date (YYYY-MM-DD / AAAA-MM-JJ)

**Signataire autorisé du client - (doit signer la demande provisoire) :** J'atteste que la demande est conforme au contrat.

Title - Titre

Date (YYYY-MM-DD / AAAA-MM-JJ)

**Signataire autorisé du client - (doit signer la demande finale) :** J'atteste que tous les biens ont été reçus, que tous les services ont été rendus, que tous les travaux ont été exécutés convenablement, et que la demande est conforme au contrat.

Title - Titre

Date (YYYY-MM-DD / AAAA-MM-JJ)

## **ANNEX C   Security Requirement Check List (SRCL)**

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Government of Canada  
Gouvernement du Canada

RECEIVED

JAN 14 2015

Contract Number / Numéro du contrat

R-058104.001

Security Classification / Classification de sécurité

Unclassified

SECURITY REQUIREMENTS CHECK LIST (SRCL)

LISTE DE VÉRIFICATION DES EXIGENCES RELATIVES À LA SÉCURITÉ (LVERS)

PART A - CONTRACT INFORMATION / PARTIE A - INFORMATION CONTRACTUELLE			
1. Originating Government Department or Organization / Ministère ou organisme gouvernemental d'origine		2. Branch or Directorate / Direction générale ou Direction Comptrollership	
3. a) Subcontract Number / Numéro du contrat de sous-traitance		3. b) Name and Address of Subcontractor / Nom et adresse du sous-traitant	
4. Brief Description of Work / Brève description du travail Large Scale Imaging Initiative Pacific Highway			
5. a) Will the supplier require access to Controlled Goods? Le fournisseur aura-t-il accès à des marchandises contrôlées?		<input checked="" type="checkbox"/> No Non <input type="checkbox"/> Yes Oui	
5. b) Will the supplier require access to unclassified military technical data subject to the provisions of the Technical Data Control Regulations? Le fournisseur aura-t-il accès à des données techniques militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques?		<input checked="" type="checkbox"/> No Non <input type="checkbox"/> Yes Oui	
6. Indicate the type of access required / Indiquer le type d'accès requis			
6. a) Will the supplier and its employees require access to PROTECTED and/or CLASSIFIED information or assets? Le fournisseur ainsi que les employés auront-ils accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS? (Specify the level of access using the chart in Question 7. c) (Préciser le niveau d'accès en utilisant le tableau qui se trouve à la question 7. c)		<input checked="" type="checkbox"/> No Non <input type="checkbox"/> Yes Oui	
6. b) Will the supplier and its employees (e.g. cleaners, maintenance personnel) require access to restricted access areas? No access to PROTECTED and/or CLASSIFIED information or assets is permitted. Le fournisseur et ses employés (p. ex. nettoyeurs, personnel d'entretien) auront-ils accès à des zones d'accès restreintes? L'accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS n'est pas autorisé.		<input type="checkbox"/> No Non <input checked="" type="checkbox"/> Yes Oui	
6. c) Is this a commercial courier or delivery requirement with no overnight storage? S'agit-il d'un contrat de messagerie ou de livraison commerciale sans entreposage de nuit?		<input checked="" type="checkbox"/> No Non <input type="checkbox"/> Yes Oui	
7. a) Indicate the type of information that the supplier will be required to access / Indiquer le type d'information auquel le fournisseur devra avoir accès			
Canada <input type="checkbox"/>		NATO / OTAN <input type="checkbox"/>	
Foreign / Étranger <input type="checkbox"/>			
7. b) Release restrictions / Restrictions relatives à la diffusion			
No release restrictions Aucune restriction relative à la diffusion <input type="checkbox"/>		All NATO countries Tous les pays de l'OTAN <input type="checkbox"/>	
Not releasable À ne pas diffuser <input type="checkbox"/>		No release restrictions Aucune restriction relative à la diffusion <input type="checkbox"/>	
Restricted to: / Limité à : Specify country(ies): / Préciser le(s) pays : <input type="checkbox"/>		Restricted to: / Limité à : Specify country(ies): / Préciser le(s) pays : <input type="checkbox"/>	
7. c) Level of information / Niveau d'information			
PROTECTED A PROTÉGÉ A <input type="checkbox"/>		NATO UNCLASSIFIED <input type="checkbox"/>	
PROTECTED B PROTÉGÉ B <input type="checkbox"/>		NATO NON CLASSIFIÉ <input type="checkbox"/>	
PROTECTED C PROTÉGÉ C <input type="checkbox"/>		NATO RESTRICTED <input type="checkbox"/>	
CONFIDENTIAL CONFIDENTIEL <input type="checkbox"/>		NATO DIFFUSION RESTREINTE <input type="checkbox"/>	
SECRET SECRET <input type="checkbox"/>		NATO CONFIDENTIAL <input type="checkbox"/>	
TOP SECRET TRÈS SECRET <input type="checkbox"/>		NATO CONFIDENTIEL <input type="checkbox"/>	
TOP SECRET (SIGINT) TRÈS SECRET (SIGINT) <input type="checkbox"/>		NATO SECRET <input type="checkbox"/>	
		COSMIC TOP SECRET <input type="checkbox"/>	
		COSMIC TRÈS SECRET <input type="checkbox"/>	
		PROTECTED A <input type="checkbox"/>	
		PROTÉGÉ A <input type="checkbox"/>	
		PROTECTED B <input type="checkbox"/>	
		PROTÉGÉ B <input type="checkbox"/>	
		PROTECTED C <input type="checkbox"/>	
		PROTÉGÉ C <input type="checkbox"/>	
		CONFIDENTIAL <input type="checkbox"/>	
		CONFIDENTIEL <input type="checkbox"/>	
		SECRET <input type="checkbox"/>	
		SECRET <input type="checkbox"/>	
		TOP SECRET <input type="checkbox"/>	
		TRÈS SECRET <input type="checkbox"/>	
		TOP SECRET (SIGINT) <input type="checkbox"/>	
		TRÈS SECRET (SIGINT) <input type="checkbox"/>	





**PART A (continued) / PARTIE A (suite)**

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets?  
Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS? ☒ No / Non ☐ Yes / Oui

If Yes, indicate the level of sensitivity:

Dans l'affirmative, indiquer le niveau de sensibilité :

9. Will the supplier require access to extremely sensitive INFOSEC information or assets?  
Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate? ☒ No / Non ☐ Yes / Oui

Short Title(s) of material / Titre(s) abrégé(s) du matériel :

Document Number / Numéro du document :

**PART B - PERSONNEL (SUPPLIER) / PARTIE B - PERSONNEL (FOURNISSEUR)**

10. a) Personnel security screening level required / Niveau de contrôle de la sécurité du personnel requis

- |   |   |   |  |
|---|---|---|--|
| <input checked="" type="checkbox"/> RELIABILITY STATUS<br>COTE DE FIABILITÉ | <input type="checkbox"/> CONFIDENTIAL<br>CONFIDENTIEL           | <input type="checkbox"/> SECRET<br>SECRET           | <input type="checkbox"/> TOP SECRET<br>TRÈS SECRET               |
| <input type="checkbox"/> TOP SECRET-- SIGINT<br>TRÈS SECRET -- SIGINT       | <input type="checkbox"/> NATO CONFIDENTIAL<br>NATO CONFIDENTIEL | <input type="checkbox"/> NATO SECRET<br>NATO SECRET | <input type="checkbox"/> COSMIC TOP SECRET<br>COSMIC TRÈS SECRET |
| <input type="checkbox"/> SITE ACCESS<br>ACCÈS AUX EMPLACEMENTS              |   |   |  |

Special comments:

Commentaires spéciaux : No screening req'd as consultant will not be accessing CBSA Information

NOTE: If multiple levels of screening are identified, a Security Classification Guide must be provided.

REMARQUE : Si plusieurs niveaux de contrôle de sécurité sont requis, un guide de classification de la sécurité doit être fourni.

10. b) May unscreened personnel be used for portions of the work?  
Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail? ☐ No / Non ☒ Yes / Oui

If Yes, will unscreened personnel be escorted?

Dans l'affirmative, le personnel en question sera-t-il escorté? ☐ No / Non ☒ Yes / Oui

**PART C - SAFEGUARDS (SUPPLIER) / PARTIE C - MESURES DE PROTECTION (FOURNISSEUR)**

INFORMATION / ASSETS / RENSEIGNEMENTS / BIENS

11. a) Will the supplier be required to receive and store PROTECTED and/or CLASSIFIED information or assets on its site or premises?  
Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS? ☒ No / Non ☐ Yes / Oui

11. b) Will the supplier be required to safeguard COMSEC information or assets?  
Le fournisseur sera-t-il tenu de protéger des renseignements ou des biens COMSEC? ☒ No / Non ☐ Yes / Oui

PRODUCTION

11. c) Will the production (manufacture, and/or repair and/or modification) of PROTECTED and/or CLASSIFIED material or equipment occur at the supplier's site or premises?  
Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ? ☒ No / Non ☐ Yes / Oui

INFORMATION TECHNOLOGY (IT) MEDIA / SUPPORT RELATIF A LA TECHNOLOGIE DE L'INFORMATION (TI)

11. d) Will the supplier be required to use its IT systems to electronically process, produce or store PROTECTED and/or CLASSIFIED information or data?  
Le fournisseur sera-t-il tenu d'utiliser ses propres systèmes informatiques pour traiter, produire ou stocker électroniquement des renseignements ou des données PROTÉGÉS et/ou CLASSIFIÉS? ☒ No / Non ☐ Yes / Oui

11. e) Will there be an electronic link between the supplier's IT systems and the government department or agency?  
Disposera-t-on d'un lien électronique entre le système informatique du fournisseur et celui du ministère ou de l'agence gouvernementale? ☒ No / Non ☐ Yes / Oui



**PART C - (continued) / PARTIE C - (suite)**

For users completing the form manually use the summary chart below to indicate the category(ies) and level(s) of safeguarding required at the supplier's site(s) or premises.

Les utilisateurs qui remplissent le formulaire manuellement doivent utiliser le tableau récapitulatif ci-dessous pour indiquer, pour chaque catégorie, les niveaux de sauvegarde requis aux installations du fournisseur.

For users completing the form online (via the Internet), the summary chart is automatically populated by your responses to previous questions.

Dans le cas des utilisateurs qui remplissent le formulaire en ligne (par Internet), les réponses aux questions précédentes sont automatiquement saisies dans le tableau récapitulatif.

**SUMMARY CHART / TABLEAU RÉCAPITULATIF**

Category Catégorie	PROTECTED PROTÉGÉ			CLASSIFIED CLASSIFIÉ			NATO				COMSEC					
	A	B	C	CONFIDENTIAL	SECRET	TOP SECRET	NATO RESTRICTED	NATO CONFIDENTIAL	NATO SECRET	COSMIC TOP SECRET	PROTECTED PROTÉGÉ			CONFIDENTIAL	SECRET	TOP SECRET
				CONFIDENTIEL	TRÈS SECRET	NATO DIFFUSION RESTREINTE	NATO CONFIDENTIEL	COSMIC COSMIC TRÈS SECRET	A	B	C	CONFIDENTIEL	TRES SECRET			
Information / Assets Renseignements / Biens	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT Media / Support TI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT Link / Lien électronique	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. a) Is the description of the work contained within this SRCL PROTECTED and/or CLASSIFIED?  
La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE?

☒ No  
Non

☐ Yes  
Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification".  
Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée  
« Classification de sécurité » au haut et au bas du formulaire.

12. b) Will the documentation attached to this SRCL be PROTECTED and/or CLASSIFIED?  
La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE?

☒ No  
Non

☐ Yes  
Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification" and indicate with attachments (e.g. SECRET with Attachments).  
Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée  
« Classification de sécurité » au haut et au bas du formulaire et indiquer qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).



Government of Canada  
Gouvernement du Canada

Contract Number / Numéro du contrat

Security Classification / Classification de sécurité

**PART D - AUTHORIZATION / PARTIE D - AUTORISATION**

**13. Organization Project Authority / Chargé de projet de l'organisme**

Name (print) - Nom (en lettres moulées) Christine Thomas and Jerry Gluss	Title - Titre Project leads - Planning & Implementation	Signature 	Date 08/26/14
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Telephone No. - N° de téléphone  
613-957-0220 / 954-6635

Facsimile No. - N° de télécopieur  
613-954-0503

E-mail address - Adresse courriel  
Christine.Thomas@cbsa-gc.ca

**14. Organization Security Authority / Responsable de la sécurité de l'organisme**

Name (print) - Nom (en lettres moulées) Luc Beaudoin <i>Pierre Guire</i>	Title - Titre SSO Security Advisor	Signature 	Date 2015-01-13
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Telephone No. - N° de téléphone  
613-941-8757 948-9376

Facsimile No. - N° de télécopieur  
613-941-6106

E-mail address - Adresse courriel  
Luc.Beaudoin@cbsa-asfc.gc.ca

**15. Are there additional instructions (e.g. Security Guide, Security Classification Guide) attached?**

Des instructions supplémentaires (p. ex. Guide de sécurité, Guide de classification de la sécurité) sont-elles jointes?

☒ No  
Non ☐ Yes  
Oui

**16. Procurement Officer / Agent d'approvisionnement**

Name (print) - Nom (en lettres moulées)	Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel
Date		

**17. Contracting Security Authority / Autorité contractante en matière de sécurité**

Name (print) - Nom (en lettres moulées) Lucie Legault	Title - Titre contract security officer	Signature 	Date January 29, 2015
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Telephone No. - N° de téléphone  
613-948-7932

Facsimile No. - N° de télécopieur

E-mail address - Adresse courriel  
lucie.legault2@psgc-pwgsc.gc.ca



## ANNEX D INSURANCE REQUIRMENTS

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## 1.0 For Non-Construction and Construction Related Activities

### 1.1 Errors and Omissions Liability Insurance

- 1.1.1 The Contractor must obtain Errors and Omissions Liability (a.k.a. Professional Liability) insurance, and maintain it in force throughout the duration of the Contract, in an amount usual for a contract of this nature but for not less than \$1,000,000 per loss and in the annual aggregate, inclusive of defence costs.
- 1.1.2 If the policy is written on a claims-made basis, coverage must be in place for a period of at least 12 months after the completion or termination of the Contract.
- 1.1.3 The following endorsement must be included:

Notice of Cancellation: The Insurer will endeavour to provide the Contracting Authority thirty (30) days written notice of cancellation.

### 1.2 Automobile Liability Insurance

- 1.2.1 The Contractor must obtain Automobile Liability Insurance, and maintain it in force throughout the duration of the Contract, in an amount usual for a contract of this nature, but for not less than \$2,000,000 per accident or occurrence.
- 1.2.2 The policy must include the following:
  - a. Third Party Liability - \$2,000,000 Minimum Limit per Accident or Occurrence
  - b. *Accident* Benefits - all jurisdictional statutes
  - c. Uninsured Motorist Protection
  - d. Notice of Cancellation: The Insurer will endeavour to provide the Contracting Authority thirty (30) days written notice of cancellation.

## 2.0 For Non-Construction Related Activities

### 2.1 Commercial General Liability Insurance

- 2.1.1 The Contractor must obtain Commercial General Liability Insurance, and maintain it in force throughout the duration of the Contract, in an amount usual for a contract of this nature, but for not less than \$2,000,000 per accident or occurrence and in the annual aggregate.
- 2.1.2 The Commercial General Liability policy must include the following:
- a. Additional Insured: Canada is added as an additional insured, but only with respect to liability arising out of the Contractor's performance of the Contract. The interest of Canada should read as follows: Canada, as represented by Public Works and Government Services Canada.
  - b. Bodily Injury and Property Damage to third parties arising out of the operations of the Contractor.
  - c. Products and Completed Operations: Coverage for bodily injury or property damage arising out of goods or products manufactured, sold, handled, or distributed by the Contractor and/or arising out of operations that have been completed by the Contractor.
  - d. Personal Injury: While not limited to, the coverage must include Violation of Privacy, Libel and Slander, False Arrest, Detention or Imprisonment and Defamation of Character.
  - e. Cross Liability/Separation of Insureds: Without increasing the limit of liability, the policy must protect all insured parties to the full extent of coverage provided. Further, the policy must apply to each Insured in the same manner and to the same extent as if a separate policy had been issued to each.
  - f. Blanket Contractual Liability: The policy must, on a blanket basis or by specific reference to the Contract, extend to assumed liabilities with respect to contractual provisions.
  - g. Employees and, if applicable, Volunteers must be included as Additional Insured.
  - h. Employers' Liability (or confirmation that all employees are covered by Worker's compensation (WSIB) or similar program)
  - i. Broad Form Property Damage including Completed Operations: Expands the Property Damage coverage to include certain losses that would otherwise be excluded by the standard care, custody or control exclusion found in a standard policy.
  - j. Notice of Cancellation: The Insurer will endeavour to provide the Contracting Authority thirty (30) days written notice of policy cancellation.
  - k. If the policy is written on a claims-made basis, coverage must be in place for a period of at least 12 months after the completion or termination of the Contract.

- I. Owners' or Contractors' Protective Liability: Covers the damages that the Contractor becomes legally obligated to pay arising out of the operations of a subcontractor.
- m. Non-Owned Automobile Liability - Coverage for suits against the Contractor resulting from the use of hired or non-owned vehicles.
- n. All Risks Tenants Legal Liability - to protect the Contractor for liabilities arising out of its occupancy of leased premises.
- o. Amendment to the Watercraft Exclusion to extend to incidental repair operations on board watercraft.
- p. Litigation Rights: Pursuant to subsection 5(d) of the [\*Department of Justice Act\*](#), S.C. 1993, c. J-2, s.1, if a suit is instituted for or against Canada which the Insurer would, but for this clause, have the right to pursue or defend on behalf of Canada as an Additional Named Insured under the insurance policy, the Insurer must promptly contact the Attorney General of Canada to agree on the legal strategies by sending a letter, by registered mail or by courier, with an acknowledgement of receipt.

**For the province of Quebec, send to:**

Director Business Law Directorate,  
Quebec Regional Office (Ottawa),  
Department of Justice,  
284 Wellington Street, Room SAT-6042,  
Ottawa, Ontario, K1A 0H8

**For other provinces and territories, send to:**

Senior General Counsel,  
Civil Litigation Section,  
Department of Justice  
234 Wellington Street, East Tower  
Ottawa, Ontario K1A 0H8

A copy of the letter must be sent to the Contracting Authority. Canada reserves the right to co-defend any action brought against Canada. All expenses incurred by Canada to co-defend such actions will be at Canada's expense. If Canada decides to co-defend any action brought against it, and Canada does not agree to a proposed settlement agreed to by the Contractor's insurer and the plaintiff(s) that would result in the settlement or dismissal of the action against Canada, then Canada will be responsible to the Contractor's insurer for any difference between the proposed settlement amount and the amount finally awarded or paid to the plaintiffs (inclusive of costs and interest) on behalf of Canada.

### **3.0 For Construction Related Activities**

#### **3.1 Insurance - General**

- 3.1.1 The insurance policies required on page 1 of the Certificate of Insurance (attached hereto as Attachment 1 to Annex D) must be in force and must include the insurance coverage listed under the corresponding type of insurance on this page.
- 3.1.2 The policies must insure the Contractor and must include Her Majesty the Queen in Right of Canada as represented by the Minister of Public Works and Government Services as an additional Insured.
- 3.1.3 The insurance policies must be endorsed to provide Canada with not less than thirty (30) days notice in writing in advance of a cancellation of insurance or any reduction in coverage.
- 3.1.4 Without increasing the limit of liability, the policies must protect all insured parties to the full extent of coverage provided. Further, the policies must apply to each Insured in the same manner and to the same extent as if a separate policy had been issued to each.

#### **3.2 Commercial General Liability Insurance**

- 3.2.1 The insurance coverage provided must not be substantially less than that provided by the latest edition of IBC Form 2100.
- 3.2.2 The policy must either include or be endorsed to include coverage for the following exposures or hazards if the Work is subject thereto:
  - (a) Blasting.
  - (b) Pile driving and caisson work.
  - (c) Underpinning.
  - (d) Removal or weakening of support of any structure or land whether such support be natural or otherwise if the work is performed by the insured contractor.
- 3.2.3 The policy must have the following minimum limits:
  - (a) \$5,000,000 Each Occurrence Limit;
  - (b) \$10,000,000 General Aggregate Limit per policy year if the policy contains a General Aggregate; and
  - (c) \$5,000,000 Products/Completed Operations Aggregate Limit.

Umbrella or excess liability insurance may be used to achieve the required limits.

### **3.3 Builder's Risk / Installation Floater**

- 3.3.1 The insurance coverage provided must not be less than that provided by the latest edition of IBC Forms 4042 and 4047.
- 3.3.2 The policy must permit use and occupancy of any of the projects, or any part thereof, where such use and occupancy is for the purposes for which a project is intended upon completion.
- 3.3.3 The policy may exclude or be endorsed to exclude coverage for loss or damage caused by asbestos, fungi or spores, cyber and terrorism.
- 3.3.4 The policy must have a limit that is not less than the sum of the contract value plus the declared value (if any) set forth in the contract documents of all material and equipment supplied by Canada at the site of the project to be incorporated into and form part of the finished Work.
- 3.3.5 If the value of the Work is changed, the policy must be changed to reflect the revised contract value.
- 3.3.6 The policy must provide that the proceeds thereof are payable to Canada or as Canada may direct in accordance with GC10.2, "Insurance Proceeds" (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R/R2900D/2>).

### **3.4 Environmental Impairment Liability Insurance**

- 3.4.1 The Contractor must obtain Pollution Legal Liability - Fixed Site Coverage insurance, and maintain it in force throughout the duration of the Contract, in an amount usual for a contract of this nature, but for not less than \$1,000,000 per accident or occurrence and in the annual aggregate.
- 3.4.2 If the policy is written on a claims-made basis, coverage must be in place for a period of at least 12 months after the completion or termination of the Contract.
- 3.4.3 The Pollution Legal Liability - Fixed Site Coverage policy must include the following:
  - a. Additional Insured: Canada is added as an additional insured, but only with respect to liability arising out of the Contractor's performance of the Contract. The interest of

Canada as additional insured should read as follows: Canada, represented by Public Works and Government Services Canada.

- b. Notice of Cancellation: The Insurer will endeavour to provide the Contracting Authority thirty (30) days written notice of policy cancellation.
- c. Separation of Insureds: The policy must apply to each Insured in the same manner and to the same extent as if a separate policy had been issued to each.
- d. Contractual Liability: The policy must, on a blanket basis or by specific reference to the Contract, extend to assumed liabilities with respect to contractual provisions.
- e. Incidental Transit Extension: The policy must extend to losses arising from any waste, products or materials transported, shipped, or delivered via any transportation mode to a location beyond the boundaries of a site at which the Contractor or any entity for which the Contractor is legally liable is performing or has performed the operations described in the contract.
- f. Litigation Rights: Pursuant to subsection 5(d) of the [Department of Justice Act](#), S.C. 1993, c. J-2, s.1, if a suit is instituted for or against Canada which the Insurer would, but for this clause, have the right to pursue or defend on behalf of Canada as an Additional Named Insured under the insurance policy, the Insurer must promptly contact the Attorney General of Canada to agree on the legal strategies by sending a letter, by registered mail or by courier, with an acknowledgement of receipt.

**For the province of Quebec, send to:**

*Director Business Law Directorate,  
Quebec Regional Office (Ottawa),  
Department of Justice,  
284 Wellington Street, Room SAT-6042,  
Ottawa, Ontario, K1A 0H8*

**For other provinces and territories, send to:**

*Senior General Counsel,  
Civil Litigation Section,  
Department of Justice  
234 Wellington Street, East Tower  
Ottawa, Ontario K1A 0H8*

A copy of the letter must be sent to the Contracting Authority. Canada reserves the right to co-defend any action brought against Canada. All expenses incurred by Canada to co-defend such actions will be at Canada's expense. If Canada decides to co-defend any action brought against it, and Canada does not agree to a proposed settlement agreed to by the Contractor's insurer and the plaintiff(s) that would result in the settlement or dismissal of the action against Canada, then Canada will be responsible to the Contractor's insurer for any difference between the proposed settlement amount



and the amount finally awarded or paid to the plaintiffs (inclusive of costs and interest) on behalf of Canada.

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## **ATTACHMENT 1 to Annex D – Certificate of Insurance**

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## CERTIFICATE OF INSURANCE

**NOTE: this form is for reference only. A revised editable version with appropriate required coverage will be supplied by the contracting authority.**

**Page 1 of 2**

Description and Location of Work	Contract No.
	Project No.

Name of Insurer, Broker or Agent	Address (No., Street)	City	Province	Postal Code
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Name of Insured (Contractor)	Address (No., Street)	City	Province	Postal Code
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**Additional Insured**

Her Majesty the Queen in Right of Canada as represented by the Minister of Public Works and Government Services

Type of Insurance	Insurer Name and Policy Number	Inception Date (DD-MM-YYYY)	Expiry Date (DD-MM-YYYY)	Limit of Liability		
				Per Occurrence	Annual General Aggregate	Completed Operations Aggregate
Commercial General Liability				\$	\$	\$
Umbrella / Excess Liability				\$	\$	\$
Builder's Risk / Installation Floater						
Pollution Liability				\$ <input type="checkbox"/> Per Incident <input type="checkbox"/> Per Occurrence		Aggregate \$
Marine Liability				\$		
Aviation Liability				\$ <input type="checkbox"/> Per Incident <input type="checkbox"/> Per Occurrence		Aggregate \$
Insert other type of Insurance as required				\$		

I certify that the above policies were issued by insurers in the course of their Insurance business in Canada, are currently in force and include the applicable insurance coverage's stated on page 2 of this Certificate of Insurance, including advance notice of cancellation / reduction in coverage.

Name of Person authorized to sign on behalf of Insurer(s) (Officer, Agent, Broker)	Telephone Number
Signature	Date (DD-MM-YYYY)



**NOTE: this form is for reference only. A revised editable version with appropriate required coverage will be supplied by the contracting authority.**

<p><b>General</b></p> <p>The insurance policies required on page 1 of the Certificate of Insurance must be in force and must include the insurance coverages listed under the corresponding type of insurance on this page.</p> <p>The policies must insure the Contractor and must include Her Majesty the Queen in Right of Canada as represented by the Minister of Public Works and Government Services as an additional Insured.</p> <p>The insurance policies must be endorsed to provide Canada with not less than thirty (30) days notice in writing in advance of a cancellation of insurance or any reduction in coverage.</p> <p>Without increasing the limit of liability, the policies must protect all insured parties to the full extent of coverage provided. Further, the policies must apply to each Insured in the same manner and to the same extent as if a separate policy had been issued to each.</p>	<p><b>Commercial General Liability</b></p> <p>The insurance coverage provided must not be substantially less than that provided by the latest edition of IBC Form 2100.</p> <p>The policy must either include or be endorsed to include coverage for the following exposures or hazards if the Work is subject thereto:</p> <p>(a) Blasting. (b) Pile driving and caisson work. (c) Underpinning. (d) Removal or weakening of support of any structure or land whether such support be natural or otherwise if the work is performed by the insured contractor.</p> <p>The policy must have the following minimum limits:</p> <p>(a) <b>\$5,000,000</b> Each Occurrence Limit; (b) <b>\$10,000,000</b> General Aggregate Limit per policy year if the policy contains a General Aggregate; and (c) <b>\$5,000,000</b> Products/Completed Operations Aggregate Limit.</p> <p>Umbrella or excess liability insurance may be used to achieve the required limits.</p>	<p><b>Builder's Risk / Installation Floater</b></p> <p>The insurance coverage provided must not be less than that provided by the latest edition of IBC Forms 4042 and 4047.</p> <p>The policy must permit use and occupancy of any of the projects, or any part thereof, where such use and occupancy is for the purposes for which a project is intended upon completion.</p> <p>The policy may exclude or be endorsed to exclude coverage for loss or damage caused by asbestos, fungi or spores, cyber and terrorism.</p> <p>The policy must have a limit that is <b>not less than the sum of the contract value</b> plus the declared value (if any) set forth in the contract documents of all material and equipment supplied by Canada at the site of the project to be incorporated into and form part of the finished Work. If the value of the Work is changed, the policy must be changed to reflect the revised contract value.</p> <p>The policy must provide that the proceeds thereof are payable to Canada or as Canada may direct in accordance with GC10.2, "Insurance Proceeds" (<a href="https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R/R2900D/2">https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R/R2900D/2</a>).</p>
<p><b>Contractors Pollution Liability</b></p> <p>The policy must have a limit usual for a contract of this nature, but not less than <b>\$1,000,000</b> per incident or occurrence and in the aggregate.</p>	<p><b>Marine Liability</b></p> <p>The insurance coverage must be provided by a Protection &amp; Indemnity (P&amp;I) insurance policy and must include excess collision liability and pollution liability.</p> <p>The insurance must be placed with a member of the International Group of Protection &amp; Indemnity Associations or with a fixed market in an amount of not less than the limits determined by the Marine Liability Act, S.C. 2001, c. 6. Coverage must include crew liability, if it is not covered by the statutory requirements of the Territory or Province having jurisdiction over such employees.</p> <p>The policy must waive all rights of subrogation against Canada as represented by Public Works and Government Services Canada for any and all loss of or damage to the watercraft however caused.</p>	<p><b>Other types of Insurance</b> <b>To be inserted in this space according to specifics of project. Use separate page if needed.</b></p>
<p><b>Aviation Liability</b></p> <p>The insurance coverage shall Include Bodily Injury (including passenger Bodily Injury) and Property Damage, in an amount of not less than \$5,000,000 per incident or occurrence and in the aggregate.</p>		