



**RETURN BIDS TO:  
RETOURNER LES SOUMISSIONS À:**

Regional Manager/Real Property  
Contracting/PWGSC  
Ontario Region, Tendering Office  
12th Floor, 4900 Yonge Street  
Toronto, Ontario  
M2N 6A6  
Ontario

**REQUEST FOR PROPOSAL  
DEMANDE DE PROPOSITION**

**Proposal To: Public Works and Government  
Services Canada**

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

**Proposition aux: Travaux Publics et Services  
Gouvernementaux Canada**

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

**Comments - Commentaires**

<b>Title - Sujet</b> Brighton Road & Hamlet Swing Bridge	
<b>Solicitation No. - N° de l'invitation</b> EQ754-161755/A	<b>Date</b> 2015-12-23
<b>Client Reference No. - N° de référence du client</b> R.059792.204	
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$PWL-035-2097	
<b>File No. - N° de dossier</b> PWL-5-38143 (035)	<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 2016-02-04</b>	
<b>Time Zone</b> <b>Fuseau horaire</b> Eastern Standard Time EST	
<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> Woodhall, Lauren	<b>Buyer Id - Id de l'acheteur</b> pw1035
<b>Telephone No. - N° de téléphone</b> (416) 512-5873 ( )	<b>FAX No. - N° de FAX</b> (416) 512-5862
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b> Brighton Road Swing Bridge Brighton, Ontario Hamlet Swing Bridge Hamlet, Ontario	

**Instructions: See Herein**

**Instructions: Voir aux présentes**

**Vendor/Firm Name and Address**

**Raison sociale et adresse du  
fournisseur/de l'entrepreneur**

**Issuing Office - Bureau de distribution**

Regional Manager/Real Property Contracting/PWGSC  
Ontario Region, Tendering Office  
12th Floor, 4900 Yonge Street  
Toronto, Ontario  
M2N 6A6  
Ontario

<b>Delivery Required - Livraison exigée</b>	<b>Delivery Offered - Livraison proposée</b>
<b>Vendor/Firm Name and Address</b> <b>Raison sociale et adresse du fournisseur/de l'entrepreneur</b>	
<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/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b>	
<b>Signature</b>	<b>Date</b>

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## REQUEST FOR PROPOSAL (RFP)

### TABLE OF CONTENTS

The following is intended to clarify the general structure of the whole document.

Front Page

Supplementary Instructions to Proponents (SI)

- SI1 Introduction
- SI2 Proposal Documents
- SI3 Questions or request for clarifications
- SI4 Canada's Trade Agreements
- SI5 Certifications
- SI6 Web Sites

Terms, Conditions and Clauses

Agreement

Supplementary Conditions (SC)

- SC1 Supplementary Conditions
- SC2 Federal Contractors Program for Employment Equity - Default by the Consultant

Agreement Particulars

Project Brief

- Description of Project (PD)
- Project Administration (PA)
- Description of Services - Required Services (RS)

Submission Requirements and Evaluation (SRE)

Team Identification Format (Appendix A)

Declaration/Certifications Form (Appendix B)

Integrity Provisions – List of Names (Appendix B – Annex A)

Price Proposal Form (Appendix C)

Doing Business with A&E Ontario Region (Appendix D)

HCEW CADD Standards (Appendix E)

Selected Existing Photos, Drawings and Reports (Appendix F)

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## SUPPLEMENTARY INSTRUCTIONS TO PROPONENTS (SI)

### SI1 INTRODUCTION

1. Public Works and Government Services Canada (PWGSC) intends to retain an individual consulting firm or joint venture to provide the professional services for the project as set out in this Request for Proposal (RFP).
2. This is a single phase selection process. The nature of the requirement and the anticipated limited number of response by the industry leads PWGSC to believe that this approach will not unduly force a large number of firms to expend an overall unreasonable amount of effort in response to PWGSC.
3. Proponents responding to this RFP are requested to submit a full and complete proposal. The proposal will cover not only the qualifications, expertise, availability, experience and organization of the proposed Consultant Team, but also the detailed approach to the work, and the pricing and terms offered. A combination of the technical and price of services submissions will constitute the proposal.

### SI2 PROPOSAL DOCUMENTS

1. All instructions, general terms, conditions and clauses identified in the RFP by number, date and title, are hereby incorporated by reference into and form part of this solicitation and any resultant contract.

All instructions, general terms, conditions and clauses identified in the RFP 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> ) issued by Public Works and Government Services Canada.

2. The following are the proposal documents:
  - (a) Supplementary Instructions to Proponents (SI);  
R1410T (2015-07-03), General Instructions (GI) – Architectural and/or Engineering Services – Request for Proposal;  
Submission Requirements and Evaluation (SRE);
  - (b) the general terms, conditions and clauses, as amended, identified in the Agreement clause;
  - (c) Project Brief;

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- (d) the document entitled "Doing Business with A&E Ontario Region";
  - (e) the document entitled "Heritage Canals and Engineering Works CADD Standard" (Appendix E)
  
  - (f) selected existing photos, drawings and reports contained in the compressed "zip" file (Appendix F)
  
  - (g) the document entitled "Team Identification Format"
  
  - (h) any amendment to the solicitation document issued prior to the date set for receipt of proposals; and
  
  - (i) the proposal, Declaration/Certifications Form and Price Proposal Form.
3. Submission of a proposal constitutes acknowledgment that the Proponent has read and agrees to be bound by these documents.

### **SI3 QUESTIONS OR REQUEST FOR CLARIFICATION**

Questions or requests for clarification during the solicitation period must be submitted in writing to the Contracting Authority named on the RFP - Page 1 as early as possible. Enquiries should be received no later than 10 working days prior to the closing date identified on the front page of the Request for Proposal. Enquiries received after that date may not be answered prior to the closing date of the solicitation.

### **SI4 CANADA'S TRADE AGREEMENTS**

This procurement is subject to the provisions of the North American Free Trade Agreement (NAFTA), and the World Trade Organization - Agreement on Government Procurement (WTO-AGP).

### **SI5 CERTIFICATIONS**

- 1. Integrity Provisions – Declaration of Convicted Offences**  
As applicable, pursuant to subsection Declaration of Convicted Offences, of section 01 of the General Instructions, the Proponent must provide with its bid, a completed Declaration Form, to be given further consideration in the procurement process.
  
- 2. Federal Contractors Program for Employment Equity - Proposal Certification**

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By submitting a proposal, the Proponent certifies that the Proponent, and any of the Proponent's members if the Proponent 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 proposal non-responsive if the Proponent, or any member of the Proponent if the Proponent 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 Agreement for default if a Consultant, or any member of the Consultant if the Consultant is a Joint Venture, appears on the "FCP Limited Eligibility to Bid" list during the period of the Agreement.

The Proponent must provide the Contracting Authority with a completed Federal Contractors Program for Employment Equity - Certification (see Appendix B - Declaration/Certifications Form), before contract award. If the Proponent is a Joint Venture, the Proponent must provide the Contracting Authority with a completed Federal Contractors Program for Employment Equity - Certification, for each member of the Joint Venture.

## SI6 - WEBSITES

The connection to some of the Web sites in the RFP is established by the use of hyperlinks. The following is a list of the addresses of the Web sites:

Employment Equity Act  
<http://laws-lois.justice.gc.ca/eng/acts/E-5.401/index.html>

Federal Contractors Program (FCP)  
[http://www.labour.gc.ca/eng/standards\\_equity/eq/emp/fcp/index.shtml](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/index.shtml)

Certificate of Commitment to Implement Employment Equity form LAB 1168  
<http://www.servicecanada.gc.ca/cgi-bin/search/eforms/index.cgi?app=profile&form=lab1168&dept=sc&lang=e>

Code of Conduct for Procurement

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No. / N° VME - FMS

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<http://www.tpsgc-pwgsc.gc.ca/app-acq/cndt-cndct/contexte-context-eng.html>

Lobbying Act

<http://laws-lois.justice.gc.ca/eng/acts/L-12.4/?noCookie>

Contracts Canada

<https://buyandsell.gc.ca/>

Supplier Registration Information

<https://srisupplier.contractsCanada.gc.ca>

Consultant Performance Evaluation Report Form

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/2913-1.pdf>

Canadian economic sanctions

<http://www.international.gc.ca/sanctions/index.aspx?lang=eng>

National Joint Council (NJC) Travel Directive

<http://www.njc-cnm.gc.ca/directive/travel-voyage/index-eng.php>

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## TERMS, CONDITIONS AND CLAUSES

### AGREEMENT

1. The Consultant understands and agrees that upon acceptance of the offer by Canada, a binding Agreement shall be formed between Canada and the Consultant and the documents forming the Agreement shall be the following:
  - (a) the Front Page and this Agreement clause;
  - (b) the General Terms, Conditions and Clauses, as amended, identified as:
    - R1210D (2015-07-09), General Condition (GC) 1 - General Provisions – Architectural and/or Engineering Services
    - R1215D (2014-06-26), General Condition (GC) 2 - Administration of the Contract
    - R1220D (2015-02-25), General Condition (GC) 3 - Consultant Services
    - R1225D (2015-04-01), General Condition (GC) 4 - Intellectual Property
    - R1230D (2015-02-25), General Condition (GC) 5 - Terms of Payment
    - R1235D (2011-05-16), General Condition (GC) 6 - Changes
    - R1240D (2011-05-16), General Condition (GC) 7 - Taking the Services Out of the Consultant's Hands, Suspension or Termination
    - R1245D (2012-07-16), General Condition (GC) 8 - Dispute Resolution
    - R1250D (2015-02-25), General Condition (GC) 9 - Indemnification and InsuranceSupplementary Conditions  
Agreement Particulars
  - (c) Project Brief;
  - (d) the document entitled "Doing Business with A&E Ontario Region";
  - (e) the document entitled "Heritage Canals and Engineering Works CADD Standards";
  - (f) the completed "Team Identification" document;
  - (g) any amendment to the solicitation document incorporated in the Agreement before the date of the Agreement;
  - (h) the proposal, the Declaration/Certifications Form and the Price Proposal Form.
  
2. The documents identified above by title, number and date are hereby incorporated by reference into and form part of this Agreement, as though expressly set out herein, subject to any other express terms and conditions herein contained.

The documents identified above by title, number and date are set out in the Standard Acquisition Clauses and Conditions (SACC) Manual, issued by Public Works and Government Services Canada (PWGSC). The SACC Manual is available on the PWGSC Web site: <https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>

3. If there is a discrepancy between the wording of any documents that appear on the following 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) any amendment or variation in the Agreement that is made in accordance with the terms and conditions of the Agreement;
  - (b) any amendment to the solicitation document incorporated in the Agreement before the date of the Agreement;
  - (c) this Agreement clause;
  - (d) Supplementary Conditions;
  - (e) General Terms, Conditions and Clauses;
  - (f) Agreement Particulars;
  - (g) Project Brief / Terms of Reference;
  - (h) the document entitled "Doing Business with A&E Ontario Region";
  - (i) the proposal.

## **SUPPLEMENTARY CONDITIONS (SC)**

### **SC1 SECURITY REQUIREMENT**

There is no security requirement applicable to this Agreement.

### **SC2 FEDERAL CONTRACTORS PROGRAM FOR EMPLOYMENT EQUITY - DEFAULT BY THE CONSULTANT**

The Consultant understands and agrees that, when an Agreement to Implement Employment Equity (AIEE) exists between the Consultant 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 Consultant will be added to the "FCP Limited Eligibility to Bid" list. The imposition of such a sanction by ESDC will constitute the Consultant in default as per the terms of the contract.

## **AGREEMENT PARTICULARS**

The Agreement Particulars will be issued at time of award of contract and will identify the fee to be paid to the Consultant for the services determined in the Price Proposal Form.

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## **PROJECT BRIEF (PB)**

### **Description of Project (PD)**

- PD 1 Project Information
- PD 2 Project Identification
- PD 3 Project Background
- PD 4 Existing Documentation
- PD 5 Project Objectives
- PD 6 Scope of Work
- PD 7 Consultant Services

### **Project Administration (PA)**

- PA 1 Project Administration
- PA 2 Project Team
- PA 3 Authorities, Submissions, Review and Approval Process
- PA 4 Invoicing and Payments

### **Required Services (RS)**

- RS 1 Analysis of Project Scope of Work
- RS 2 Management of Consultant's In-House and External Resources (Sub-Consultant/Specialist) and Services
- RS 3 Investigations, Studies and Reports
- RS 4 Estimating and Cost Planning
- RS 5 Risk Management and Quality Management
- RS 6 Design Concept
- RS 7 Design Development
- RS 8 Construction Documents, Pre-Tender Construction Cost Estimate, Risk Management Plan and Project Schedule
- RS 9 Tender Call, Bid Evaluation & Construction Contract Award
- RS 10 Construction and Contract Administration
- RS 11 Resident Site Services During Construction
- RS 12 Post Construction Services

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## **PROJECT BRIEF (PB)**

### **DESCRIPTION OF PROJECT (PD)**

Public Works and Government Services Canada (PWGSC) intends to retain a firm of civil/structural bridge engineers with a multi-disciplinary team of engineers for the provision of services required for this project.

#### **PD 1 PROJECT INFORMATION**

- 1.1 PWGSC Project Title:** **Replacement of Brighton Road Swing Bridge, Repair/Upgrade-Replacement of Hamlet Swing and Fixed Bridges**
- 1.2 Location of the Projects:** **SITE A - Brighton Road Swing Bridge,**  
Trent Severn Waterway, Murray Canal,  
1204 County Road 64,  
Brighton, Ontario.
- SITE B – Hamlet Swing and Fixed Bridges**  
Trent Severn Waterway,  
1641 Muskoka District Road 49  
Hamlet, Ontario.
- 1.3 PWGSC Project Numbers:** R.059792.204 (Site A)  
& R.073593.001 (Site B)
- 1.4 Client / User:** Trent-Severn Waterway,  
Ontario Waterways Unit  
Parks Canada Agency
- 1.5 PWGSC Project Team:** Andrew Werblinski, Project Manager  
Atif Suhail, Deputy Project Manager

#### **PD 2 PROJECT IDENTIFICATION**

##### **2.1 Overview**

1. The services of a bridge engineering firm will be required to undertake the full planning; site inspection and investigations; evaluations of bridges to be rehabilitated/upgraded, conceptual design and design development; preparation of construction documents; technical assistance during tender and post tender period; construction and contract administration services; resident engineering services during construction; inspection and commissioning services; and post-construction services for the repair/upgrade or replacement of bridges at two separate sites: Site A and

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Site B. Additionally, rehabilitation of the existing Canal shore walls at Site A is required.

2. The completed bridges shall satisfy the User Department requirements and meet current Canadian Highway Bridge Design Code (CHBDC) standards and Transportation Association of Canada (TAC) standards, unless otherwise accepted by the PWGSC Project Manager and the User Department. The design and construction of the bridges must be conducted in an efficient, expedient and economical manner, all within the specified time limitations.
3. The selected engineering firm will provide a full consulting team including the required expertise in swing bridges: structural engineering, mechanical engineering, electrical/controls engineering, transportation engineering, geotechnical engineering, hydraulics specialist, cost specialist, underwater inspections and surveys and any other specialists, as necessary to complete the project.

## **2.2 User Department**

1. The User Department, referred to throughout the Project Brief, is Parks Canada Agency.
2. The Trent-Severn Waterway of the Parks Canada Agency (PCA) meanders 386 kilometers along Central Ontario and mainly consists of many locks, bridges and dams. The Trent-Severn Waterway is designated as a National Historic Site. Additional information can be found at: <http://www.pc.gc.ca/eng/lhn-nhs/on/trentsevern/index.aspx>

## **2.3 Site Description and Condition SITE A - The Brighton Road Swing Bridge**

1. The Brighton Road Swing Bridge spans across the Murray Canal and is part of the Trent-Severn Waterway, with civic address of 1204 County Road 64. County road 64 is a two lane road that crosses the bridge to connect the Town of Brighton and the City of Quinte West.
2. Structure Description:
  - a) The bridge was constructed in 1947 by the Central Bridge Company.
  - b) The bridge is composed of two 44.6m long riveted steel pony trusses with 9 panels of approximately 5.0 m length each. Lateral centre-centre of pony trusses is approximately 7.0m.
  - c) The bridge deck is a 6.5m wide nail laminated timber deck with wood curbs and an asphalt wearing surface, supported by steel stringers and steel floor beams which in turn connect to the bottom panel points of the two side trusses.
  - d) It is an equal arm type swing bridge pivoting 90 degrees about a center pintle with 8 balance wheels.

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- e) The bridge currently carries two sub-3.1m wide lanes of traffic.
  - f) The existing posted speed in the vicinity of the bridge is 60 km/hr.
  - g) The swing bridge is supported by a concrete-topped stone masonry center pivot pier and concrete-topped stone masonry abutments. The rest piers are aligned with the center pivot pier, and are of the same concrete-over-masonry construction. There are rock-filled wood cribbing infill sections topped with concrete in-between the pivot pier and the two rest piers, forming an elongated swing pier.
  - h) There is no dedicated passageway for cyclists or pedestrians.
  - i) Since July 2011 the load limit posting is Maximum Gross Vehicle Weight of 9 Tonnes.
3. Fluid Hydraulic System:
- a) The present fluid power hydraulics system was installed in the 1960's.
  - b) The fluid hydraulic system is comprised of:
    - i) Two main swing cylinders located on the center pivot pier, which are used to swing the bridge;
    - ii) Hydraulic end wedges;
    - iii) The pump and hydraulic fluid reservoir and distribution system is located in the bridge control building.
4. Electrical and Control System:
- a) The bridge electrical system was installed in the 1960's. The control system has since been upgraded to a PLC system.
  - b) The electrical system is comprised of:
    - i) Electrical panel and distribution system located in the operator's control Cabin;
    - ii) Buried electrical lines;
    - iii) Limit switches for the controls of the hydraulic cylinders and jacks, and locking pin cylinders, navigation lights;
    - iv) Traffic control lights and gates.
5. Condition of Bridge:
- a) McCormick Rankin was retained in 2010 to complete a Recapitalization Study of this bridge. The report was completed August 2010. From the 2010 Recapitalization study the main findings of the visual inspection were:
    - i) Severe corrosion and thinning of the floor beams. Critical members were identified.
    - ii) Light to medium corrosion of truss members. Critical members were identified.
    - iii) Medium transverse cracking in the asphalt pavement.
    - iv) Localized disintegration and wide cracking of concrete abutments.

- v) Severe disintegration and erosion of concrete and exposure of rebar on the center pier.
- vi) Undermining of shore walls with one section in an unstable condition.
- vii) The approaches to the bridge have sharp radius curves, reducing vehicle speeds as they cross the bridge.
- viii) There are no traffic barriers on the bridge, there are only short traffic barriers leading to the bridge and no energy attenuators on the barrier ends.
- ix) The mechanical, hydraulic and electrical systems do not meet the requirements of the CHBDC and require replacement.
- x) The Canal walls are severely deteriorated, with large voids and areas of instability. It is additionally noted that a portion of the Canal wall has subsequently collapsed in 2015.

## 2.4 Site Description and Condition SITE B - Hamlet Swing and Fixed Bridges

1. The Hamlet Swing and Fixed Bridges are located at 1641 Muskoka District Road 49, Severn Bridge, ON, just north of Orillia. Stakeholders include townships of Severn and Georgian Bay. The bridge provides a crossing for traffic over the Upper Severn River which is part of the Trent-Severn Waterway. The bridge is comprised of two sections; a 60 m equal arm swing span (Bridge #57) and a 31 m fixed span (Bridge #58). Work will be carried out on both sections.
2. Structure Description:
  - a) The swing bridge was constructed circa 1922. The fixed span was originally built in 1905 for use at another location, but was moved to this location in 1915, and the bridge crossing was not finished until circa 1922 due to WW1.
  - b) The bridge is composed of a 31m fixed span to the East and a 60m equal arm swing span to the West.
  - c) The swing span (Bridge #57) is supported by two through-trusses (Warren trusses).
  - d) The fixed span (Bridge #58) is supported by two through-trusses (Pratt trusses).
  - e) The bridge deck is 5.5 m wide and carries one single lane of traffic.
  - f) The bridge deck is a nail laminated timber deck with timber running boards as the wearing surface.
  - g) The deck is supported by steel stringers and steel floor beams which in turn connect to the bottom panel points of the two side trusses.
  - h) There are timber curbs on each side of the bridge.
  - i) The original drawings indicate that the bridge system has four concrete sub-structures; an East abutment, a West abutment, the

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- East pier between the fixed and swing spans, and the West pivot pier. The elongated swing pier on each side of the concrete pivot pier, including the two rest piers, is a wood cribbing structure topped with concrete blocks and cast concrete.
- j) The fixed bridge has sliding bearings (roller nests) at the East pier and fixed bearings at the West abutment.
  - k) The swing bridge pivots about a center pintle with balance wheels. Castor wheels support the East end of the bridge on rest plates. Two hydraulic cylinders support the West end.
  - l) The existing posted speed limit in the vicinity of the bridge is 60 km/hr.
  - m) There is no dedicated passageway for cyclists or pedestrians.
  - n) The current load limit posting is Maximum Gross Vehicle Weight of 3 tonnes, and is governed by the fixed span.
3. Fluid Hydraulic System:
- a) The bridge was initially manually operated and modified to be electrically operated, then modified in 2008 to be hydraulically operated.
  - b) The fluid hydraulic system is comprised of:
    - i) Two slewing cylinders are used to swing the bridge from the West pivot pier;
    - ii) Two hydraulic end lift jacks are located on the West end of each bridge truss;
    - iii) The West hydraulic locking pin is located on the West approach pier. The East locking pin is manually operated and located at the center of the bridge at the North Truss;
    - iv) The hydraulic power unit, hydraulic fluid reservoir and distribution system are located in a separate building (bridge control building) adjacent to the swing span.
4. Electrical and Control System:
- a) The bridge electrical system was installed in the 1960's. The control system has since been upgraded to a PLC system.
  - b) The electrical system is comprised of:
    - i) Electrical panel and distribution system located in the bridge control building;
    - ii) Buried electrical lines;
    - iii) Limit switches for the controls of the hydraulic cylinders and jacks, and locking pin cylinders, navigation lights;
    - iv) Traffic control lights and gates.
5. Condition of Bridge:
- a) Evidence of deterioration has been observed by maintenance and engineering staff over the years. Due to previous funding

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- restrictions, only minor repairs have been completed to address component failures.
- b) Delcan was retained in 2011 to complete a Comprehensive Detailed Inspection and Structural Evaluation Report on this bridge. The report was completed in March 2012.
  - c) In March 2013, the bridge was impacted by a Transport Truck, causing damage to three members of the fixed portion. Delcan inspected the damage and provided a report.
  - d) From the 2012 bridge inspection report by Delcan:
    - i) Fixed Span
      - 1) The bottom chord eye-bars at the east bearings of the North and South trusses are exhibiting extreme section loss (>90%), with only approximately 1/16th of the original cross sections remaining. Wire rope ties have been added as a temporary fix.
      - 2) The top of the east abutment wall has tilted West towards the river, and the top of the south-east wingwall has tilted towards the South.
      - 3) Traffic barrier systems do not meet current CHBDC crash-tested requirements or current provincial standards.
      - 4) Approximately 50% of the coating system has typically flaked off from the lower truss connections, with light to medium corrosion developing.
      - 5) Extensive areas of coating failure and light to very severe corrosion were observed on the majority of the floor beams.
      - 6) The steel cable and timber post guide rails in the east approach are in poor condition.
    - ii) Swing Span
      - 1) The structural steel coating system is in very poor condition throughout the structure, with extensive areas of cracked and flaking coatings typically noted, permitting light to very severe corrosion to develop on the trusses, bracing, floor system, and pivot steel members.
      - 2) The sides of the pivot pier have several large areas of severe scaling at the top and very severe erosion along the length of the pier at the waterline.
      - 3) Numerous narrow to wide transverse cracks, large spalls, and large areas of severe scaling are typical in the top of the concrete pier cap. Large areas of severe and very severe scaling and spalled concrete were observed in the sides of the concrete pier cap at numerous locations and in numerous concrete blocks.

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- 4) The existing traffic barrier system does not meet current CHBDC crash-tested requirements or applicable provincial standards.
  - 5) The steel cable and timer post guide rails on the North and South sides of the east approach are in poor condition.
  - 6) The balance wheel rail is in poor condition with moderate corrosion and section loss, undermining of the rail support pier, and impressions. The rail was observed to deflect under loads from the balance wheels during operation.
  - 7) The bridge is not provided with a standby power or auxiliary means of operating the bridge in the event of power outage.
  - 8) The conventional relay logic control is outdated with obsolete relays and devices and provides limited functionality and questionable reliability, and should be replaced with state of art modern PLC control.
  - 9) The bridge control station provides very limited indication of bridge status for the operator, span position and individual traffic gate position indication lights have not been included in the control station. Additionally, no system failure indication lights have been provided, and the station is not provided with a keyed "on-off" switch or means of de-energizing the control station when the bridge is unmanned.
  - 10) The operator control station is the only means to start and stop the hydraulic system, which causes a safety hazard for maintenance personnel when testing the hydraulic system as it can only be stopped remotely from where maintenance would be performed and relies on positive lines of communications between the bridge operator and maintenance personnel. A means of operating and emergency stopping all hydraulic drives locally for the safety of maintenance personnel should be installed.
  - 11) The Bridge is not provided with any fender navigation lights for channel marking as per Coast Guard requirements.
  - 12) Traffic gates are not provided with hand crank limit switches, which prevent electrical operation of the gates when the hand crank handle is inserted.
  - 13) The limit switch support steel plates are heavily corroded and should be replaced.

- 14) No safety limit switches were provided from the east locking pin to prevent operation of the bridge when the pin is extended.

## 2.5 Construction Budget Indicative Estimates

1. The construction costs, exclusive of HST, are estimated to be:
  - a) SITE A - Brighton Road Swing Bridge: CAD \$8 Million
  - b) SITE B - Hamlet Swing & Fixed Bridge: CAD \$7 Million
2. These figures do not include PWGSC Project Management fees, administration costs, and consultant fees.

## 2.6 Assignment and Commitment of Adequate Resources to meet Project Requirements:

1. Assign and commit appropriate number of specialist and sub-consultant resources and personnel representing appropriate levels of qualifications, expertise, experience and availability throughout the entire scope of required services in order to complete and deliver the project within the schedule constraints listed. If unavoidable delays are experienced, assign additional personnel and resources, as may be required, to catch up to the schedule and deliver final construction documents on time.
2. Submit a Complete Team Identification chart, including reporting structure and responsibilities, to D.R. for review. Project personnel shall correspond to those identified in the RFP Submission Requirement Evaluation section for the purpose of evaluation. Team Identification is to include individual's name, position/role, area of and percentage of work time that can be devoted to this project.

## 2.7 Schedule

1. Project schedule constraints – Site A, Brighton Road Swing Bridge and Canal Walls:
  - a) The completion of construction and successful commissioning of the Brighton Road replacement Swing Bridge and of the Canal wall repairs is to occur no later than **May 5th, 2017**.
  - b) On-site construction work requiring cessation of vehicular and/or marine traffic is to begin on **October 11th, 2016** at the earliest. Preparatory site and non-site works that do not interfere with normal navigational season canal/crossing operations may begin prior to October 11th, 2016.
  - c) All necessary final construction documents accepted by the D.R. and issued "For Construction" are to be submitted for tendering no later than **July 22nd, 2016**.

- d) Initial on-site investigative and testing works, if required, may be performed earlier, but only if approved well in advance by authorities having jurisdiction, and upon receipt of written acceptance to perform such work from D.R.
2. Project schedule constraints – Site B, Hamlet Swing and Fixed Bridges:
- a) The completion of construction and successful commissioning of the Hamlet Swing bridge rehabilitation/upgrade and Fixed bridge replacement is to occur no later than **November 17<sup>th</sup>, 2017**.
- b) On-site construction work requiring cessation of vehicular and at most intermittent interruption of marine traffic is to begin on **April 17<sup>th</sup>, 2017** at the earliest, but a shorter construction time is highly preferred. Preparatory site and non-site works that do not interfere with normal vehicle crossing operations may begin prior to April 17<sup>th</sup>, 2017.
- c) All necessary final construction documents accepted by the D.R. and issued "For Construction" are to be submitted to the D.R. for tendering no later than **January 27<sup>th</sup>, 2017**.
- d) Initial on-site investigative and testing works, if required, may be performed earlier, but only if approved well in advance by authorities having jurisdiction, and upon receipt of written acceptance to perform such work from D.R.
3. Concept, Design, Tender and Construction phases to be carried out as required to deliver projects on time.
4. Work on the bridges is to be planned in co-ordination with the waterway navigation season and minimum navigation requirements, such that no interruption in navigation occurs.
5. Work is to be designed and planned so that the minimal duration of road and bridge closures are required.
6. Fixed Schedule:

#### **SITE A - Brighton Road Swing Bridge and Canal Walls:**

<u>Milestone</u>	<u>Date</u>
Final construction documents "Issued for Construction":	July 22, 2016
Earliest start of work affecting navigation in channel:	October 11, 2016
Completion of construction and commissioning:	May 5, 2017

#### **SITE B – Hamlet Swing and Fixed Bridges**

<u>Milestone</u>	<u>Date</u>
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Final construction documents "Issued for Construction":	January 27, 2017
Earliest start of work affecting navigation in channel:	April 17, 2017
Completion of construction and commissioning:	November 17, 2017

7. The Consultant is to prepare a detailed network diagram in accordance with the above milestone listing for review as part of the deliverables identified in the Required Services (RS) section.

## PD 3 PROJECT BACKGROUND

### 3.1 Project Constraints

1. General Constraints (applicable to both sites)
  - a) *Navigation Season* – Parks Canada's navigation season typically starts Victoria Day weekend and ends Thanksgiving weekend. Work on the Bridges must not disrupt navigation in the main channel of the Trent Severn Waterway. Estimated Navigation Season for 2016 is May 20<sup>th</sup> to October 10<sup>th</sup>. Estimated Navigation Season for 2017 is May 19 to October 9<sup>th</sup>.
  - b) *Maintenance Period* – Parks Canada's maintenance period before and after navigation season is typically a few weeks on the Trent Severn Waterway. It is preferable that work not disrupt maintenance activities during this period. Parks Canada to confirm actual maintenance period at these two sites.
  - c) *Limited Construction Period* – refer to Required Services Sections of this Project Brief.
  - d) *Construction Schedule* - On-time project delivery is a high priority to the success of this project. An extension of the construction period longer than specified is expected to have significant negative socio-economic and political impact to the residents and surrounding communities. Effective scheduling is highly important and must be given priority consideration. Refer to Required Services Sections of this Project Brief.
  - e) *Environmental Assessment* - An Environmental Assessment (EA) screening reports may, or may not, be required for either Site as per Canadian Environmental Assessment Agency (CEAA). PCA or PWGSC may require an equivalent environmental assessment report. If this applies, then PWGSC Environmental Services will produce a report with input/assistance from the Consultant, Departmental Representative, and PCA representatives. All EA constraints shall be incorporated in the design and applied to the construction stage.

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- f) Refer to RS Sections for other general constraints, including constraints for structural steel and concrete construction.
2. SITE A - Brighton Road Swing Bridge and Canal Walls
- a) *Road Traffic and Road Closure* - The closure of this high volume municipal/county road poses significant negative impact to local residents and passing commuters, and is to be avoided. All interruptions to traffic require the completion of a traffic control plan, per Book 7 of Ontario Traffic Manual, acceptable to the local municipalities. Any road closure and detour must be coordinated with the municipalities of Quinte West and Brighton, and pre-approved by the Departmental Representative. Parks Canada has committed to provide temporary means of crossing the canal at the site during the construction period. Refer to Required Services Sections of this Project Brief for temporary vehicle traffic crossing options.
- b) *Temporary Pedestrian Crossing* - Parks Canada has committed to provide a temporary pedestrian crossing over the canal during the period of construction. The quantity of pedestrian traffic crossing the bridge is low so only the same level of service is to be included in the temporary pedestrian traffic crossing options. Refer to Required Services Sections of this Project Brief.
- c) *Adjacent Property Lots* - There may be limited and/or restricted access to adjacent lands not owned by Parks Canada in the immediate vicinity to the work site. The Consultant may be required to investigate, coordinate, or aid in the negotiations to enter into an agreement for temporary use or lease of these lands.
- d) *Parks Canada Land* - Parks Canada owns the land in which the swing bridge is located in addition to areas alongside of the Murray Canal. However, construction space may be limited for material staging, bridge structure removal and assembly.
- e) *Transport Canada Permit* - The project will require a permit under the Navigational Waters Protection Act from Transport Canada (TC). The process will be initiated by the PWGSC Departmental Representative and will require the Consultant to complete the application process by contacting TC, providing project information, submitting required design documents and plans, and coordinating any other activities necessary to obtain the approval(s).
- f) *Geotechnical Work* - A geotechnical report is included in the 2010 Recapitalization Report, but it may contain limited information for the design of a new bridge, center pier, and abutments. Additional geotechnical work may be required for these areas, as well as for Canal shore wall repairs.
3. SITE B - Hamlet Swing and Fixed Bridges:

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- a) *Road Traffic Detour* - The closure of this county road poses significant negative impact to local residents and passing commuters, creating a 20km detour. All interruptions to traffic require the completion of a traffic control plan, per Book 7 of Ontario Traffic Manual, acceptable to the local municipalities and counties. The road closure and detour during construction period must be coordinated with the appropriate counties, municipalities and Authorities Having Jurisdiction, and pre-approved by the Departmental Representative. **No temporary means of crossing the Upper Severn River will be provided** during the construction period. Refer to Required Services Sections of this Project Brief.
  - b) *Road Closure* - The duration of the scheduled road closure to vehicular traffic across the Hamlet bridges must be kept to a minimum during the entire construction period.
  - c) *Temporary Pedestrian Crossing* - Parks Canada has agreed that a temporary pedestrian crossing is not required.
  - d) *Adjacent Property Lots* - There may be limited and/or restricted access to adjacent lands not owned by Parks Canada in the immediate vicinity to the work site. The Consultant may be required to investigate, coordinate, or aid in the negotiations to enter into an agreement for temporary use or lease of these lands.
  - e) *Parks Canada Land* - Parks Canada owns the land in which the Hamlet bridges are located in addition to areas alongside of the Trent Canal. However, construction space may be limited for material staging, bridge structure removal and assembly.
  - f) *Transport Canada Permit* - The project will require a permit under the Navigational Waters Protection Act from Transport Canada (TC). The process will be initiated by the PWGSC Departmental Representative and will require the Consultant to complete the application process by contacting TC, providing project information, submitting required design documents and plans, and coordinating any other activities necessary to obtain the approval(s).
  - g) *Geotechnical Work* - A geotechnical report is included in the 2011 Detailed Condition Inspection Report, but it may contain limited information for the design of a new bridge, pivot pier, center pier, and abutments. Additional geotechnical work may be required for these areas.

## PD 4 EXISTING DOCUMENTATION

### 4.1 Existing Documentation - Available to all Proponents

1. Currently Available Documentation – Brighton Road Bridge:
  - a) August 2010 Recapitalization Study Report, with Site Plan drawing (AutoCad)
  - b) October 2013 Traffic Safety Study Report

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- c) 2015 Survey drawing (AutoCad)
  - d) June 2015 Inspection letter
  - e) Swing Statistics from 2003 to 2015
  - f) Photographs of bridge and approaches
  - g) Existing Drawings library (tif)
2. Currently Available Documentation – Hamlet Swing + Fixed Bridges:
- a) 2011 Comprehensive Detailed Inspection Report
  - b) 2013 Vehicle Impact Review letters (qty 2)
  - c) Photographs of some deteriorations
  - d) Swing Statistics from 1994 to 2008
  - e) Maximum water levels in Sparrow Lake for the past 97 years
  - f) Heritage Value Report
  - h) Existing Drawings library (tif)

## PD 5 PROJECT OBJECTIVES

The overarching goal is to build a safe, efficient bridges as fast as possible, within Parks Canada navigational constraints and with minimized road closure periods.

### 5.1 Quality

1. Design Principles - General
- a) The Department expects the Consultant to maintain a high standard of bridge design, based upon recognized contemporary design principles. Proven and beneficial innovative solutions are acceptable. All design elements, planning, engineering and commissioning are to be fully coordinated, and consistent in adherence to good design principles and good engineering practice.
  - b) The project is to be implemented in an environmentally responsible manner.
  - c) Materials, solutions and construction methods shall be commensurate with the type of bridge and the approximate budget. Avoid unproven experimental materials. Take into account the total life-cycle costs and activities for maintenance and operation of the bridge. Life-cycle and materials constraints and goals are described in the Required Services Sections of this Project Brief.
  - d) The structure shall be of high quality and high performance by ensuring innovative concept development, design and construction while respecting project limitations.
  - e) Achieve:
    - i) Required strength, durability, overall stability, safety and serviceability with appropriate safeguards against excessive cracking, fatigue, unacceptable deformation, premature

- corrosion, deterioration of material, undesirable vibration and deflection to extend the overall service life of the bridge.
- ii) A structure that is aesthetically pleasing and harmonious with its environment.
- iii) Minimized long-term maintenance costs through provision of suitable corrosion prevention and durability features. Refer also to the Required Services Sections of this Project Brief.
- iv) Design requirements consistent with the latest Canadian Highway Bridge Design Code (CHBDC), standards and practices, and shall incorporate the current state-of-the-art knowledge in the industry.
- v) Ease of implementation, taking into consideration site and project time constraints.

## 2. Design Codes, Standards and Regulations

- a) The standards, codes and specifications to be used for the design and construction of the bridge shall be the latest edition of the following (including all amendments, supplements and revisions thereto):
  - i) CAN/CSA-S6 Canadian Highway Bridge Design Code, and Commentary
  - ii) AASHTO LRFD Bridge Design Specifications and Interim Revisions
  - iii) AASHTO LRDF Movable Highway Bridge Design Specifications and Interim Revisions
  - iv) AASHTO Movable Bridge Inspection, Evaluation and Maintenance Manual
  - v) AASHTO Manual for Bridge Evaluation with Interim Revisions
  - vi) NCHRP Inspection and Management of Bridges with Fracture-Critical Details
  - vii) FHWA Inspection of Fracture-Critical Bridge Members
  - viii) FHWA Load Rating Guidance and Examples for Bolted and Riveted Gusset Plates in Truss Bridges
  - ix) WSDOT Report: Triage Evaluation of Gusset Plates in Steel Truss Bridges
  - x) American Iron and Steel Institute (AISI) Handbook of Steel Drainage & Highway Construction Products
  - xi) Applicable electrical and mechanical Codes and Regulations
  - xii) Ontario Traffic Control Manual
  - xiii) Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads
  - xiv) National Building Code of Canada
  - xv) Transport Canada - Navigable Waters Protection Act
  - xvi) Department of Fisheries and Oceans - Fisheries Act

- xvii) Canada and Provincial Occupational Health and Safety Regulations
- xviii) Fire Commissioner of Canada Standards
- xix) Canada Labour Code, Part II
- xx) Provincial and Municipal Traffic Acts and Regulations
- xxi) Federal and Provincial Environmental Regulations
- b) The CAN/CSA-S6 Canadian Highway Bridge Design Code is the primary code that will be used for design with appropriate live load levels. Design to a live load of CL-625-ONT. Design, analyze and evaluate to the latest update of the CHBDC 2014, and the Commentary to CHBDC 2014. Also, refer to Required Services Sections of this Project Brief.
- c) The Consultant has the option of consulting other design codes and is expected to utilize new and innovative developments in structural engineering whenever they appear appropriate in accordance with good engineering practice, but must provide documented evidence of suitability satisfactory to the PWGSC Project Manager.

## 5.2 Sustainable Development

1. Canada has begun a series of initiatives to ensure that sustainable development principles are built into the policy of all federal organizations. Public Works and Government Services Canada (PWGSC) like all federal departments are required to have a Sustainable Development Strategy (SDS). Real Property Services Branch of PWGSC has developed their Strategy Plan, which sets out principles, goals and actions for integrating sustainable development principles into its policies and operations.
2. Sustainable Development is defined in broad terms as a strategy that routinely and consistently includes the consideration of the environmental, economic and societal impact of every decision made for the project. The general areas of focus and in accordance with ASHRAE 90.1 and C2000 standards include:
  - a) Energy efficiency and conservation,
  - b) Greenhouse gas emissions reduction,
  - c) Water management and conservation,
  - d) Pollution prevention,
  - e) Product selection and resource conservation,
  - f) Site conservation (protection and preservation of valued natural site features),
  - g) Environmentally friendly maintenance procedures and products.

## 5.3 Waste Management

1. A waste management program must be implemented for all construction phases.

2. Ensure conformance with pertinent recommendations of Environmental Assessment Report(s), if applicable.
3. The Construction, Renovation, and Demolition (CRD) Non-hazardous Solid Waste Management Protocol to which Real Property Services (RPS) is bound, provides directions on the undertaking of non-hazardous solid waste management actions for CRD projects. The protocol is designed to meet the requirements of federal and provincial policies and the objectives of the RPS Sustainable Development Strategy (SDS) as these relate to non-hazardous solid waste generated in CRD projects.

#### **5.4 Code Compliance/Conformance**

1. Codes, regulations, by laws and decisions of "authorities having jurisdiction" shall be observed. In cases of overlap, the most stringent will apply. The Consultant shall identify other jurisdictions appropriate to the project.

#### **5.5 Risk Management**

1. A risk management strategy is crucial for PWGSC Project Management and integrates project planning into procurement planning. All the stakeholders of a project will be an integral part of the risk management strategy, culminating in an integrated product team. Specific services required for all stages of project delivery are outlined in Required Services (RS) Sections.

#### **5.6 Health and Safety**

1. PWGSC, recognizes the responsibility to ensure the health and safety of all persons on Crown construction projects and the entitlement of the public, federal employees and private sector workers to the full protection afforded them by occupational health and safety regulations.
2. In keeping with the responsibility and in order to enhance health and safety protection for all individuals on federal construction sites, PWGSC will voluntarily comply with the applicable provincial/territorial construction health and safety acts and regulations, in addition to the related Canada Occupational Safety and Health Regulations.

### **PD 6 SCOPE OF WORK**

#### **6.1 Project Scope SITE A Brighton Road Swing Bridge**

1. Replacement of the swing bridge superstructure, including widening and new sidewalk.
2. Replacement of entire span drive, hydraulics, bearing and end lift systems.

3. Replacement of entire bridge and approach electrical system, signalization and controls system, with possible inclusion of the control house.
4. Repair and/or replace the swing bridge concrete abutments, piers, and canal walls, as required.
5. Replacement of existing approach traffic barriers, and gates (if required).
6. Review and possible replacement of existing transportation and safety signage and signalization related to swing bridge.
7. Design of temporary roadway and pedestrian walkway over canal for public use during bridge closure period.

## **6.2 Project Scope SITE B Hamlet Swing Bridge**

1. Repair/Upgrade or replacement of the swing bridge superstructure.
2. Replacement of the fixed bridge superstructure.
3. Rehabilitate and/or replace the swing and fixed bridge concrete abutments, wing walls and piers, as required.
4. Rehabilitation or replacement of entire span drive, hydraulics, bearing and end lift systems, as required.
5. Rehabilitation or replacement of entire bridge and approach electrical system, signalization and controls system, with possible inclusion of the control house.
6. Replacement of existing approach traffic barriers and gates. If required, implementation of new truck size and height limiting barriers on approaches.
7. Review and possible replacement of existing transportation and safety signage and signalization related to the bridge system. New signalization may be required, where missing.

## **6.3 Structural / Bridge Engineering Work**

1. Review site conditions.
2. Review existing drawings and reports, with respect to all code requirements affecting this project. Implement as required, with the exception of accepted non-conformances.
3. Coordinate work with local municipalities, counties and agencies having jurisdiction including Transport Canada, Navigable Water Protection Act (NWP) application, etc.
4. Assign appropriate quality and quantity of resources and personnel to ensure on-time completion of all project stages, achieving high-quality end results at all times.
5. Manage resources and services.

6. Provide specialized cost estimating and planning.
7. Provide risk management and quality management.
8. Review the structural design and member/material conditions of the superstructures, deck and floor system, and substructures for the purpose of understanding the current bridge operation and identifying any issues that may impact bridge rehabilitation/upgrade and replacement designs.
9. Conceptualize bridge design options to replace and/or rehabilitate/upgrade the existing bridges, as required. Analyze the options in terms of time for construction, durability, ease of construction, ease of maintenance, cost, aesthetics and environmental impacts.
10. Provide environmental impact assessment during design and required monitoring during construction.
11. Obtain geotechnical services and data required to determine all geotechnical design parameters.
12. Provide conceptual design report.
13. Conduct preliminary and final design, and construction administrative services for the replacement and/or rehabilitation/upgrade of bridges, equipment and services on both sites.
14. Prepare construction contract documents and assist in the tendering of the construction contracts.
15. Complete all work, meeting or exceeding most stringent federal and provincial design codes and standards.
16. Provide site resident services during construction.
17. Develop and implement inspection, quality control and commissioning programs.
18. Submit all project documentation, including As-Built Record Documentation and Operations Manual.
19. Provide support during one-year post-construction period.

#### **6.4 Civil Engineering Work - Transportation**

1. Assemble and report vehicular traffic data for Site B (Hamlet) as necessary to design the approaches, signalization and superstructure design/evaluation.
2. Traffic control plan for Site B (Hamlet) and also for Site A (Brighton Rd), in accordance with Transportation Association of Canada (TAC) and Ministry of Transportation (MTO) to ensure the safe detour of vehicles away from the construction area and its incorporation in the plans and specifications.

3. Evaluate and recommend any work required on the approaches to the bridges. If needed, coordinate with municipal/county engineers to address design requirements, and meet applicable codes and standards, unless otherwise accepted by the PWGSC Project Manager and User Department.
4. Design of transition area between approach traffic gates, barriers and bridge traffic barriers.
5. Provide full construction engineering services including quality assurance during construction.
6. Upgrade approach signage, signalization and structures to meet traffic requirements.

#### **6.5 Materials and Testing Engineering Work**

1. Provide full quality assurance testing and analysis services.
2. Provide non-resident construction support.
3. Provide resident engineering construction services.
4. Provide support during post-construction period.

#### **6.6 Mechanical Engineering**

1. Develop, evaluate, recommend, and design modern swing bridge mechanisms and hydraulic systems, or rehabilitation/upgrades to existing systems.
2. All mechanical systems to be in accordance with the CHBDC.
3. Develop an inspection and commissioning program.

#### **6.7 Electrical/Controls Engineering**

1. Develop, evaluate and recommend and new design and/or upgrades to the existing electrical systems, including bridge electrical system and controls, traffic control system, traffic gate system, bridge power distribution, etc.
2. All electrical systems to be in accordance with the CHBDC and the Canadian Electrical Code.
3. Develop an inspection and commissioning program.

#### **6.8 Environmental**

1. The Consultant will be required to participate/assist with the preparation of the Environmental Assessment Screening.
2. Consultant is to include the mitigation measures identified in the Environmental Assessment Screening Report (EA), if required, in the

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design, and tender package documents. Consultant may add other environmental issues and concerns based on their expertise.

## **6.9 Geotechnical**

1. Review site conditions.
2. Review existing drawings and reports, with respect to geotechnical background information.
3. Visit the site to become familiar with all conditions that may impact the geotechnical evaluation for new design or strengthening of substructures/foundations.
4. Review, analyze and report the geotechnical characteristics that may affect the design and operation of a replacement bridge structure.
5. Conduct additional geotechnical investigations, as required, during the development of the conceptual and final designs.

## **6.10 Work Not Included**

1. Not included in the Consultant Services are:
  - a) The preparation of the EA Screening Report for bridge replacements/rehabilitation on Sites A and B.
  - b) Coordination with other federal, provincial, or local authorities not listed as having jurisdiction in this project, unless otherwise indicated elsewhere in the Project Brief.

## **PD 7 CONSULTANT SERVICES**

1. The Prime Consultant shall be responsible for mobilization, co-ordination and direction of all Consultant Team members and their activities.
2. The Consultant Team shall be comprised of appropriately qualified professional and technical personnel with relevant expertise and extensive experience, and shall be capable of providing the services identified in the Required Services (RS) section of this Project Brief in a timely manner.
3. The following Required Services (RS) are the overall Consultant Services required to deliver this project:
  - RS 1 Analysis of Project Scope of Work
  - RS 2 Management of Consultant's In-House and External Resources (Sub-Consultant/Specialist) and Services
  - RS 3 Investigations, Studies and Reports
  - RS 4 Estimating and Cost Planning
  - RS 5 Risk Management and Quality Management
  - RS 6 Design Concept
  - RS 7 Design Development

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- RS 8 Construction Documents, Pre-Tender Construction Cost Estimate, Risk Management Plan and Project Schedule
  - RS 9 Tender Call, Bid Evaluation & Construction Contract Award
  - RS 10 Construction and Contract Administration
  - RS 11 Resident Site Services During Construction
  - RS 12 Post Construction Services

4. The numbered lists of Required Services (RS) are the identical for both SITE A – Brighton Road Swing Bridge and SITE B – Hamlet Swing and Fixed Bridge. The required services for each site are distinguished with a letter A or B after the RS number such as; RS 1A and RS 1B.
5. The Consultant Team for this project must be capable of providing the following services:
  - a) Administrative
  - b) Project Management
  - c) Regulatory Analysis, Planning, Design, and Development
  - d) Site Analysis, Planning, Design, and Development
  - e) Civil/Structural Engineering - swing and fixed Bridges
  - f) Mechanical Engineering – swing bridges
  - g) Electrical/Controls Engineering – swing bridges
  - h) Transportation/Traffic Engineering
  - i) Geotechnical
  - j) Hydraulics
  - k) Materials Testing
  - l) Environmental
  - m) Waste Management
  - n) Surveying
  - o) Underwater Inspections/Surveys
  - p) Cost Planning, Life Cycle Costing, Estimating and Control
  - q) Risk Management
  - r) Quality Management
  - s) Sustainable Design

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## **PROJECT ADMINISTRATION (PA)**

### **PROJECT ADMINISTRATION**

#### **PA 1 PROJECT ADMINISTRATION**

The following administrative requirements apply during all phases of the project delivery.

##### **1.1 PWGSC Project Management**

1. The PWGSC Project Manager assigned to the project is the Departmental Representative.
2. The Departmental Representative is directly concerned with the project and responsible for its progress on behalf of PWGSC. The Departmental Representative is the liaison amongst and between the Consultant, PWGSC and the Client Department.
3. PWGSC administers the project and exercises continuing control over the project during all phases of development. Unless directed otherwise by the Departmental Representative, the Consultant obtains all Federal and Provincial permits, requirements and approvals necessary for the work.

##### **1.2 Lines of Communication**

1. **Unless otherwise arranged by the PWGSC Project Manager, the Consultant shall communicate with the PWGSC Project Manager only.**
2. Formal contact between the Consultant and the User Department Representatives, shall be through the PWGSC Project Manager.
3. Direct communication between members of the Consultant Team and between the Consultant and the Contractor on routine matters is required to enable the discussion, coordination and resolution of technical issues. However, no communication shall alter the terms of the project scope, budget or schedules unless directed in writing by the Contracting Authority.
4. During construction tender call PWGSC conducts all correspondence with bidders and makes the contract award.
5. Consultant shall not advise the client/users in any matter without obtaining guidance and written pre-approval from PWGSC.
6. Consultant shall not respond to requests for project related information or questions from the municipalities/counties or the public. Such inquiries are to be directed to the PWGSC Project Manager.

##### **1.3 Media**

1. The Consultant shall not respond to requests for project related information or questions from the media. Such inquiries are to be directed to the PWGSC Project Manager.

#### **1.4 General Project Deliverables**

1. All project deliverables are to be submitted separately for each site (Site A – Brighton Rd, and Site B – Hamlet) since they are to be invoiced to two separate PWGSC project numbers (one for Site A, the other for Site B).
2. Unless otherwise specified in the Required Services (RS) Sections, and where deliverables and submissions include summaries, reports, network diagrams, drawings, plans, specifications, engineering design briefs, structural analysis models, structural evaluations, 3D BrIM models, etc. submit deliverables as follows:
  - a) Hard copies: one (1)
  - b) Electronic format:
    - i) one (1) copy editable original format. The electronic deliverables are to be created using Microsoft, AutoCAD (Drawings, Sketches, etc.), and Tekla (3D BrIM models) applications. Bridge structural analysis models (including all loads, load cases, material, member, etc. data) and results are to be submitted in both the original analysis software format, and in the S-Frame v.11 format.
    - ii) one (1) copy editable PDF format. The electronic deliverables to be provided in editable Adobe Acrobat PDF format, which is to include Bookmarks of chapters and sections of the documents for ease of navigation.
    - iii) Editable versions of images. Each image (photo, graphic, video, sketch or drawing) used in reports is to be provided in original editable format.
  - c) Drawings to be generated and distributed in AutoCAD format and using the layering and file transfer protocols as prescribed in the 'Doing Business with A&E, PWGSC Ontario Region', and the "Heritage Canals and Engineering Works CADD standards supplement", both found in the appendices to this RFP.
  - d) Specification to be prepared using the National Master Specification format, as referred to in Appendix "Doing Business with A&E PWGSC Ontario Region".

#### **1.5 Acceptance of Project Deliverables**

1. While PWGSC acknowledges the Consultant's obligations to meet project requirements, the project delivery process entitles PWGSC to review work. PWGSC reserves the right to reject undesirable or unsatisfactory work. The Consultant must obtain Departmental Representative

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- acceptances during each of the project stages, and whenever new direction, concept, solution, etc. is contemplated by the Consultant Team.
2. Acceptances indicate that based on a general review of material for specific issues, the material is considered to comply with governmental and departmental objectives and practices, and that overall project objectives are being satisfied.
  3. The acceptance does not relieve the Consultant of professional and legal responsibilities for the work and compliance with the contract.
  4. PWGSC acceptances do not prohibit rejection of work which is determined to be unsatisfactory at later stages of review. If progressive design development, or time / cost / risk updates, or technical investigation reveal that earlier acceptances must be withdrawn, the Consultant is responsible for re-designing work and re-submitting for acceptance.
  5. Acceptances by the Client / Users and other agencies and levels of government must be obtained by PWGSC Project Manager to supplement PWGSC acceptances. The Consultant shall assist the Departmental Representative in securing all such acceptances and adjust/revise all documents/designs as required by such authorities when securing acceptance.

## **1.6 Coordination with Sub-Consultants / Specialists**

The Consultant shall:

1. Throughout all phases of the project, assume responsibility for coordinating the work of all in-house personnel and Sub-consultants/ Specialists retained by the Consultant and by the PWGSC Project Manager.
2. Ensure clear, accurate and ongoing communication of concept design, non-conformances, budget, risks and scheduling issues, including changes, as they relate to the responsibilities of all Sub-consultants and Specialists from initial concept design reviews to closure reports.
3. Coordinate input for the Departmental Representative's Risk Management Plan.
4. Coordinate the Quality Assurance / Quality Control process ensuring submissions of Sub-consultants and Specialists are complete and signed-off by the designated independent reviewer. See Required Services (RS) Sections for constraints regarding independent reviewers.
5. Ensure Sub-consultants and Specialists provide adequate site investigation and/or site inspection services and attend all required meetings.

## **1.7 Co-ordination with Contractor**

The Consultant shall:

1. Not enter into the area of responsibility of the Contractor's superintendent.
2. Not make any changes that will affect scope/budget/schedule without prior written approval from the Departmental Representative.

### **1.8 Project Response/Delivery Time**

1. It is a requirement of this project that the key personnel of the Consultant and all sub-consultants or specialist firms are personally available to attend meetings within two (2) business days of the request.
2. Key personnel of the Consultant and all sub-consultants or specialist firms are to respond to inquiries within one (1) business day.
3. All submissions to the Consultant Team are to be reviewed and commented by the Consultant and the independent reviewer, and returned signed "Accepted" and dated, all within three (3) business days of their receipt. One (1) electronic copy of all returned submissions and of the corresponding Quality Control sign-offs is to be provided to PWGSC at the same time.
4. Project schedule limitations and specific delivery dates for both Site A and Site B are specified in the RS 2A and RS 2B sections. These constraints shall be achieved, unless otherwise accepted by the PWGSC Project Manager in writing.

### **1.9 Meetings**

1. Unless otherwise specified in the Required Services (RS) sections, the Departmental Representative shall arrange meetings generally every two weeks throughout the entire project development and implementation period, for all members of the Project Team, including representatives from:
  - a) Public Works and Government Services Canada;
  - b) Consultant Team;
  - c) Contractor and Sub-contractors, during the construction stage.
2. During design development, tender preparation, and tendering phases:
  - a) Attend the meetings,
  - b) Record the issues and decisions, and
  - c) Prepare and distribute minutes within two (2) working days of the meeting.
  - d) Meetings will be held at PWGSC offices, 2720 Riverside Drive, Ottawa, Ontario, or at the Consultant's office if so requested by the Departmental Representative.
3. During construction and implementation:

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- a) Advise the Contractor to hold, and attend the meetings;
  - b) Cooperate and coordinate with the Contractor, record the issues and decisions, and prepare and distribute minutes within two (2) working days of the meeting;
  - c) Kick off meeting will be held at PWGSC offices, 2720 Riverside Drive, Ottawa, Ontario, or at the Consultant's office if so requested by the Departmental Representative. Progress meetings will be at the respective Site A and Site B site offices.

## 1.10 Health and Safety

### 1. General Requirements:

- a) Develop written Site-Specific Health and Safety Plan (SSHSP) based on hazard assessment prior to beginning any field work and continue to implement, maintain, and enforce plan through all phases of the project.
- b) The SSHSP needs to cover all activity of the Consultant Team (consultant personnel, sub-consultant, specialists and contractors).
- c) Any underwater inspection will require a separate Site Specific Health and Safety Plan for the diving work, which together with a copy of the Ministry of Labour Dive Notice and copies of divers' Certifications shall be submitted to the Departmental Representative. Use of underwater ROV equipment is preferred, if equivalent or better results can be achieved.
- d) The Consultant shall incorporate in his SSHSP and abide by any additional constraint or safety requirement imposed by PWGSC and/or Parks Canada for accessing and using Parks Canada property or part thereof.
- e) Coordinate field work with Parks Canada activity on or adjacent to the project site. Initial requests are to be channeled through the Departmental Representative.
- f) Provide all required Personal Protective Equipment, equipment and material as required to meet the intent of the safety requirement set in the SSHSP, or as required by the Federal and Provincial Occupational Health and Safety Legislation.
- g) The Consultant shall be responsible for all of their Team and for government employees on site, and for protection of general public adjacent to site, to the extent that they may be affected by conduct of the field work.
- h) Assign responsibility and obligation to Competent Person or Supervisor to oversee the field work. At Competent Person's discretion, the field work may be stopped, if necessary or advisable for reasons of health or safety. The Departmental Representative may also stop work for health and safety considerations.

- i) During the Construction Phase of the project, incorporate into the SSHSP and abide with any additional constraints or safety requirements imposed by the Contractor.
- j) Prior to starting field work, organize and attend a Safety Briefing meeting with Parks Canada and PWGSC.
- k) Reference Codes and Standards:
  - i) Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended;
  - ii) Canada Labour Code;
  - iii) Ontario Diving Regulations No. 629/74 and CSA Diving Operations and CSA Standard Z275.04-12. Competency standard for diving, hyperbaric chamber, and remotely operated vehicle operations.
  - iv) NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites;
  - v) Workplace Safety and Insurance Act, 1997,
  - vi) Book 7 of the Ontario Traffic Manual,
  - vii) Municipal statutes and authorities.

## 2. Submittals

- a) Submit Site-Specific Health and Safety Plan (SSHSP): Within seven (7) days after date of Notice to Proceed and prior to commencement of field work. Plan must include:
  - i) Results of site specific safety hazard assessment,
  - ii) Mitigation and precaution measures that will be implemented as a result of safety and health risk of hazard analysis for site tasks and operations,
  - iii) Consultant's Team Safety Communications Plan,
  - iv) Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Where applicable, coordinate plan with existing Parks Canada Emergency Response requirements and procedures provided by Departmental Representative.
- b) In addition to the SSHSP the following documents shall also be submitted:
  - i) A copy of the Consultant Team WSIB Clearance Certificates.
  - ii) Occupational training and certification records: The Consultant must provide documentation verifying all members of the consultant team have received the appropriate safety training including equipment operation training as required to perform the specific field work,
- c) Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request a resubmission

- with correction of deficiencies, concerns, or requested improvements implemented.
- d) Departmental Representative's review of Consultant's final SSHSP should not be construed as approval and does not reduce the Consultant's overall responsibility for Health and Safety at the project site.

## **PA 2 THE PROJECT TEAM**

### **2.1 General Organization**

1. It is the intent of PWGSC that this project be organized, managed and implemented in a collaborative manner. The Project Management Team and the Consultant Team are to work cooperatively at every stage of the design and construction process in order to assure the creation of appropriate, successful and meaningful work within time constraints specified throughout this Project Brief. Under the leadership of the PWGSC Project Manager, all Project Team members are responsible for establishing and maintaining a professional and cordial relationship.

### **2.2 Project Team Organization**

1. The Project Team refers to the representatives, both federal and private, involved in delivering and coordinating the project.

### **2.3 Roles for the PWGSC Project Management Team and the User Department**

1. PWGSC Project Manager:
  - a) is accountable for the expenditure of public funds and delivery of the project in accordance with terms accepted by the Treasury Board;
  - b) is responsible for the day-to-day management of the project;
  - c) is the Departmental Representative for all project contract services and, as such, will be the Consultant's single point of contact for all project information and direction.
2. The User Department Representative:
  - a) The User Department Representative will play several critical roles for the successful implementation of the project, as follows:
    - i) Ensure and coordinate the quality, timing and completeness of information and decisions to form the Functional Program, and provide this information and decisions to the PWGSC Project Manager;
    - ii) Ongoing responsibility to ensure Functional Program requirements are met, and are communicated in a timely manner to the PWGSC Project Manager.

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## **PA 3 AUTHORITIES, SUBMISSIONS, REVIEW AND APPROVAL PROCESS**

### **3.1 Federal Government Authority/Jurisdiction**

1. The following are authorities having Federal Government jurisdiction over the project:
  - a) Public Works and Government Services Canada: Contracting authority and project delivery.
  - b) Parks Canada Agency: Functional design requirements, approvals and standards.
  - c) Transport Canada: Navigable Waters Protection Act.
  - d) Department of Fisheries and Oceans: Fisheries Act.
  - e) Environment Canada: Canadian Environmental Assessment Act and Canadian Environmental Protection Act.

### **3.2 Submissions, Reviews, and Approvals**

1. The Departmental Representative will review work in progress on a continuing basis. Submissions, reviews and formal presentations are required for design and project acceptance in accordance with those outlined elsewhere in this Project Brief. Below is a list of Federal Authorities that will require presentations and submissions for approval:
  - a) PWGSC;
  - b) Parks Canada Agency, if and as requested by the PWGSC Project Manager.
2. The frequencies of meetings indicated elsewhere in this Project Brief are estimates. They will be affected by the project stage, issues and requirements for decisions and approvals. The Consultant will be required to attend all additional meetings as needed, and to make presentations to satisfy Authorities as identified.
3. Reviews by PWGSC Departmental Representative(s) and others:
  - a) Purpose of review and acceptance:
    - i) Program, investigations, concept, analysis, design, and quality assurance;
  - b) Submission format:
    - i) Reports, drawings and specifications, models, oral presentation;
  - c) Submission schedule:
    - i) Submissions are reviewed when complete submission has been forwarded to the Departmental Representative;
  - d) Expected turnaround time:
    - i) 3 to 5 working days;
  - e) Number of submissions:
    - i) As stipulated in this Project Brief, plus any follow-up reviews.

4. Other Authorities Having Jurisdiction
  - a) Although the Federal Government does not formally recognize jurisdiction at other levels of government, voluntary compliance with the requirement of these other Authorities is a requirement unless otherwise directed by the Departmental Representative.
  - b) Codes, regulations, by-laws and decisions of authorities having jurisdiction shall be observed.
  - c) In cases of overlap, the most stringent will apply. The Consultant shall identify and report to the PWGSC Project Manager other jurisdictions appropriate to the project.
  - d) Unless otherwise directed by the Departmental Representative, PWGSC will voluntarily comply with the applicable Provincial Construction Acts and regulations, in addition to the related Canada Occupational Safety and Health Regulations. Consultant shall identify and report to the PWGSC Project Manager all unavoidable non-conformances.

#### PA 4 INVOICING AND PAYMENTS

1. Further to R1230D GC 5.3 Payment to the Consultant, the payment schedule during the pre-construction stage (RS 1 to 9) of the project will be on the basis of deliverables, as described in this Section. Progressive monthly payments between deliverables will be permitted.
2. Payment for work completed in other Required Services (RS 10 to 12) will be on time-basis, as described in this Section, issued upon receipt of monthly invoicing.
3. Deliverables are defined as those listed and implied in the Required Services (RS) sections.
4. For processing of invoices, include the following information on each invoice for payment:
  - a) PWGSC project number;
  - b) Invoicing period with dates;
  - c) Work done to justify invoice (short narrative) for services provided;
  - d) Summary of costs, separately for each Required Service performed, as follows:

Amount this invoice	(1)	Fees + HST = Total
Total previous invoices	(2)	Fees + HST = Total
Total invoiced to date	(1+2) =(3)	Fees + HST = Total
Agreed fees	(4)	Fees + HST = Total
Amount to complete	(4-3) =(5)	Fees + HST = Total

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% Services completed this stage (6)

80% of Agreed fees (0.8x4)=(7) Fees + HST = Total

90% of Agreed fees (0.9x4)=(8) Fees + HST = Total

- e) Authorized signature(s) of the Consultant, Quality Control sign-off, and the date.
5. The value of As-built Record Documentation is established as 10% of the total value of the consulting fees calculated on a Fixed Fee basis.
6. Consultant shall additionally take into account the following invoicing requirements:
- a) Monthly billing is to be used up to 80% of total contract value for each individual Required Service (RS) separately;
  - b) 10% of total contract value for each RS shall be invoiced separately, and only following a written acceptance of all Deliverables for that RS by the PWGSC Project Manager;
  - c) The remaining 10% of total contract value for each RS shall be invoiced separately, and only following a written acceptance of As-Built Record Documents by the PWGSC Project Manager.

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## **REQUIRED SERVICES (RS)**

### **REQUIRED SERVICES:**

The overarching goal is to build safe, efficient bridges as fast as possible within Parks Canada navigational constraints and with minimized road closure periods.

Services shall be provided in accordance with the requirements identified and/or implied elsewhere in this Project Brief including but not limited to the requirements identified in 'Doing Business with A&E PWGSC Ontario Region' attached to this Project Brief.

### **SITE A – BRIGHTON ROAD SWING BRIDGE**

#### **RS 1A Analysis of Project Scope of Work:**

- 1.1 Review available existing documentation. PWGSC will provide a DVD disk with documents currently available. Determine what other required information is missing and inform the PWGSC Departmental Representative (D.R.), who will attempt to procure it from external sources. If the missing information is not obtainable, but is necessary to proceed with the project, prepare a list of additional information to be acquired, and submit it promptly to the D.R. for review. All provided documents shall be returned to the D.R. immediately following the completion of the project.
- 1.2 Currently Available Documentation – Brighton Road Bridge:
  - a) August 2010 Recapitalization Study Report, with Site Plan drawing (AutoCad)
  - b) October 2013 Traffic Safety Study Report
  - c) 2015 Survey drawing (AutoCad)
  - d) June 2015 Inspection letter
  - e) Swing Statistics from 2003 to 2015
  - f) Photographs of bridge and approaches
  - g) Existing Drawings library (tif)
- 1.3 Submit a Site Specific Health and Safety Plan and an Environmental Protection Plan for all required Consultants for review by D.R.
- 1.4 Visit the site to perform visual reconnaissance and site review, surveys, and measurements, meet bridge maintenance and operations staff, and obtain local information applicable to design and construction.
- 1.5 Submit Quality Management Plan (including samples of Quality Control Sign-Off Sheets for both design and construction phases), Initial Project Schedule and Initial Risk Assessment Plan for review by D.R. Project Schedule and Risk Management Plan are to be updated and re-submitted to D.R. every two (2) weeks. All Quality Assurance/Quality Control Sign-off Sheets (signed by independent senior engineer reviewers who are not

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part of the Consultant Project Team) pertaining to both in-house and external Consultant/Specialist work are to be submitted to the D.R. on an ongoing basis.

**RS 2A Management of Consultant's In-House and External Resources and Services**

- 2.1 The Consultant shall perform all pertinent project management functions necessary for proper management of all services being provided, including (but not limited to): management of its own in-house personnel, co-ordination of services between disciplines, management of sub-Consultants'/Specialists' services, and similar general management tasks.

**RS 3A Investigations, Studies and Reports:**

- 3.1 Additional investigations, studies and tests needed to complete the scope of work may include, but not be limited to:
- a) Geotechnical and underwater investigations to aid with replacement/extension of pivot pier and possibly rest piers, and rehabilitation/extension/replacement of abutments;
  - b) Underwater survey of damages to all four Canal walls to aid in developing and designing appropriate wall repairs.
- 3.2 Program the scope and schedule, and submit breakdown of all costs associated with the proposed investigations/studies/tests, clearly indicating if on-site works require temporary roadway and/or navigation closure(s). With the assistance of the Consultant, PWGSC will seek approval from authorities having jurisdiction. Upon receiving written acceptance to proceed from the PWGSC D.R., perform only the accepted additional studies, investigations and/or tests.
- 3.3 Assist PWGSC, as required, in completing an Environmental Assessment Study and implement its findings into the design, schedule and risk assessment.
- 3.4 Prepare Reports of all findings and submit to D.R. for review and comments no later than ten (10) business days following completion of field work.
- 3.5 Inspection and investigation work shall be carried in accordance with: the current PWGSC Bridge Inspection Manual (BIM) 2010, the current Canadian Highway Bridge Design code (CHBDC), FHWA Inspection of Fracture-Critical Members, AASHTO Movable Bridge Inspection Evaluation and Maintenance Manual, and other Codes and Standards, as required.
- 3.6 The inspection and investigation of specialized components of bridges (structural, mechanical, electrical, control system, hydraulics, cables, hoist

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systems, etc.), shall be carried out by specialized, experienced and licensed engineers, and shall be coordinated and integrated with the inspections of other structural components of the bridge in a manner that minimizes impact on bridge operations and general public.

#### **RS 4A Estimating and Cost Planning**

- 4.1 The Consultant shall provide cost consulting services by a Cost Estimating Specialist with expertise specific to fixed and movable bridge construction and de-construction in Ontario, from the commencement of project concept design through to construction completion, including the preparation of complete estimates for all construction trades. The estimates are to consider escalation, inflation, markets, contingency costs, etc.
- 4.2 The specialist responsible for estimating and cost planning shall attend all pertinent project meetings throughout the design phases and be prepared to present and substantiate the estimates directly to the Departmental Representative.

#### **RS 5A Risk Management and Quality Management**

- 5.1 The Consultant shall provide support to the D.R. in identifying risks and managing them throughout the project life cycle, from the commencement of project concept design through to construction completion.
- 5.2 A risk management strategy is essential to the project management at PWGSC. Such a strategy combines project planning, design development planning, procurement planning and implementation planning. Implement "Doing Business with A&E Ontario Region" Risk Management strategies and requirements, including "Definitions" and "Checklist".
- 5.3 Risk Management Process:
  - a) Identify risk events based on past experience and using proposed checklist or other available lists;
  - b) Qualify/quantify probability of risk event (Low, Medium, High) and their impact (Low, Medium, High);
  - c) Prioritize risk events;
  - d) Develop risk response, including but not limited to risk avoidance, transfer, mitigation and acceptance;
  - e) Implement risk controls and risk response strategies as required.
- 5.4 The Consultant shall plan, formalize and write a complete and thorough Project Quality Management/Assurance Plan (QA), and implement and manage Project Quality Control (QC), including QC of all services and QC of construction, throughout the project life cycle, from the commencement of project concept design through to construction completion.

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- 5.5 QC of services shall be performed by independent specialists, who shall be senior specialist engineers who are not part of the Consultant Project Team, and who may or may not be employees of the firms forming the Consultant Team.
  - 5.6 Submit all QC Sign-Off Sheets to the D.R. on an on-going basis, as work progresses.
  - 5.7 Once per week, on the same day of the week, confirm to the D.R. in writing that design work progress is on-track and on-schedule.
  - 5.8 Project Quality Assurance and Quality Control are essential to the project management at PWGSC.

## **RS 6A Design Concept**

- 6.1 The Consultant is to explore various design options and analyze them against identified priorities and program objectives. Within this process:
  - a) and in its earliest stages, all initially considered options are to be presented, complete with annotated hand sketches, order of magnitude cost estimates, initial estimates for construction time, possible implementation challenges and a list of unavoidable non-compliances to codes, standards and regulations, to the D.R. during the initial Design Concept meeting;
  - b) following this meeting, up to three options in each of the structural, mechanical and electrical/controls disciplines are to be recommended, selected, developed further, matched for compatibility with other disciplines' concepts, evaluated and compared to each other in sufficient detail and clarity to recommend a single preferred option for Design Development stage.
- 6.2 Organize, initiate, conduct and produce minutes (for D.R.'s review and acceptance) of video-conference meetings using WebEx software, and/or face-to-face meetings, every two weeks throughout the Design Concept stage. At all times, ensure that all pertinent members of the Consultant Team are participating in these meetings, including Sub-consultants' and other Specialists' project personnel. During the meetings, the Consultant Team is to at minimum:
  - a) recap progress achieved to date and work remaining to be completed;
  - b) submit an updated schedule for the entirety of Design Concept work, and compare it to the schedule submitted during the previous meeting;
  - c) present progress achieved since the previous meeting;
  - d) summarize any difficulties/complications encountered, as well as the resolution options submitted to the D.R. during the period in-

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- between current and previous meetings. Advise of any outstanding decisions in this regard;
- e) summarize new and revised concepts, directions of investigation/evaluation, etc submitted to the D.R. during the period in-between current and previous meetings. Advise of any outstanding decisions in this regard;
  - f) recap status of previously submitted Requests For Information (RFIs) generated by all parties. Advise of any outstanding decisions in this regard;
  - g) advise the D.R. in advance of unavoidable Team member changes;
  - h) submit goals to be achieved in the following two weeks.
- 6.3 Submit to D.R. the design concept(s) documents for review at the initial Design Concept meeting, at 99% and 100% complete stages in sufficient detail to illustrate the design concept(s) and to demonstrate compliance with the Project requirements.
- 6.4 Consider all design issues beyond the bridge structure itself, which may need to be addressed, and which could include unavoidable non-conformances, repair methods for canal walls, piers and abutments, bridge controls, electrical, mechanical, hydraulic, signage, lighting, approaches, traffic, site safety, etc.
- 6.5 Consider issues such as construction approach and methodology, constructability, long-term cost-benefit considerations, project timelines, community impact, speed of construction, weather conditions during the pre-established construction period, environmental considerations, etc. Issues such as land ownership restrictions and continued usage of site, provision of a temporary bridge/road for vehicles and pedestrians, staging areas, safety, etc. are also to be considered.
- 6.6 For up to three conformant and most appropriate bridge replacement options, each consisting of best matched structural+mechanical+electrical/controls concepts, and a single canal walls repair option recommended by the Consultant and accepted by the D.R. for detailed Design Concept analysis:
- a) adequately demonstrate that options adhere to the project objectives and constraints;
  - b) submit a Concept Report adequately supported by graphs, lists, tables, drawings, sketches, plans, sections, and perspective views. Ensure that that the Executive Summary section is suitably written for high-level decision makers to have all pertinent and necessary information ;
  - c) include Class C Construction Cost Estimates, a Cost Plan , a Project Risk Management Plan and updated Project Schedule to confirm the feasibility of the Project;
  - d) include a list of unavoidable non-conformances;

- e) include options analysis, complete with 75-year life cycle cost analysis;
- f) submit QA/QC documentation for this portion of work;
- g) submit copies of all design concept documents in two (2) hard copies, a complete electronic PDF version, as well as photographs in native JPEG, and drawings in native AutoCad 2015 versions.

6.7 Overall project Objectives/Goals:

- a) Complete Swing bridge superstructure replacement, with as much as possible CHBDC-compliant and TAC-compliant, two-lane swing bridge including a pedestrian/bicyclist sidewalk;
- b) Achieve time-to-first-major-repair of 35 years minimum;
- c) Type and shape of the replacement superstructure is not required to be sympathetic with the existing superstructure's "look". Inform the D.R. at the outset of the concept investigation of other swing bridge configurations that could result in significant time and/or cost savings, reliability, durability, life expectancy, or increased public safety;
- d) Replacement bridge superstructure, with possible exception of the bridge deck, is to be constructed in structural steel, with detailing that is naturally and significantly less corrosion-prone than the existing built-up member truss configuration;
- e) Adjust the elevation, widen and re-surface the approaches, only if and as necessary;
- f) Provide new pintle, balance wheels and rail, live and jacking supports, rest supports, span locks, travel restraints, etc.;
- g) Provide new mechanical, hydraulic, electrical and control equipment and wiring/piping as required for 75-year bridge life expectancy and low-maintenance, trouble-free operation. Propose at least two fully automatic operation/control alternatives, with one based on PLC controls;
- h) Modify the Control House or build a new one, as required. Choose best position on site if a new Control House is necessary;
- i) Provide traffic gates, signs, signalization, lighting, etc. as required;
- j) Full lengths of canal walls, east and west of the bridge and on both north and south banks of the canal are to be fully rehabilitated. Investigate appropriate methods of necessary repairs to achieve time-to-first-major-repair of 50 years minimum. Initially, also investigate and compare time/schedule and cost benefits, if any, of full or partial replacement of the 4 canal walls;

6.8 Overall project constraints:

- a) Construction is to take place during the Winter 2016/17, during the period specified;
- b) Vehicular traffic across the canal must continue throughout the construction period. Provide either a temporary canal-fill roadway,

- or provide a temporary bridge and abutments, complete with all required signalization. Provide a temporary pedestrian crossing jointly or separately from the temporary 2-lane roadway. Provide access roadway/sidewalk to the temporary structure(s). Provide time to construct, time to de-construct and cost analyses for both options;
- c) The replacement bridge is to be substantially fabricated before demolition work of the existing bridge begins;
  - d) Conform to User Department requirement that no approach roadway re-alignment is to be considered for this project;
  - e) Bottom portions of main superstructure trusses, or of other projecting main load-carrying longitudinal elements, are to be shielded from splashing action generated by passing vehicles;
  - f) Provide crash-tested traffic barriers independent of main trusses and other projecting main load-carrying longitudinal elements. Match position with new barriers on approaches. Provide bicycle barriers on the sidewalk;
  - g) Deck is to be of the "closed" type, and is to have adequate slopes in at least one direction, but preferably in both. As much as possible, deck drainage is not to be directed towards the gaps between deck ends and the abutments. Approaches should likewise not drain towards that gap. Drain pipes, if used, are to be minimum 150mm diameter PVC or ABS, with 2x45 degree elbows forming all 90 degree vertical turns. Horizontal drain turns are to be avoided;
  - h) Maintain the current clear navigation channel width of 17 metres on the south channel, and encroach on the north channel, if and as necessary, to achieve the required bridge widening. Minimize the north channel encroachment. Any encroachment into or narrowing of the present width of the north channel will require Transport Canada (TC) approval, which is to be secured by the Consultant, once it is accepted in principle by the Departmental Representative. If TC does not approve the proposed encroachment, the Consultant is to investigate and develop alternative design widths and/or approaches to achieving bridge widening;
  - i) Swing piers' center will probably have to be shifted northward significantly to accommodate the required bridge widening and the restriction on south navigational channel width. As a result, provide a new pivot pier and investigate the adequacy of existing rest piers for a northward extension (instead of full replacement). Investigate and report to the D.R. if an alternative to shifting the location of the center pivot location exists and is seen as feasible and beneficial to this project;
  - j) Position the sidewalk on the most appropriate (for pedestrian traffic) side of the replacement bridge. The direction of rotation of the new

- swing bridge is to be determined in consequence of the position of the sidewalk, such that the sidewalk is on the north side of the new bridge in its swung-open position;
- k) Due to the likely shift of the new bridge pivot pier center, the replacement bridge may be designed either as an equal-arm, or an unequal-arm with counterweight. An equal-arm swing bridge may require a new north abutment. Consider and provide time to construct, time to erect and cost analyses for both options;
  - l) Investigate both abutments for adequacy to support any new, heavier loads. Replace if necessary, or re-face/repair stonework and concrete over the full height and width of all 3 exposed sides on each abutment;
  - m) The composition and construction of the 4 canal walls on each side of bridge abutments is unknown, but suspected to be: wood cribbing on bedrock, overlay of stone masonry on cribbing, masonry topped with concrete capping. Underwater inspections are to be conducted to determine the best method of wall repairs. Wall repairs on south side of the canal cannot result in narrowing of the south navigation channel, while encroachment on the north channel is to be kept to an absolute minimum, with preference for no encroachment;
  - n) Existing canal wall and center pier cribwork sections are to be continually sprayed with water when construction area within the canal is dewatered. Re-flood the area immediately once dewatering is no longer required;
  - o) Constraints for structural steel construction:
    - i) Use high strength steel, if necessary to make the above-roadway superstructure visually "slender" and appealing;
    - ii) All steel and steel anchors in contact with concrete are to be hot-dip galvanized to 700g/sq.m.;
    - iii) Main bridge trusses are to be shop-coated with a 3-coat state-of-the-art bridge coating system approved by Ministry of Transportation (MTO). The color of the bridge is to be determined by the User Department, and will be provided to the Consultant by the D.R.;
    - iv) All below-deck structural steel elements not forming an integral/inseparable part of main trusses are to be hot-dip galvanized and unpainted, except if an Orthotropic Steel Deck (OSD) is selected, in which case they are to be shop-coated with the same coating system as the trusses and the OSD. Pivot girder(s) are to be hot-dip galvanized and at least a complete base coat of the paint system is to be fully applied over the newly galvanized surfaces STRICTLY within 12 hours of the galvanization process. Certification of this maximum permissible paint-over-galvanization delay is

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- required. Mid and top coats are to be applied over the base coat within delays recommended by the coating system manufacturer;
- v) All bolted steel connections are to be sealed with mastic sealant bead placed on all sides of the mating surfaces except the downward facing side. Mastic is to be applied over the completed coating system, and only once the system has cured. Visible seal beads are to be then touched up to match the color of the bridge structure;
  - vi) The replacement bridge is to be fully assembled and coated in the fabrication shop, with the geometry and dimensions verified and certified. Delivery to site in a fully assembled state is preferred, but other options are to be explored by the Consultant in the Concept Design stage, if deemed beneficial to the project;
  - vii) A Level 3 NACE inspector is to perform adequate inspections to be able to accept and certify all surface preparation and coating operations of structural steel;
  - viii) Use only hot-dip galvanized bolts for all bolted connections.
- p) Constraints for reinforced concrete construction:
- i) Use only hot-dip galvanized, or GFRP reinforcing bars of appropriate tensile strength, tensile modulus, tensile strain, bond strength and longitudinal coefficient of thermal expansion. All anchors and embedments are to be hot-dip galvanized. No cutting of galvanized items is permitted;
  - ii) Concrete mix is to comply with C-XL exposure class, except that: maximum water-cement ratio is to be 0.35. The mix is to have very good workability, adequately high fly ash (type F) or silica fume content, air content is to be category 1. Except for mass concrete, the mix is to have two different lengths of PVA (PolyVinyl Alcohol) fibres added into the truck barrel on site in the following concentrations: type compatible with NyconPVA RF4000-30mm long at 0.23% volume, and type compatible with NyconPVA RFs400-18mm long at 0.23% volume. Ensure that a PVA fibre manufacturer's representative instructs all necessary personnel in approved methods, procedures and timing for introducing and mixing PVA fibres in the concrete mix. The manufacturer's representative shall be present on site for the first day of concrete placement to witness, trouble-shoot and accept the fibre-related procedures, such that the desired results are consistently achieved for all concrete placing throughout the project;
  - iii) All concrete re-facings and additions are to be a minimum of 300mm thick;

- iv) In all cases a 10-day long wet curing of concrete is required;
- v) Design and provide adequate concrete temperature control for mass concrete casts;
- vi) The time elapsed between plant production and on-site placing end-time for each truck load is to be STRICTLY recorded and controlled. Under no circumstances allow placing of concrete that is more than 1h45min. (105 minutes) old since cement was combined with water and aggregates. Reduce the permissible time between batching and complete discharge to 1h15min. (75 minutes) when ambient air temperature exceeds 25 degrees Celsius. All concrete not satisfying these time limits is to be rejected. A report of all concrete deliveries and the corresponding batching time and placing end time is to be produced on a daily basis and submitted to the D.R.;
- vii) Provide and implement direct communication between the Contractor and the batching plant during all concrete placement operations such that concrete delivery trucks: a) do not wait to discharge concrete at site, and b) do not arrive late causing a delay in monolithic concrete cast.
- viii) For monolithic and mass concrete casts, place concrete in a continuous operation until the section is completed. Ensure appropriate concrete placing rate which ensures that each layer is placed while the previous layer is soft or plastic, such that the two adjacent layers become monolithic by penetration of vibrators, and precludes formation of cold joints.
- ix) Limit concrete temperature at placing to not less than 10 degrees Celsius and not more than 20 degrees Celsius at all times.

6.9 Recommend a single Preferred Conceptual Option for Design Development consideration in writing to the D.R.

## **RS 7A Design Development**

7.1 The Consultant is to, after acceptance of the Design Concept documents and after receiving a written directive to proceed from the D.R., prepare and:

- a) refine the approved Preferred Conceptual Design Option to a level of detail which will facilitate preparation of Class B Cost Estimates, updated Cost Plan, updated Risk Management Plan, updated Project Schedule, Updated Construction QA/QC Plan, design and design documents, and list of Code and TAC non-conformances;
- b) submit to the Departmental Representative, design development documents in sufficient detail to fully define the size, intent,

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- character, schedule, cost of the entire Project, and associated risks and means of their mitigation;
- c) submit an updated and refined Construction Cost Estimate based on the design development documents, an updated Cost Plan, Project Risk Management Plan and Project Schedule, as well as QA/QC documentation for this portion of design work;
  - d) submit design drawings, notes and calculations to demonstrate appropriate work progress at 50% completion stage of Design Development;
  - e) submit two (2) hard copies and a complete PDF version of all design development documents at 99% and 100% completion stages;
  - f) implement all D.R.'s comments and directions following each submission;
  - g) submit all final design development documents in two (2) hard copies, a complete electronic PDF version, as well as photographs in native JPEG, and drawings in native AutoCad 2015 versions.
- 7.2 Final design shall be all-inclusive, except for temporary works during construction, which are to be designed by the Contractor. The design documents shall be comprehensively detailed to permit fabrication and assembly/erection/casting of all structures, as well as purchase and installation of all equipment.
- 7.3 Drawings shall include a table of all structural steel members, elements and connections, each identified by unique number, with corresponding factored and unfactored design forces and moments calculated in accordance with CHBDC provisions. The same numbering system shall clearly identify all these members, elements and connections on drawing plans, sections and elevations.
- 7.4 Project meetings are to be organized, conducted and minutes taken at the same frequency and with the same submissions defined in RS6 Design Concept article 6.2.
- 7.5 Overall project goals and constraints are as specified in Design Concept RS Section.

**RS 8A Construction Documents, Pre-Tender Construction Cost Estimate, Risk Management Plan and Project Schedule**

- 8.1 All completed and final, issued "For Construction", drawings and specifications, as well as the accompanying Class A Construction Cost Estimates, Cost Plan, Construction Risk Management Plan, Construction Schedule and Construction Quality Assurance/Control Plan shall be submitted no later than the date specified in PD 2.7 Schedule.

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- 8.2 The Consultant is to, after acceptance of the Design Development documents by the Departmental Representative and after receiving a written directive to proceed, prepare and:
- a) submit construction drawings and specifications to demonstrate appropriate work progress at 50% completion stage of Construction Documents preparation;
  - b) submit two (2) hard copies and a complete PDF version of all for-construction documents at 99% and 100% completion stages;
  - c) implement all D.R.'s comments and directions following each submission;
  - d) submit an updated and refined Construction Cost Estimate, as well as an updated Cost Plan, Project Risk Management Plan, Construction Quality Management Plan and Project Schedule, as well as QA/QC documentation for this portion of document preparation work at each specified stage of completion. All documents prepared by Sub-consultants and other external specialists shall be reviewed, corrected as necessary, and signed "Reviewed and Accepted" by the Prime Consultant prior to their submission to the D.R.;
  - e) submit all final documents signed and sealed by specialist Professional Engineers licensed in the Province of Ontario and issued "For Construction" in two (2) hard copies, a complete electronic PDF version, as well as photographs in native JPEG, and drawings in native AutoCad 2015 versions without engineering seals and signatures;
  - f) submit a comprehensive Final Engineering Design Brief signed and sealed by Professional Engineers licensed in the Province of Ontario referencing applicable design Codes and Guides throughout, in a PDF format for PWGSC archiving and future reference purposes.
- 8.3 Project meetings are to be organized, conducted and minutes taken at the same frequency and with the same submissions defined in RS6 Design Concept article 6.2.
- 8.4 Overall project goals and constraints are as specified in Design Concept RS Section.

## **RS 9A Tender Call, Bid Evaluation and Construction Contract Award**

- 9.1 Tender Call:
- a) The Consultant is to, after acceptance of the final submission of the construction documents by the Departmental Representative, provide one (1) complete electronic set of the accepted "For Construction" drawings in AutoCad 2015 format digitally signed and sealed by specialist Professional Engineers licensed in the

Province of Ontario, suitable for reproduction only, one (1) set of same drawings in PDF format, and two (2) sets of the approved "For Construction" specifications signed and sealed by specialist Professional Engineers licensed in the Province of Ontario: one electronic set in MS Word format to be suitable for reproduction and the other set to be properly bound and covered as required by the Contracting Authority.

- b) Upon request, the Consultant is to:
  - i) provide the Departmental Representative with information required for interpretation and clarification of the construction documents;
  - ii) assist in the evaluation and approval of equivalent alternative materials, methods and systems;
  - iii) attend job or site showings as required.

9.2 Bid Evaluation and Construction Contract Award:

- a) The Contracting Authority shall be responsible for public posting of tender documents and arranging for the receipt of bids and awarding of the Construction Contract.
- b) The Consultant shall, on request review and evaluate the bids received for the construction of the Project, and advise on their relative merits and/or shortcomings.

**RS 10A Construction and Contract Administration**

10.1 Construction Schedule

- a) The Consultant shall:
  - i) as soon as practical after the award of the Construction Contract, request from the Contractor a detailed construction schedule, and, after review for conformity with the Project Schedule and implementation of necessary adjustments, forward an annotated, dated, signed "Reviewed and Accepted" by the Consultant, construction schedule to the D.R. in an electronic format;
  - ii) monitor and report to the D.R. the progress of the construction, or lack thereof, on a weekly basis;
  - iii) immediately notify the D.R. of any known and anticipated delays which may affect the completion date of the Project, and in conjunction with the Contractor propose delay mitigation measures, complete with associated costs;
  - iv) keep accurate records of the causes and duration of all delays, and update the Risk Management Plan as required.
- b) Consultant shall evaluate and provide advice to the D.R., and the D.R. shall consider all requests from the Contractor for time extensions, and shall issue directions to the Contractor and the Consultant.

## 10.2 Construction Safety

- a) All construction projects performed by the contractor are subject to federal and provincial regulations.
- b) The Contractor must provide Site Specific Health and Safety Plans in accordance with the contract; this will include emergency response plans, fire plans, etc. The Consultant is to review, provide comments and ensure that these plans are adequate and are adhered to at all times.

## 10.3 Construction Meetings

- a) The Consultant shall:
  - i) advise the Contractor to hold and attend construction meetings as required by the Construction Contract;
  - ii) advise the D.R. of the dates and times of the proposed meetings;
  - iii) attend all such meetings;
  - iv) maintain a record of the proceedings of such meetings and provide the Departmental Representative with a copy thereof within a maximum of five (5) working days of the meeting.

## 10.4 Clarification and Interpretation

- a) The Consultant shall promptly provide clarifications and interpretations of the construction documents in written and/or graphic form, to the Contractor, with a copy to the D.R., for the proper execution and progress of the construction as and when necessary;
- b) The Consultant shall not make any changes that will affect scope/budget/schedule without prior written approval from the D.R.

## 10.5 Shop Drawings, Contractor Design(s) and Construction Materials Submissions

- a) The Consultant shall:
  - i) specify in the construction documents the shop drawings, materials data sheets/information and temporary works designs that are to be submitted by the Contractor;
  - ii) review in a timely manner the shop drawings/designs/materials submissions provided by the Contractor to determine conformity with the general concept and intent of the construction documents and indicate to the Contractor such conformance with the general concept or lack thereof. Provide comments to and request re-submissions from the Contractor, as necessary;
  - iii) within five (5) business days of receipt, provide the D.R. with a signed "Reviewed and Accepted" and dated electronic copy of all submissions when such conformity is confirmed.

## 10.6 Testing and Inspection

- a) The Consultant shall:
  - i) recommend the need for testing, and review test reports of materials and/or construction;
  - ii) specify in the construction documents and implement the Construction Quality Management Plan, recommend quality assurance testing to be undertaken during construction, evaluate the results and advise the Departmental Representative accordingly. On projects requiring coating of structural steel members/elements/components, comprehensive services of a Level 3 NACE-accredited Painting Inspector shall be retained by the Consultant in a manner assuring proper quality of base preparation and of coating system application;
  - iii) request the Contractor to take remedial action when observed material or construction fails to comply with the requirements of the Construction Contract, and immediately advise the D.R.;
  - iv) specify in the construction documents material, product and performance testing to be undertaken by the Consultant with the assistance from the Contractor, including Commissioning of all replacement bridges and of existing bridges that have undergone major repairs that may affect their operation;
  - v) ensure that all specified testing, commissioning and other QA/QC specifications and recommendations are fully implemented throughout the construction process;
  - vi) Provide environmental monitoring and enforcement during construction.

## 10.7 Site Visits by the Design Engineers

- a) The Consultant' design engineers shall:
  - i) conduct periodic visits to the site to determine, on an adequate sampling basis but not less frequently than twice each month, whether construction work is in conformity with the discipline's construction documents, industry standards and good practice. The design engineer in each engineering discipline is to perform these site visits only when work affecting/pertaining to their discipline is being conducted on site;
  - ii) record and report to the D.R. on the progress, non-conformities and deficiencies observed during each site visit, and provide the Contractor with written progress reports and lists of deficiencies observed;
  - iii) recommend the action(s) to be taken;

- iv) assist PWGSC in ensuring prompt implementation by the Contractor of all remedial actions which have been accepted by the D.R. in writing, and issue a written confirmation of their completion to the D.R. and to the Contractor.

#### 10.8 Changes to Construction Contract

- a) The Consultant shall:
  - i) submit to the D.R. for approval all requests and recommendations for changes to the Construction Contract, as well as their implications;
  - ii) obtain quotations from the Contractor for contemplated changes, review the prices for acceptability and fairness, assess the effect on construction progress and completion date, and submit recommendations to the D.R.
- b) The Departmental Representative shall issue Change Orders for all approved changes.

#### 10.9 Contractor's Progress Claims

- a) The Consultant shall:
  - i) request from the Contractor a cost breakdown of the Construction Contract Award Price in detail appropriate to the size and complexity of the Project, or as may otherwise be specified in the Construction Contract, and submit the cost breakdown to the D.R. prior to the Contractor's first progress claim;
  - ii) examine progress claims in a timely manner and, if acceptable, certify the progress claims for work completed and materials delivered pursuant to the Construction Contract, and submit them to the D.R. for approval and processing;
  - iii) if the construction is based on unit prices, measure and record the quantities of labour, materials and equipment involved for the purpose of certifying progress claims.

#### 10.10 Substantial Completion of the Project

- a) The Consultant shall:
  - i) review the construction with the D.R. and the Contractor, and record all unacceptable and incomplete work detected;
  - ii) request from the Contractor, review for completeness and adequacy, and provide the D.R. with, all Operation and Maintenance Manuals and any other documents or items to be provided by the Contractor, in accordance with the Construction Contract;
  - iii) prepare and submit to the D.R. for approval and processing, and as a basis for payment to the Contractor, a Certificate of Substantial Completion as required by the Construction

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Contract, together with supporting documents properly signed and certified.

#### 10.11 Commissioning

- a) The Consultant shall develop the specification and plan for commissioning of every new/replacement movable bridge, as well as for existing bridges that have undergone major repairs/rehabilitation work that may affect their operation. The Consultant is to provide commissioning services to verify that the department's functional requirements are correctly interpreted during the design and construction stages, and that the structures operate consistently, under all normal load conditions and in all operating positions;
- b) Additionally, for movable bridges the scope of commissioning is to include the first seasonal start-up following completion of construction;
- c) Consultant is required to develop a complete commissioning plan and specification, to be incorporated into the construction tender documents, which will detail how the commissioning is to proceed and how it will be evaluated;
- d) A Commissioning Report describing the commissioning work performed, evaluating overall success of commissioning, describing interim difficulties, failures and repairs/replacements implemented, is to be submitted to the D.R. for review;
- e) The Commissioning Report is to be accepted by the D.R. before the Consultant issues the final Certificate of Completion.

#### 10.12 As-Built Record Drawings

- a) For complete bridge replacement projects, As-Built Record Documentation shall include a 3D Bridge Information Model (BrIM) in an electronic format native to Tekla Structures software. The BrIM model is to be created using Industry Foundations Classes (IFC) in accordance to ISO 16739, ISO 29481 and ISO 12006-3 Standards, as well as with processes, specifications and recommendations from BuildingSmart International ([www.buildingsmart\\_tech.org](http://www.buildingsmart_tech.org)).
- b) The Consultant shall, before issuing the final Certificate of Completion:
  - i) prepare and provide the Departmental Representative with a complete set of as-built record drawings, and 3D BrIM model as the case may be, of the type and number as specified;
  - ii) verify that record drawings are suitable for digital storage and retrieval, incorporating all recorded changes to the original working drawings based on as-built prints, drawings and other information provided by the Contractor, together with change orders and site instructions;

- iii) verify that record drawings are labeled "Record", dated and signed by the Consultant, and provide also a marked-up copy of the specifications recording changes thereto.

#### 10.13 Final Completion of the Project

- a) The Consultant shall:
  - i) advise the D.R. in writing that the construction has been completed in general conformity with the Construction Contract and the Approved Design;
  - ii) complete the first seasonal start-up commissioning and submit the final Commissioning Report to the D.R.;
  - iii) make a final review of the construction with the Departmental Representative and the Contractor and, if satisfactory, prepare and submit to the D.R. for approval and final payment to the Contractor, a final Certificate of Completion as required by the Construction Contract, together with supporting documents properly signed and certified, including manufacturers' and suppliers' warranties.

### **RS 11A Resident Site Services During Construction**

- 11.1 The Resident Site Representative shall be intimately familiar with the Project drawings, specifications, general concept of the design and execution of works, as well as with all pertinent details and requirements of construction, sequencing, methodologies, etc., as well as with the Safety Plans, Project Schedule, Risk Management Plan, Construction Quality Management Plan, Cost Estimates, etc., such that potential and avoidable Contractor site errors, deficiencies, schedule delays, safety concerns are corrected and risks mitigated in advance and at all times.
- 11.2 Resident Site Services are to include a site office and/or site-based office equipment, including but not limited to Internet access, appropriate computer system and software, telephone service, etc.
- 11.3 The Resident Site Representative shall:
  - a) assist in carrying his construction and contract administration duties;
  - b) inspect all phases of the work in progress, for the purpose of bringing to the attention of the Contractor, after confirming with both the Consultant and the D.R., any discrepancies between the work, the contract documents, the schedule and accepted construction procedures and practices;
  - c) assist PWGSC in ensuring prompt implementation by the Contractor of all remedial actions which have been accepted by the D.R. in writing, and issue a written confirmation of their completion to the Consultant, to the D.R. and to the Contractor;

- d) maintain and submit to D.R. a detailed and descriptive daily log of all inspections, observations, work progress, equipment and workers, material quantities, site conditions, and of unexpected occurrences on site, and additionally, on a consistent day of each week, electronically issue a weekly summary report, which is to include pertinent photographs and be prepared in the format to be acceptable to the D.R., to the Consultant and to the D.R.;
- e) prepare any other reports or surveys as may be required to provide complete information to D.R. ;
- f) verify quantities of materials received and record work progress through photographs (digital files to be submitted to PWGSC)
- g) Provide environmental monitoring and enforcement during construction.

## **RS 12A Post Construction Services**

- 12.1 The Consultant shall **continue** to provide inspection, trouble-shooting, problem-solving and construction contract warranty(ies) review/assistance services, on as-needed basis, for a period of **one (1) calendar year** following the date of issuance of the final Certificate of Completion by the D.R.
- 12.2 The Consultant shall prepare a list of, review, accept and ensure that all end-of-construction deliverables from the Contractor, including but not limited to warranties and operations manual(s), have been submitted in specified quantities and format to the D.R.
- 12.3 The Consultant shall also submit closure reports generally comprising of the following Record Documents:
  - a) Introduction:
    - i) Project history;
    - ii) Scope of work;
    - iii) Design development;
    - iv) Tendering process and award of contract
  - b) Project Implementation:
    - i) Start - up meeting;
    - ii) Final work plan, risk management plan, construction cost breakdown and schedule of work;
    - iii) Field testing and quality control;
    - iv) Change orders and site instructions
  - c) Issues and difficulties encountered during implementation:
    - i) Delays in the work;
    - ii) Review of claims
  - d) Operations and monitoring program:
    - i) Inspections;
    - ii) Studies;
    - iii) Monitoring work;

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- e) Conclusion and Summary, including a Certificate of General Conformance.
  - f) List of Appendices:
    - i) Contract specifications;
    - ii) Contract drawings;
    - iii) Accepted shop drawings, materials data, and contractor's design documents;
    - iv) Contractor's final schedule;
    - v) List of subcontractors and suppliers;
    - vi) Digital photographs;
    - vii) Digital As-built Record Drawings and Specification, with 3D BrIM on a USB drive or DVD disk where required;
    - viii) Geotechnical, materials, testing reports, if applicable;
    - ix) Environmental considerations report;
    - x) Bi-weekly progress summaries;
    - xi) Progress meetings and minutes;
    - xii) Quality assurance and quality control (services quality control sign-off sheets, materials testing, water quality, specified materials, commissioning report, etc.);
    - xiii) Health and safety;
    - xiv) Operations and Maintenance Manual;
    - xv) Warranties;
    - xvi) Any other report related to the project

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## **SITE B – HAMLET SWING and FIXED BRIDGES**

### **RS 1B Analysis of Project Scope of Work:**

- 1.1 Review available existing documentation. PWGSC will provide a DVD disk with documents currently available. Determine what other required information is missing and inform the PWGSC Departmental Representative (D.R.), who will attempt to procure it from external sources. If the missing information is not obtainable, but is necessary to proceed with the project, prepare a list of additional information to be acquired, and submit it promptly to the D.R. for review. All provided documents shall be returned to the D.R. immediately following the completion of the project.
- 1.2 Currently Available Documentation – Hamlet Swing + Fixed Bridges:
  - a) 2011 Comprehensive Detailed Inspection Report
  - b) 2013 Vehicle Impact Review letters (qty 2)
  - c) Photographs of some deteriorations
  - d) Swing Statistics from 1994 to 2008
  - e) Maximum water levels in Sparrow Lake for the past 97 years
  - f) Heritage Value Report
  - g) Existing Drawings library (tif)
- 1.3 Submit a Site Specific Health and Safety Plan and an Environmental Protection Plan for all required Consultants for review by D.R.
- 1.4 Visit the site to perform visual reconnaissance and site review, surveys, measurements, meet bridge operations and maintenance staff, and obtain local information applicable to design and construction.
- 1.5 Submit Quality Management Plan (including samples of Quality Control Sign-Off Sheets for both design and construction phases), Initial Project Schedule and Initial Risk Assessment Plan for review by D.R. Project Schedule and Risk Management Plan are to be updated and re-submitted to D.R. every two (2) weeks. All Quality Assurance/Quality Control Sign-off Sheets (signed by independent senior engineer reviewers who are not part of the Consultant Project Team) pertaining to both in-house and external Consultant/Specialist work are to be submitted to the D.R. on an ongoing basis.

### **RS 2B Management of Consultant's In-House and External Resources and Services**

- 2.1 The Consultant shall perform all pertinent project management functions necessary for proper management of all services being provided, including (but not limited to): management of its own in-house personnel, co-ordination of services between disciplines, management of sub-Consultants'/Specialists' services, and similar general management tasks.

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**RS 3B Investigations, Studies and Reports:**

- 3.1 Likely additional investigations, studies and tests needed to complete the scope of work for Hamlet Fixed bridge replacement and Hamlet Swing bridge rehabilitation/upgrade may include, but not be limited to:
- a) Geotechnical investigations to aid with possible pier/abutment replacements
  - b) Vehicular traffic volume and safety study
  - c) Additional or complete structural analyses (swung-open position, jacking load in swung-closed position, and other load cases not yet investigated), as required
  - d) Fatigue analysis of the bridge(s) to be rehabilitated/upgraded, if deemed pertinent
  - e) Truss joints, fasteners and gussets capacity evaluations in the swing bridge superstructure
  - f) Limited elevation survey of: top of roadway approaches, tops of abutments, top of pivot pier, top of rest piers, top of combined pier, top of floor structure at centers of both bridges
- 3.2 Program the scope and schedule, and submit breakdown of all costs associated with the proposed investigations/studies/tests, clearly indicating if on-site works require temporary roadway and/or navigation closure(s). With the assistance of the Consultant, PWGSC will seek approval from authorities having jurisdiction. Upon receiving written acceptance to proceed from the PWGSC D.R., perform only the accepted additional studies, investigations and/or tests.
- 3.3 Assist PWGSC, as required, in completing an Environmental Assessment Study and implement its findings into the design, schedule and risk assessment.
- 3.4 Prepare Reports of all findings and submit to D.R. for review and comments no later than ten (10) business days following completion of field work.
- 3.5 Inspection and investigation work shall be carried in accordance with: the current PWGSC Bridge Inspection Manual (BIM) 2010, the current Canadian Highway Bridge Design code (CHBDC), FHWA Inspection of Fracture-Critical Members, AASHTO Movable Bridge Inspection Evaluation and Maintenance Manual, and other Codes and Standards, as required.
- 3.6 Steel truss bridges to be rehabilitated/upgraded shall have all gusset plates in truss panel points evaluated using methods and guidance described in the following publications:
- a) WSDOT Report WA-RD 757.1. entitled "Triage Evaluation of Gusset Plates in Steel Truss Bridges" (Dec. 2010);

- b) Gusset plates that do not pass the Triage Evaluation, shall be re-evaluated in detail with guidance from the FHWA Guide FHWA-IF-09-014, entitled "Load Rating Guidance and Examples for Bolted and Riveted Gusset Plates in Truss Bridges" (Feb. 2009), and guidance from the NCHRP Document 197, entitled "Guidelines for the Load and Resistance Factor Design and Rating of Riveted and Bolted Gusset Plate Connections for Steel Bridges" (Feb. 2013).
- 3.7 The inspection and investigation of specialized components of bridges (structural, mechanical, electrical, control system, hydraulics, cables, hoist systems, etc.), shall be carried out by specialized, experienced and licensed engineers, and shall be coordinated and integrated with the inspections of other structural components of the bridge in a manner that minimizes impact on bridge operations and general public.

#### **RS 4B Estimating and Cost Planning**

- 4.1 The Consultant shall provide cost consulting services by a Cost Estimating Specialist with expertise specific to fixed and movable bridge construction and de-construction in Ontario, from the commencement of project concept design through to construction completion, including the preparation of complete estimates for all construction trades. The estimates are to consider escalation, inflation, markets, contingency costs, etc.
- 4.2 The specialist responsible for estimating and cost planning shall attend all pertinent project meetings throughout the design phases and be prepared to present and substantiate the estimates directly to the D.R.

#### **RS 5B Risk Management and Quality Management**

- 5.1 The Consultant shall provide support to the D.R. in identifying risks and managing them throughout the project life cycle, from the commencement of project concept design through to construction completion.
- 5.2 A risk management strategy is essential to the project management at PWGSC. Such a strategy combines project planning, design development planning, procurement planning and implementation planning. Implement "Doing Business with A&E Ontario Region" Risk Management strategies and requirements, including "Definitions" and "Checklist".
- 5.3 Risk Management Process:
- a) Identify risk events based on past experience and using proposed checklist or other available lists;
  - b) Qualify/quantify probability of risk event (Low, Medium, High) and their impact (Low, Medium, High);
  - c) Prioritize risk events;

- d) Develop risk response, including but not limited to risk avoidance, transfer, mitigation and acceptance;
  - e) Implement risk controls and risk response strategies as required.
- 5.4 The Consultant shall plan, formalize and write a complete and thorough Project Quality Management/Assurance Plan (QA), and implement and manage Project Quality Control (QC), including QC of all services and QC of construction, throughout the project life cycle, from the commencement of project concept design through to construction completion.
- 5.5 QC of services shall be performed by independent specialists, who shall be senior specialist engineers who are not part of the Consultant Project Team, and who may or may not be employees of the firms forming the Consultant Team.
- 5.6 Submit all QC Sign-Off Sheets to the D.R. on an on-going basis, as work progresses.
- 5.7 Once per week, on the same day of the week, confirm to the D.R. in writing that design work progress is on-track and on-schedule.
- 5.8 Project Quality Assurance and Quality Control are essential to the project management at PWGSC.

## **RS 6B Design Concept**

- 6.1 The Consultant is to explore various design options and analyze them against identified priorities and program objectives. For each of the two bridges separately, within this process:
- a) and in its earliest stages, all initially considered options are to be presented, complete with annotated hand sketches, order of magnitude cost estimates, initial estimates for construction time, possible implementation challenges and a list of unavoidable non-compliances to codes, standards and regulations, to the D.R. during the initial Design Concept meeting;
  - b) following this meeting, up to three options in each of the structural, mechanical and electrical/controls disciplines are to be recommended, selected, developed further, matched for compatibility with other disciplines' concepts, evaluated and compared to each other in sufficient detail and clarity to recommend a single preferred option for Design Development stage.
- 6.2 Organize, initiate, conduct and produce minutes (for D.R.'s review and acceptance) of video-conference meetings using WebEx software, and/or face-to-face meetings, every two weeks throughout the Design Concept stage. At all times, ensure that all pertinent members of the Consultant Team are participating in these meetings, including Sub-consultants' and

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other Specialists' project personnel. During the meetings, the Consultant Team is to at minimum:

- a) recap progress achieved to date and work remaining to be completed;
  - b) submit an updated schedule for the entirety of Design Concept work, and compare it to the schedule submitted during the previous meeting;
  - c) present progress achieved since the previous meeting;
  - d) summarize any difficulties/complications encountered, as well as the resolution options submitted to the D.R. during the period in-between current and previous meetings. Advise of any outstanding decisions in this regard;
  - e) summarize new and revised concepts, directions of investigation/evaluation, etc submitted to the D.R. during the period in-between current and previous meetings. Advise of any outstanding decisions in this regard;
  - f) recap status of previously submitted Requests For Information (RFIs) generated by all parties. Advise of any outstanding decisions in this regard;
  - g) advise the D.R. in advance of unavoidable Team member changes;
  - h) submit goals to be achieved in the following two weeks.
- 6.3 Submit to D.R. the design concept(s) documents for review at the initial Design Concept meeting, at 99% and 100% complete stages in sufficient detail to illustrate the design concept(s) and to demonstrate compliance with the Project requirements.
- 6.4 Consider all design issues beyond the bridge structure itself, which may need to be addressed, and which could include unavoidable non-conformances, repair/replacement methods for piers and abutments, bridge controls, electrical, mechanical, hydraulic, signage, lighting, approaches, traffic, site safety, etc.
- 6.5 Consider issues such as construction approach and methodology, constructability, long-term cost-benefit considerations, project timelines, community impact, speed of construction, weather conditions during the pre-established construction period, environmental considerations, etc. Issues such as land ownership restrictions and continued usage of site, staging areas, public and worker safety, marine navigation traffic during the construction period, etc. are also to be considered.
- 6.6 For up to three conformant and most appropriate swing bridge rehabilitation/upgrade/strengthening options, each consisting of best matched structural+mechanical+electrical/controls concepts, and for up to three conformant and most appropriate fixed bridge replacement options, recommended by the Consultant and accepted by the D.R. for detailed Design Concept analysis:

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- a) adequately demonstrate that options adhere to the project objectives and constraints;
  - b) submit a Concept Report adequately supported by graphs, lists, tables, drawings, sketches, plans, sections, and perspective views. Ensure that the Executive Summary section is suitably written for high-level decision makers to have all pertinent and necessary information ;
  - c) include Class C Construction Cost Estimates, a Cost Plan , a Project Risk Management Plan and updated Project Schedule to confirm the feasibility of the Project;
  - d) include a list of unavoidable non-conformances;
  - e) include options analysis, complete with 75-year life cycle cost analysis;
  - f) submit QA/QC documentation for this portion of work;
  - g) submit copies of all design concept documents in two (2) hard copies, a complete electronic PDF version, as well as photographs in native JPEG, and drawings in native AutoCad 2015 versions.

6.7 Overall project Objectives/Goals:

- a) Complete Swing bridge superstructure rehabilitation, with improvements/upgrades/strengthening that would render it more CHBDC-compliant and TAC-compliant, including an increase in live load capacity to as much as possible meet the full CHBDC Ontario highway load requirements, while retaining the existing one-lane and no sidewalk configuration. Appropriately rehabilitate or provide new abutment, common pier with fixed bridge, pivot pier and rest piers;
- b) Thoroughly investigate and compare two scenarios for repair, strengthening, existing coating and corrosion removal, and application of new coating system on the existing Swing bridge superstructure:
  - i) in-shop work, and
  - ii) in-the-field work.
- c) Complete Fixed bridge superstructure replacement, with as much as possible CHBDC-compliant and TAC-compliant, new one-lane and no sidewalk fixed bridge on new bearings and new or rehabilitated abutment and common pier. The replacement bridge is to meet full CHBDC Ontario highway load requirements. Type and shape of the replacement superstructure is to be sympathetic with the existing superstructure's "look". Inform the D.R. in writing at the outset of the concept investigation if other fixed bridge configurations, or if full rehabilitation+upgrade of the existing fixed bridge superstructure, could result in significant time and/or cost savings, reliability, life expectancy, or increased public safety. If

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- steel through-trusses are used in the replacement bridge, their height and arrangement is to be similar to the existing ones;
- d) For both bridges achieve time-to-first-major-repair of 35 years minimum. If laminated timber deck option is considered, use a 25-year period for that element only;
  - e) Fixed replacement bridge superstructure in structural steel is to have detailing that is naturally and significantly less corrosion-prone than the existing built-up member configuration;
  - f) Adjust the elevation and re-surface the approaches, only if necessary;
  - g) Investigate repairing/rehabilitating, or provide new pintle, balance wheels and rail, live and jacking supports, rest supports, span locks, travel restraints, etc.;
  - h) Investigate raising the swing pier's top-of-concrete elevation to above common water levels – see "Constraints" section. Investigate impact, if any, on the combined pier, both abutments, top of bridge decks elevation, and approaches;
  - i) Investigate repairing/rehabilitating/reusing, or provide new mechanical, hydraulic, electrical and control equipment and wiring/piping as required for 75-year bridge life expectancy and low-maintenance, trouble-free operation. Propose at least two fully automatic operation/control alternatives, with one based on PLC controls;
  - j) Modify the Control House or build a new one, as required. Choose best position on site if a new Control House is necessary and/or new wiring/piping is to be installed;
  - k) Provide traffic gates, signs, signalization, lighting, etc. as required;
  - l) If the height/length/width and/or weight of trucks allowed to access the rehabilitated/replaced bridge system requires limitation, investigate installation of size/height barriers and signage appropriately placed on both approaches to preclude such trucks from entering the bridge system.

6.8 Overall project constraints:

- a) Construction is to take place in Spring, Summer and Fall 2017, during the period specified;
- b) Vehicular traffic across the navigation channel will not be permitted throughout the construction period. Minimize the roadway closure period as much as possible. All necessary permits, temporary signage, road closure schedule and community notices pertaining to the road closure and detour are to be provided and maintained by the contractor;
- c) Marine traffic shall not be interrupted, except intermittently and for a very short period if absolutely necessary and approved by the D.R. and the Client Department;

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- d) Investigate if approach roadway re-alignment would be beneficial from the safety perspective, and if so, if it is feasible within Parks Canada land ownership/right-of-way boundaries. Report findings to the D.R.;
  - e) Investigate and propose means of shielding bottom portions of main superstructure trusses, or of other projecting main load-carrying longitudinal elements, on both fixed and swing spans, from the splashing action generated by passing vehicles;
  - f) Investigate and propose traffic barriers independent of main trusses and other projecting main load-carrying longitudinal elements for both the Swing and Fixed bridges. Match position with new barriers on approaches;
  - g) Bridge decks are to be of the "closed" type, and should have adequate slopes in at least one direction, but preferably in both. As much as possible, swing bridge deck drainage is not to be directed towards the gaps between deck ends and the abutment or common pier. Approaches should likewise not drain towards the bridges. Drain pipes, if used, are to be minimum 150mm diameter PVC or ABS, with 2x45 degree elbows forming all 90 degree vertical turns. Horizontal drain turns are to be avoided;
  - h) Investigate both abutments, common pier, pivot pier and rest piers for adequacy to support any new or heavier loads. Note that the center pier (pivot and rest piers) appears to be seated on wood cribbing. Foundation details of other substructure elements on both bridges are uncertain. Replace if and as necessary, or re-face/strengthen the substructure elements over their full height and width on all exposed sides, in order to achieve trouble-free life expectancy corresponding to that of the replaced and rehabilitated superstructures;
  - i) Existing cribwork sections are to be continually sprayed with water at all times when dewatered (exposed to air) during construction. Re-flood the area immediately once dewatering is no longer required;
  - j) The User Department reports that it is not uncommon for the swing pier to be under water at this location. Investigate this issue, its frequency and consequences to the swing pier, mechanical/electrical/control equipment, pintle, balance wheel rail, and the bridge superstructure. Report findings and consequential impact on design and construction;
  - k) Constraints for structural steel construction:
    - i) Use high strength steel, if necessary to make the above-roadway superstructure visually "slender" and appealing;
    - ii) All steel and steel anchors in contact with concrete are to be hot-dip galvanized;

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- iii) Main through trusses of the replacement Fixed bridge are to be shop-coated with a 3-coat state-of-the-art bridge coating system approved by Ministry of Transportation (MTO). The color of the bridge is to be determined by the User Department, and will be provided to the Consultant by the D.R. Use the same coating system on the main trusses of the Swing bridge;
  - iv) All new and replaced below-deck structural steel elements not forming an integral/inseparable part of main trusses are to be hot-dip galvanized and unpainted, except if an Orthotropic Steel Deck (OSD) is selected, in which case they are to be shop-coated with the same coating system as the trusses and the OSD. Pivot girder(s) are to be hot-dip galvanized and at least a complete base coat of the paint system is to be fully applied over the newly galvanized surfaces STRICTLY within 12 hours of the galvanization process. Certification of this maximum permissible paint-over-galvanization delay is required. Mid and top coats are to be applied over the base coat on pivot girder(s) within delays recommended by the coating system manufacturer;
  - v) All bolted/riveted steel connections are to be sealed with mastic sealant bead placed on all sides of the mating surfaces except the downward facing side. Mastic is to be applied over the completed coating system, and only once the system has cured. Visible seal beads are to be then touched up to match the color of the bridge structure;
  - vi) The replacement fixed bridge is to be fully assembled and coated in the fabrication shop, with the geometry and dimensions verified and certified. Delivery to site in a fully assembled state is preferred, but other options are to be explored by the Consultant in the Concept Design stage, if deemed beneficial to the project;
  - vii) A Level 3 NACE inspector is to perform adequate inspections to be able to accept and certify all surface preparation and coating operations of structural steel;
  - viii) If bolted connections are selected for main trusses, round head bolts (eg.: Tension Control bolts) are to be used, and oriented so that that bolt heads are the most readily visible part for bridge users.
  - ix) Use only hot-dip galvanized bolts for all bolted connections.
  - l) Constraints for reinforced concrete construction:
    - i) Use only hot-dip galvanized, or GFRP reinforcing bars of appropriate tensile strength, tensile modulus, tensile strain, bond strength and longitudinal coefficient of thermal

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- expansion. All anchors and embedments are to be hot-dip galvanized. No cutting of galvanized items is permitted;
- ii) Concrete mix is to comply with C-XL exposure class, except that: maximum water-cement ratio is to be 0.35. The mix is to have very good workability, adequately high fly ash (type F) or silica fume content, air content is to be category 1. Except for mass concrete, the mix is to have two different lengths of PVA (PolyVinyl Alcohol) fibres added into the truck barrel on site in the following concentrations: type compatible with NyconPVA RF4000-30mm long at 0.23% volume, and type compatible with NyconPVA RFs400-18mm long at 0.23% volume. Ensure that a PVA fibre manufacturer's representative instructs all necessary personnel in approved methods, procedures and timing for introducing and mixing PVA fibres in the concrete mix. The manufacturer's representative shall be present on site for the first day of concrete placement to witness, trouble-shoot and accept the fibre-related procedures, such that the desired results are consistently achieved for all concrete placing throughout the project;
  - iii) All concrete re-facings and additions are to be a minimum of 300mm thick;
  - iv) In all cases a 10-day long wet curing of concrete is required;
  - v) Design and provide adequate concrete temperature control for mass concrete casts;
  - vi) The time elapsed between plant production and on-site placing end-time for each truck load is to be STRICTLY recorded and controlled. Under no circumstances allow placing of concrete that is more than 1h45min. (105 minutes) old since cement was combined with water and aggregates. Reduce the permissible time between batching and complete discharge to 1h15min. (75 minutes) when ambient air temperature exceeds 25 degrees Celsius. All concrete not satisfying these time limits is to be rejected. A report of all concrete deliveries and the corresponding batching time and placing end time is to be produced on a daily basis and submitted to the D.R.;
  - vii) Provide and implement direct communication between the Contractor and the batching plant during all concrete placement operations such that concrete delivery trucks: a) do not wait to discharge concrete at site, and b) do not arrive late causing a delay in monolithic concrete cast.
  - viii) For monolithic and mass concrete casts, place concrete in a continuous operation until the section is completed. Ensure appropriate concrete placing rate which ensures that each

layer is placed while the previous layer is soft or plastic, such that the two adjacent layers become monolithic by penetration of vibrators, and precludes formation of cold joints.

- ix) Limit concrete temperature at placing to not less than 10 degrees Celsius and not more than 20 degrees Celsius at all times.

- 6.9 Recommend a single Preferred Conceptual Option for each of the two bridges for Design Development consideration in writing to the D.R.

## **RS 7B Design Development**

- 7.1 The Consultant is to, after acceptance of the Design Concept documents and after receiving a written directive to proceed from the D.R., prepare and:
  - a) refine the approved Preferred Conceptual Design Option for each of the two bridges to a level of detail which will facilitate preparation of Class B Cost Estimates, updated Cost Plan, updated Risk Management Plan, updated Project Schedule, Updated Construction QA/QC Plan, design and design documents, and list of Code and TAC non-conformances;
  - b) submit to the Departmental Representative, design development documents in sufficient detail to fully define the size, intent, character, schedule, cost of the entire Project, and associated risks and means of their mitigation;
  - c) submit an updated and refined Construction Cost Estimate for each of the two bridges based on the design development documents, an updated Cost Plan, Project Risk Management Plan and Project Schedule, as well as QA/QC documentation for this portion of design work;
  - d) submit design drawings, notes and calculations to demonstrate appropriate work progress at 50% completion stage of Design Development;
  - e) submit two (2) hard copies and a complete PDF version of all design development documents at 99% and 100% completion stages;
  - f) implement all D.R.'s comments and directions following each submission;
  - g) submit all final design development documents in two (2) hard copies, a complete electronic PDF version, as well as photographs in native JPEG, and drawings in native AutoCad 2015 versions.
- 7.2 Final design shall be all-inclusive, except for temporary works during construction, which are to be designed by the Contractor. The design documents shall be comprehensively detailed to permit fabrication and

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assembly/erection/casting of all structures, as well as purchase and installation of all equipment.

- 7.3 Drawings shall include a table of all structural steel members, elements and connections, each identified by unique number, with corresponding factored and unfactored design forces and moments calculated in accordance with CHBDC provisions. The same numbering system shall clearly identify all these members, elements and connections on drawing plans, sections and elevations.
- 7.4 Project meetings are to be organized, conducted and minutes taken at the same frequency and with the same submissions defined in RS6 Design Concept article 6.2.
- 7.5 Overall project goals and constraints are as specified in Design Concept RS Section.

**RS 8B Construction Documents, Pre-Tender Construction Cost Estimate, Risk Management Plan and Project Schedule**

- 8.1 All completed and final, issued "For Construction", drawings and specifications, as well as the accompanying Class A Construction Cost Estimates, Cost Plan, Construction Risk Management Plan, Construction Schedule and Construction Quality Assurance/Control Plan shall be submitted no later than the date specified in PD 2.7 Schedule.
- 8.2 The Consultant is to, after acceptance of the Design Development documents by the Departmental Representative and after receiving a written directive to proceed, prepare and:
- a) submit construction drawings and specifications to demonstrate appropriate work progress at 50% completion stage of Construction Documents preparation;
  - b) submit two (2) hard copies and a complete PDF version of all for-construction documents at 99% and 100% completion stages;
  - c) implement all D.R.'s comments and directions following each submission;
  - d) submit an updated and refined Construction Cost Estimate, as well as an updated Cost Plan, Project Risk Management Plan, Construction Quality Management Plan and Project Schedule, as well as QA/QC documentation for this portion of document preparation work **at each specified stage of completion**. All documents prepared by Sub-consultants and other external specialists shall be reviewed, corrected as necessary, and signed "Reviewed and Accepted" by the Prime Consultant prior to their submission to the D.R.;
  - e) submit all final documents signed and sealed by specialist Professional Engineers licensed in the Province of Ontario and issued "For Construction" in two (2) hard copies, a complete

- electronic PDF version, as well as photographs in native JPEG, and drawings in native AutoCad 2015 versions without engineering seals and signatures;
- f) submit a comprehensive Final Engineering Design Brief signed and sealed by Professional Engineers licensed in the Province of Ontario referencing applicable design Codes and Guides throughout, in a PDF format for PWGSC archiving and future reference purposes.
- 8.3 Project meetings are to be organized, conducted and minutes taken at the same frequency and with the same submissions defined in RS6 Design Concept article 6.2.
- 8.4 Overall project goals and constraints are as specified in Design Concept RS Section.

## **RS 9B Tender Call, Bid Evaluation and Construction Contract Award**

- 9.1 Tender Call:
- a) The Consultant is to, after acceptance of the final submission of the construction documents by the Departmental Representative, provide one (1) complete electronic set of the accepted "For Construction" drawings in AutoCad 2015 format digitally signed and sealed by specialist Professional Engineers licensed in the Province of Ontario, suitable for reproduction only, one (1) set of same drawings in PDF format, and two (2) sets of the approved "For Construction" specifications signed and sealed by specialist Professional Engineers licensed in the Province of Ontario: one electronic set in MS Word format to be suitable for reproduction and the other set to be properly bound and covered as required by the Contracting Authority.
- b) Upon request, the Consultant is to:
- i) provide the Departmental Representative with information required for interpretation and clarification of the construction documents;
  - ii) assist in the evaluation and approval of equivalent alternative materials, methods and systems;
  - iii) attend job or site showings as required.
- 9.2 Bid Evaluation and Construction Contract Award:
- a) The Departmental Representative shall be responsible for public posting of tender documents and arranging for the receipt of bids and awarding of the Construction Contract.
- b) The Consultant shall, on request review and evaluate the bids received for the construction of the Project, and advise on their relative merits and/or shortcomings.

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## **RS 10B Construction and Contract Administration**

### 10.1 Construction Schedule

- a) The Consultant shall:
  - i) as soon as practical after the award of the Construction Contract, request from the Contractor a detailed construction schedule, and, after review for conformity with the Project Schedule and implementation of necessary adjustments, forward an annotated, dated, signed "Reviewed and Accepted" by the Consultant, construction schedule to the D.R. in an electronic format;
  - ii) monitor and report to the D.R. the progress of the construction, or lack thereof, on a weekly basis;
  - iii) immediately notify the D.R. of any known and anticipated delays which may affect the completion date of the Project, and in conjunction with the Contractor propose delay mitigation measures, complete with associated costs;
  - iv) keep accurate records of the causes and duration of all delays, and update the Risk Management Plan as required.
- b) Consultant shall evaluate and provide advice to the D.R., and the D.R. shall consider all requests from the Contractor for time extensions, and shall issue directions to the Contractor and the Consultant.

### 10.2 Construction Safety and Detour of Emergency Services

- a) All construction projects performed by the contractor are subject to federal and provincial regulations.
- b) The Contractor is to provide Site Specific Health and Safety Plans in accordance with the contract. This will include emergency response plans, fire plans, etc. The Consultant is to review, provide comments and ensure that these plans are adequate and are adhered to at all times.
- c) The Consultant is to specify in the construction documents the Contractor's responsibility to prepare, submit for review/comments/acceptance by the D.R., and inform the community and all pertinent Emergency and School Services of the required Vehicular Detour(s) resulting from construction. All necessary intermittent Navigational Traffic closures shall be pre-established by the Contractor prior to start of construction.

### 10.3 Construction Meetings

- a) The Consultant shall:
  - i) advise the Contractor to hold and attend construction meetings as required by the Construction Contract;
  - ii) advise the D.R. of the dates and times of the proposed meetings;

- iii) attend all such meetings;
- iv) maintain a record of the proceedings of such meetings and provide the Departmental Representative with a copy thereof within a maximum of five (5) working days of the meeting.

#### 10.4 Clarification and Interpretation

- a) The Consultant shall promptly provide clarifications and interpretations of the construction documents in written and/or graphic form, to the Contractor, with a copy to the D.R., for the proper execution and progress of the construction as and when necessary;
- b) The Consultant shall not make any changes that will affect scope/budget/schedule without prior written approval from the D.R.

#### 10.5 Shop Drawings, Contractor Design(s) and Construction Materials Submissions

- a) The Consultant shall:
  - i) specify in the construction documents the shop drawings, materials data sheets/information and temporary works designs that are to be submitted by the Contractor;
  - ii) review in a timely manner the shop drawings/designs/materials submissions provided by the Contractor to determine conformity with the general concept and intent of the construction documents and indicate to the Contractor such conformance with the general concept or lack thereof. Provide comments to and request re-submissions from the Contractor, as necessary;
  - iii) within five (5) business days of receipt, provide the D.R. with a signed "Reviewed and Accepted" and dated electronic copy of all submissions when such conformity is confirmed.

#### 10.6 Testing and Inspection

- a) The Consultant shall:
  - i) recommend the need for testing, and review test reports of materials and/or construction;
  - ii) specify in the construction documents and implement the Construction Quality Management Plan, recommend quality assurance testing to be undertaken during construction, evaluate the results and advise the Departmental Representative accordingly. On projects requiring coating of structural steel members/elements/components, comprehensive services of a Level 3 NACE-accredited Painting Inspector shall be retained by the Consultant in a manner assuring proper quality of base preparation and of coating system application;

- iii) request the Contractor to take remedial action when observed material or construction fails to comply with the requirements of the Construction Contract, and immediately advise the D.R.;
- iv) specify in the construction documents material, product and performance testing to be undertaken by the Consultant with the assistance from the Contractor, including Commissioning of all replacement bridges and of existing bridges that have undergone major repairs that may affect their operation;
- v) ensure that all specified testing, commissioning and other QA/QC specifications and recommendations are fully implemented throughout the construction process;
- vi) Provide environmental monitoring and enforcement during construction.

#### 10.7 Site Visits by the Design Engineers

- a) The Consultant's design engineers shall:
  - i) conduct periodic visits to the site to determine, on an adequate sampling basis but not less frequently than twice each month, whether construction work is in conformity with the discipline's construction documents, industry standards and good practice. The design engineer in each engineering discipline is to perform these site visits only when work affecting/pertaining to their discipline is being conducted on site;
  - ii) record and report to the D.R. on the progress, non-conformities and deficiencies observed during each site visit, and provide the Contractor with written progress reports and lists of deficiencies observed;
  - iii) recommend the action(s) to be taken;
  - iv) assist PWGSC in ensuring prompt implementation by the Contractor of all remedial actions which have been accepted by the D.R. in writing, and issue a written confirmation of their completion to the D.R. and to the Contractor.

#### 10.8 Changes to Construction Contract

- a) The Consultant shall:
  - i) submit to the D.R. for approval all requests and recommendations for changes to the Construction Contract, as well as their implications;
  - ii) obtain quotations from the Contractor for contemplated changes, review the prices for acceptability and fairness, assess the effect on construction progress and completion date, and submit recommendations to the D.R.
- b) The D.R. shall issue Change Orders for all approved changes.

## 10.9 Contractor's Progress Claims

- a) The Consultant shall:
  - i) request from the Contractor a cost breakdown of the Construction Contract Award Price in detail appropriate to the size and complexity of the Project, or as may otherwise be specified in the Construction Contract, and submit the cost breakdown to the D.R. prior to the Contractor's first progress claim;
  - ii) examine progress claims in a timely manner and, if acceptable, certify the progress claims for work completed and materials delivered pursuant to the Construction Contract, and submit them to the D.R. for approval and processing;
  - iii) if the construction is based on unit prices, measure and record the quantities of labour, materials and equipment involved for the purpose of certifying progress claims.

## 10.10 Substantial Completion of the Project

- a) The Consultant shall:
  - i) review the construction with the D.R. and the Contractor, and record all unacceptable and incomplete work detected;
  - ii) request from the Contractor, review for completeness and adequacy, and provide the D.R. with, all Operation and Maintenance Manuals and any other documents or items to be provided by the Contractor, in accordance with the Construction Contract;
  - iii) prepare and submit to the D.R. for approval and processing, and as a basis for payment to the Contractor, a Certificate of Substantial Completion as required by the Construction Contract, together with supporting documents properly signed and certified.

## 10.11 Commissioning

- a) The Consultant shall develop the specification and plan for commissioning of every new/replacement movable bridge, as well as for existing bridges that have undergone major repairs/rehabilitation work that may affect their operation. The Consultant is to provide commissioning services to verify that the department's functional requirements are correctly interpreted during the design and construction stages, and that the structures operate consistently, under all normal load conditions and in all operating positions;
- b) Additionally, for movable bridges the scope of commissioning is to include the first seasonal start-up following completion of construction;

- c) Consultant is required to develop a complete commissioning plan and specification, to be incorporated into the construction tender documents, which will detail how the commissioning is to proceed and how it will be evaluated;
- d) A Commissioning Report describing the commissioning work performed, evaluating overall success of commissioning, describing interim difficulties, failures and repairs/replacements implemented, is to be submitted to the D.R. for review;
- e) The Commissioning Report is to be accepted by the D.R. before the Consultant issues the final Certificate of Completion.

#### 10.12 As-Built Record Documentation

- a) For complete bridge replacement projects, and for major rehabilitation/upgrade projects, As-Built Record Documentation shall include a 3D Bridge Information Model (BrIM) in an electronic format native to Tekla Structures software. The BrIM model is to be created using Industry Foundations Classes (IFC) in accordance to ISO 16739, ISO 29481 and ISO 12006-3 Standards, as well as with processes, specifications and recommendations from BuildingSmart International ([www.buildingsmart\\_tech.org](http://www.buildingsmart_tech.org)).
- b) The Consultant shall, before issuing the final Certificate of Completion:
  - i) prepare and provide the Departmental Representative with a complete set of as-built record drawings, and 3D BrIM model, of the type and number as specified;
  - ii) verify that record drawings are suitable for digital storage and retrieval, incorporating all recorded changes to the original working drawings based on as-built prints, drawings and other information provided by the Contractor, together with change orders and site instructions;
  - iii) verify that record drawings are labeled "Record", dated and signed by the Consultant, and provide also a marked-up copy of the specifications recording changes thereto.

#### 10.13 Final Completion of the Project

- a) The final hand-over of the 100% completed project, including at least the initial commissioning, shall be made no later than the date specified.
- b) The Consultant shall:
  - i) advise the D.R. in writing that the construction has been completed in general conformity with the Construction Contract and the Approved Design;
  - ii) complete the first seasonal start-up commissioning and submit the final Commissioning Report to the D.R.;
  - iii) make a final review of the construction with the Departmental Representative and the Contractor and, if

satisfactory, prepare and submit to the D.R. for approval and final payment to the Contractor, a final Certificate of Completion as required by the Construction Contract, together with supporting documents properly signed and certified, including manufacturers' and suppliers' warranties.

## **RS 11B Resident Site Services During Construction**

- 11.1 The Resident Site Representative shall be intimately familiar with the Project drawings, specifications, general concept of the design and execution of works, as well as with all pertinent details and requirements of construction, sequencing, methodologies, etc., as well as with the Safety Plans, Project Schedule, Risk Management Plan, Construction Quality Management Plan, Cost Estimates, etc., such that potential and avoidable Contractor site errors, deficiencies, schedule delays, safety concerns are corrected and risks mitigated in advance and at all times.
- 11.2 Resident Site Services are to include a site office and/or site-based office equipment, including but not limited to Internet access, appropriate computer system and software, telephone service, etc.
- 11.3 The Resident Site Representative shall:
  - a) assist the Consultant in carrying his construction and contract administration duties;
  - b) inspect all phases of the work in progress, for the purpose of bringing to the attention of the Contractor, after confirming with both the Consultant and the D.R., any discrepancies between the work, the contract documents, the schedule and accepted construction procedures and practices;
  - c) assist PWGSC in ensuring prompt implementation by the Contractor of all remedial actions which have been accepted by the D.R. in writing, and issue a written confirmation of their completion to the Consultant, to the D.R. and to the Contractor;
  - d) maintain and submit to D.R. a detailed and descriptive daily log of all inspections, observations, work progress, equipment and workers, material quantities, site conditions, and of unexpected occurrences on site, and additionally, on a consistent day of each week, electronically issue a weekly summary report, which is to include pertinent photographs and be prepared in the format to be acceptable to the D.R., to the Consultant and to the D.R.;
  - e) prepare any other reports or surveys as may be requested by the PWGSC D.R. through the Consultant;
  - f) verify quantities of materials received and record work progress through photographs (digital files to be submitted to PWGSC);
  - g) Provide environmental monitoring and enforcement during construction.

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## **RS 12B Post Construction Services**

- 12.1 The Consultant shall continue to provide inspection, trouble-shooting, problem-solving and construction contract warranty(ies) review/assistance services, on as-needed basis, for a period of one (1) calendar year following the date of issuance of the final Certificate of Completion by the D.R.
- 12.2 The Consultant shall prepare a list of, review, accept and ensure that all end-of-construction deliverables from the Contractor, including but not limited to warranties and operations manual(s), have been submitted in specified quantities and format to the D.R.
- 12.3 The Consultant shall also submit closure reports generally comprising of the following Record Documents:
  - a) Introduction:
    - i) Project history;
    - ii) Scope of work;
    - iii) Design development;
    - iv) Tendering process and award of contract
  - b) Project Implementation:
    - i) Start - up meeting;
    - ii) Final work plan, risk management plan, construction cost breakdown and schedule of work;
    - iii) Field testing and quality control;
    - iv) Change orders and site instructions
  - c) Issues and difficulties encountered during implementation:
    - i) Delays in the work;
    - ii) Review of claims
  - d) Operations and monitoring program:
    - i) Inspections;
    - ii) Studies;
    - iii) Monitoring work;
  - e) Conclusion and Summary, including a Certificate of General Conformance.
  - f) List of Appendices:
    - i) Contract specifications;
    - ii) Contract drawings;
    - iii) Accepted shop drawings, materials data, and contractor's design documents;
    - iv) Contractor's final schedule;
    - v) List of subcontractors and suppliers;
    - vi) Digital photographs;
    - vii) Digital As-built Record Drawings and Specification, with 3D BrIM on a USB drive or DVD disk where required;
    - viii) Geotechnical, materials, testing reports, if applicable;
    - ix) Environmental considerations report;

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No. / N° VME - FMS

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- x) Bi-weekly progress summaries;
- xi) Progress meetings and minutes;
- xii) Quality assurance and quality control (services quality control sign-off sheets, materials testing, water quality, specified materials, commissioning report, etc.);
- xiii) Health and safety;
- xiv) Operations and Maintenance Manual;
- xv) Warranties;
- xvi) Any other report related to the project

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No./ N° VME - FMS

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## **SUBMISSION REQUIREMENTS AND EVALUATION (SRE)**

- SRE 1 General Information
- SRE 2 Proposal Requirements
- SRE 3 Submission Requirements and Evaluation
- SRE 4 Price of Services
- SRE 5 Total Score
- SRE 6 Submission Requirements – Checklist

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## **SUBMISSION REQUIREMENTS AND EVALUATION (SRE)**

### **SUBMISSION REQUIREMENTS AND EVALUATION**

#### **SRE 1 GENERAL INFORMATION**

##### **1.1 Reference to the Selection Procedure**

1.1.1 An "Overview of the Selection Procedure" can be found in R1410T General Instructions to Proponents (GI3).

##### **1.2 Calculation of Total Score**

1.2.1 For this project the Total Score will be established as follows:

Technical Rating x 90%	=	Technical Score (Max. 90 Points)
Price Rating x 10%	=	<u>Price Score (Max. 10 Points)</u>
Total Score	=	Max. 100 Points

#### **SRE 2 PROPOSAL REQUIREMENTS**

##### **2.1 Requirement for Proposal Format**

2.1.1 The following proposal format information should be implemented when preparing the proposal.

- a) Submit one (1) bound signed original plus three (3) bound copies of the proposal
- b) Paper size should be - 216mm x 279mm (8.5" x 11")
- c) Minimum font size - 11 point Arial, or equivalent
- d) Minimum margins - 12 mm left, right, top, and bottom
- e) Double-sided submissions are preferred
- f) One (1) 'page' means one side of a 216mm x 279mm (8.5" x 11") sheet of paper formatted as described above
- g) 279mm x 432 mm (11" x 17") fold-out sheets for spreadsheets, organization charts etc. will be counted as one page per side
- h) The order of the content of the proposals should follow the order established in the Request for Proposal SRE section

##### **2.2 Specific Requirements for Proposal Format**

2.2.1 The maximum number of pages (including text and graphics) to be submitted for the Rated Requirements under SRE 3.2 is **thirty (30) pages**.

2.2.2 Consequence of non-compliance: any pages which extend beyond the above page limitation and any other attachments will be extracted from the proposal and will not be forwarded to the PWGSC Evaluation Board members for evaluation.

2.2.3 The following are not part of the page limitation mentioned above;

- a) Covering letter
- b) Cover page
- c) Tab/Dividers, provided they are free of text and/or graphics
- d) Consultant Team Identification (Appendix A)
- e) Declaration/Certification Form (Appendix B)
- f) Integrity Provisions – List of Names (Appendix B – Annex A)
- g) Front page of the RFP
- h) Front page of revision(s) to the RFP
- i) Price Proposal Form (Appendix C)

### **SRE 3 SUBMISSION REQUIREMENTS AND EVALUATION**

#### **3.1 MANDATORY REQUIREMENTS**

Failure to meet these mandatory requirements will render the proposal as non-responsive and no further evaluation will be carried out.

##### 3.1.1 Licensing, Certification and Authorization

- a) The proponent shall be a **Civil/Structural Engineering Consultant**, licensed, or eligible to be licensed, certified or otherwise authorized to provide the necessary professional services to the full extent that is required by the province of Ontario.
- b) This licensing and certification requirement also applies to key members of the proponent's team, including the Senior Team Leaders, Engineering Team Members, Specialists and Sub-consultants.

##### 3.1.2 Consultant Team Identification

- a) The required Mechanical and Electrical/Controls Engineers are to be either in-house specialists of the proponent, or employees of a single Mechanical/Electrical sub-consultant.
- b) The Consultant Team to be identified for the purposes of the evaluation shall include the following, except that Mechanical and Electrical/Controls engineers need only be listed once (either under In-house or Sub-consultant category):
  - i) Prime Consultant (Proponent): Civil/Structural Engineering Consultant
    - In-house Senior Team Leaders:
      - Project Manager
      - Civil/Structural Engineer
      - Mechanical Engineer (In-house)
      - Electrical/Controls Engineer (In-house)
    - In-house Engineering Team Members:

- 
- List six (6) Engineering Team members, two team members for each of Structural, Mechanical and Electrical/Controls disciplines.
  - ii) Mechanical/Electrical Sub-Consultant Firm (if required to substitute for in-house Senior Team Leaders and Engineering Team Members)
    - Senior Team Leaders:
      - Mechanical Engineer (Sub-Consultant)
      - Electrical/Controls Engineer (Sub-Consultant)
    - Engineering Team Members:
      - Two Mechanical Engineers (Sub-Consultant)
      - Two Electrical/Controls Engineers (Sub-Consultant)
  - c) Information required:
    - i) Name of proponent, and name of Mechanical/Electrical/Controls sub-consultant, if used.
    - ii) Copy of proponents Certificate of Authorization issued by Professional Engineers Ontario.
    - iii) Names and roles of key personnel to be assigned to the project per Section a) above.
    - iv) For the Senior Team Leaders, Engineering Team Members indicate current professional license status and affiliation, and/or how you intend to meet the Ontario professional licensing requirements.
    - v) In the case of a joint venture identify the existing or proposed legal form of the joint venture (refer to R1410T General Instructions to Proponents, GI9 Limitation of Submissions).
  - d) The Project Manager must have a minimum 15 years of experience managing Canadian projects of equivalent scope and depth on fast-track schedules.
  - e) The Civil/Structural Engineer, the Mechanical Engineer and the Electrical/Controls Engineer who as Senior Team Leaders will supervise and lead each discipline must be senior Engineers with a minimum 15 years of experience in steel truss swing bridge inspection, analysis, design, and construction projects. Within the 15 years of experience, 7 years of the experience must be within Canada.
  - f) The Engineering Team Members are to have a minimum 5 years relevant swing and fixed steel truss bridge experience.
  - g) The format for submission of the Team Identification information is provided in Appendix A.
  - h) Additional information listed in paragraphs above shall be provided on separate sheets under Appendix A.

### 3.1.3 Declaration/Certifications Form

- a) Proponents must complete, sign and submit the following:

---

i) Appendix B, Declaration/Certifications Forms;

3.1.4 Integrity Provisions – List of Names

- a) Proponents who are incorporated, including those bidding as a joint venture, must provide a complete list of names of all individuals who are currently directors of the Proponent. Proponents bidding as sole proprietorship, as well as those bidding as a joint venture, must provide the name of the owner(s). Proponents bidding as societies, firms, or partnerships do not need to provide lists of names. If the required list of names has not been received by the time the evaluation of bids is completed, Canada will inform the Proponent of a time frame within which to provide the information. Failure to provide the names within the time frame specified will render the bid non-responsive. Providing the required names is a mandatory requirement for contract award.
- i) Submit under Appendix B; Annex A

**3.2 RATED REQUIREMENTS**

3.2.1 Achievements of Proponent on similar Projects

- a) Describe the Proponent's experience and details of work performed as prime consultant specifically related to short to medium span steel swing bridge projects and steel truss bridge projects.
- b) Select Two (2) steel swing bridge projects (preferably truss superstructures) completed within the last ten (10) years, that were either major rehabilitation projects or full replacement projects. The projects must have been completed within the stated timeframe.
- c) Information that should be supplied:
- i) Clearly indicate how each project is comparable and relevant to the two projects described in this Request for Proposal (RFP).
- 1) For projects located outside of Canada, Proponents are to clearly demonstrate comparability/relevancy of projects by addressing:
- comparability to Canadian Codes and Standards
  - understanding and use of applied system(s) of measurement(s) vs. the metric system by structural, mechanical and electrical/controls engineering and drafting personnel
  - bridge construction industry abroad vs. Canadian
  - if applicable, provide dates when Proponent's engineers, who will be designated to sign and seal the construction documents, were most recently holders of a temporary professional license in Ontario.
- ii) Provide brief project description and intent.

- iii) Discuss design philosophy or design approach to meet the intent, design challenges and resolutions.
- iv) List details of engineering design and project management work performed.
- v) Provide engineering fees per discipline and final construction cost.
- vi) Provide project schedule. Include start and end date of construction.
- vii) Indicate key personnel who were involved in project delivery that are proposed for involvement in the projects covered by this RFP.
- viii) Provide Client references - name, address, phone and email address of client contact at working level - references may be checked.

### 3.2.2 Achievements of Senior Team Leaders to be assigned to this Project

- a) Describe the experience and performance of Senior Team Leaders to be assigned to this project regardless of their past association with the current proponent or sub-consultant firm.  
This is the opportunity to emphasize their strengths and expertise directly related to swing and fixed truss bridges, to recognize their past responsibilities and achievements.
- b) Provide information for each of the following Senior Team Leaders:
  - i) Project Manager
  - ii) Civil/Structural Engineer
  - iii) Mechanical Engineer
  - iv) Electrical/Controls Engineer
- c) Only identify Senior Team Leaders who will be carrying out the Engineering and/or management work on this project.
- d) Information that should be supplied for each Senior Team Leader:
  - i) Current professional accreditation and eligibility for professional licensure in Ontario,
  - ii) Relevant (steel swing bridges) experience and expertise,
  - iii) Number of years of relevant experience,
  - iv) Role, responsibility and details of involvement of the individual in relevant past projects
- e) Use of in-house resources may be rated higher than sub-consultants.

### 3.2.3 Achievements of Engineering Team Members to be assigned to this Project

- a) Describe the expertise and performance of engineering team members to be assigned to this project regardless of their past association with the current proponent firm.  
This is the opportunity to emphasize the strengths and expertise of individuals on the team supporting the Senior Team Leaders on this

project, as directly related to swing and fixed truss bridges, to recognize their past responsibilities and achievements.

- i) Provide information for six (6) Engineering Team Members for evaluation, two (2) per discipline (i.e., Civil/Structural Engineer, Mechanical Engineer, Electrical/Controls Engineer). The actual Consultant Team for the project may include more staff, but only include six (6) Engineering team members for evaluation in this proposal.
- b) Only identify Engineering Team Members who will be carrying out the majority of the Engineering work on this project.
- c) Information that is to be supplied for each Engineering Team Member:
  - i) Current professional accreditation and eligibility for professional licensure in Ontario,
  - ii) Relevant (steel swing bridges) experience and expertise,
  - iii) Number of years relevant experience,
  - iv) Role, responsibility and details of involvement of the individual in relevant past projects  
Use of in-house resources may be rated higher than sub-consultants.

#### 3.2.4 Understanding the Project Milestones and Schedule

- a) The proponent is to demonstrate capability to perform the services and meet project challenges and milestones by providing a plan of work.
- b) Information must be provided for both Sites (Brighton Road and Hamlet Bridges).
- c) Information that is to be supplied:
  - i) Scope of Services - as defined in the Required Services (RS) Sections of this RFP. List and elaborate on any services that need to be added, modified, expanded, etc. in the opinion of the Proponent
  - ii) Work Plan - detailed breakdown of work tasks and deliverables
  - iii) Project Schedule - proposed major milestones schedule, which falls within the schedule constraints established in the RS Sections
  - iv) Risk management strategy and key items to be considered for the two sites

#### 3.2.5 Understanding the Consultant Team Personnel Requirements

- a) The proponent is to demonstrate the capacity and capability to perform the services and meet the tight pre-tender period schedule constraints by providing personnel assignment quantities for the maximum 46-week long period (February 29<sup>th</sup> 2016 to January 27<sup>th</sup>, 2017) designated for the Investigations, Concept, Design &

- Construction Documents stages (pre-tender work) of both Brighton Road and Hamlet Bridges. Delivery dates of complete Construction Documents for the two individual Sites are stated in the RS Sections.
- b) Quantity of proponent's personnel assigned for each individual week, per discipline and per seniority level is to be demonstrated in a tabular format.
  - c) If additional qualified personnel is available to work concurrently, and therefore reduce the number of weeks required to deliver Construction Documents, the proponent may reflect this in the table, except that Brighton Road pre-tender work is to be completed no later than July 22<sup>nd</sup>, 2016, and Hamlet pre-tender work is to be completed no later than January 27<sup>th</sup>, 2017.
  - d) Table format and information to be supplied:
    - i) Present table on a single side of one 11"x17" sheet;
    - ii) Table is to have 47 columns: one for row titles, plus 46 representing each of the 46 weeks of pre-tender Consultant Team work schedule, numbered "wk01" to "wk46";
    - iii) Row titles are to describe the function/discipline/seniority of Team Members assigned to work during the 46 week period. Example: Overall Project Manager; Structural Team Lead; Structural Senior Engineers; Structural Intermediate Engineers; Mechanical Team Lead, and so on for all other disciplines/specializations working during this period;
    - iv) In each cell of the table, fill in the quantity of person-days to be assigned to complete the work within the designated delivery dates for Brighton and Hamlet bridge sites.

### 3.2.6 Design Approach

- a) The proponent is to elaborate on unique aspects of these two sites that could be considered major challenges in order to illustrate their design approach to developing an economical, durable and easily maintained bridge design that allows for fast track construction using innovative design details and construction staging to deliver these two projects strictly within the schedule.
- b) Information that is to be supplied:
  - i) Describe proposed fast track design plan with design philosophy, materials, construction methods, and other techniques and methodology that will be implemented to ensure that the bridges are repaired or replaced during the indicated construction timeframe.
  - ii) The design plan will be evaluated in terms of being able to present a creative design and construction approach that will minimize the bridge closure period to vehicular and

- pedestrian traffic over the canal and allow for opportunities to accelerate construction work.
- iii) Describe the major challenges and how team approach will be applied to meet those particular challenges.

### 3.3 EVALUATION AND RATING

#### 3.3.1 Technical Rating

- a) In the first instance, price envelopes will remain sealed and only the technical components of the proposals which are responsive will be reviewed, evaluated and rated by a PWGSC Evaluation Board in accordance with the following table to establish Technical Ratings:

Criterion	Weight Factor	Rating	Weighted Rating
3.2.1 Achievements of Proponent on similar Projects	1.0	0 - 10	0 – 10
3.2.2 Achievements of Senior Team Leaders to be assigned to this Project	1.5	0 - 10	0 – 15
3.2.3 Achievements of Engineering Team Members to be assigned to this Project	1.5	0 - 10	0 – 15
3.2.4 Understanding the Project Milestones and Schedule	2.0	0 - 10	0 – 20
3.2.5 Understanding the Consultant Team Personnel Requirements	2.0	0 - 10	0 - 20
3.2.6 Design Approach	2.0	0 - 10	0 – 20
<b>Technical Rating</b>	<b>10.0</b>		<b>0 - 100</b>

- b) To be considered further, proponents must achieve a minimum Technical Rating of sixty-five (65) points out of the hundred (100) points available as specified above.
- c) No further consideration will be given to proponents not achieving the pass mark of sixty-five (65) points.

### 3.4 GENERIC EVALUATION TABLE

3.4.1 PWGSC Evaluation Board members will evaluate the strengths and weaknesses of the Proponent's response to the evaluation criteria and will rate each criterion with even numbers (0, 2, 4, 6, 8 or 10) using the generic evaluation table below:

<b>NON RESPONSIVE</b>	<b>INADEQUATE</b>	<b>WEAK</b>	<b>ADEQUATE</b>	<b>FULLY SATISFACTORY</b>	<b>STRONG</b>
<b>0 point</b>	<b>2 points</b>	<b>4 points</b>	<b>6 points</b>	<b>8 points</b>	<b>10 points</b>
Did not submit information which could be evaluated	Lacks complete or almost complete understanding of the requirements.	Has some understanding of the requirements but lacks adequate understanding in some areas of the requirements.	Demonstrates a good understanding of the requirements.	Demonstrates a very good understanding of the requirements.	Demonstrates an excellent understanding of the requirements.
	Weaknesses cannot be corrected	Generally doubtful that weaknesses can be corrected	Weaknesses can be corrected	No significant weaknesses	No apparent weaknesses
	Proponent do not possess qualifications and experience	Proponent lacks qualifications and experience	Proponent has an acceptable level of qualifications and experience	Proponent is qualified and experienced	Proponent is highly qualified and experienced
	Team proposed is not likely able to meet requirements	Team does not cover all components or overall experience is weak	Team covers most components and will likely meet requirements	Team covers all components - some members have worked successfully together	Strong team - has worked successfully together on comparable projects
	Sample projects not related to this requirement	Sample projects generally not related to this requirement	Sample projects generally related to this requirement	Sample projects directly related to this requirement	Leads in sample projects directly related to this requirement

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pwl035  
N° CCC / CCC No. / N° VME - FMS

	Extremely poor, insufficient to meet performance requirements	Little capability to meet performance requirements	Acceptable capability, should ensure adequate results	Satisfactory capability, should ensure effective results	Superior capability, should ensure very effective results
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#### **SRE 4 PRICE OF SERVICES**

- 4.1.1 All price proposal envelopes corresponding to responsive proposals which have achieved the pass mark of sixty-five (65) points will be opened upon completion of the technical evaluation.
- 4.1.2 An average price is determined by adding all the price proposals together and dividing the total by the number of price proposals being opened.
- 4.1.3 All price proposals which are greater than twenty-five percent (25%) above the average price amount will be set aside and receive no further consideration.
- 4.1.4 The remaining price proposals are rated as follows:
- a) The lowest price proposal receives a Price Rating of 100
  - b) The second, third, fourth and fifth lowest prices receive Price Ratings of 80, 60, 40, and 20 respectively. All other price proposals receive a Price Rating of 0.
  - c) On the rare occasion where two (or more) price proposals are identical, the matching price proposals receive the same rating and the corresponding number of following ratings are skipped.
  - d) The Price Rating is multiplied by the applicable percentage to establish the Price Score.

#### **SRE 5 TOTAL SCORE**

- 5.1.1 Total Scores will be established in accordance with the following:

<b>Rating</b>	<b>Possible Range</b>	<b>% of Total Score</b>	<b>Score (Points)</b>
Technical Rating	0 - 100	90	0 - 90
Price Rating	0 - 100	10	0 - 10
Total Score		100	0 - 100

- 5.1.2 The Proponent receiving the highest Total Score is the first entity that the Evaluation Board will recommend be approached in order to finalize the details of a contractual agreement for the provision of the required services.
- 5.1.3 In the case of a tie, the proponent submitting the lower price for the services will be selected.

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## **SRE 6 SUBMISSION REQUIREMENTS - CHECKLIST**

The following list of documents and forms is provided with the intention of assisting the Proponent in ensuring a complete submission. The Proponent is responsible for meeting all submission requirements.

Please follow detailed instructions in R1410T General Instructions to Proponents, GI16 Submission of Proposal. Proponents may choose to introduce their submissions with a cover letter.

Team Identification - see typical format in Appendix A

Declaration/Certifications Form - completed and signed - form provided in Appendix B

Integrity Provisions - list of directors / owners provided in Appendix B – Annex A

Integrity Provisions - declaration form (as applicable, pursuant to subsection Declaration of Convicted Offences, of section 01 of the General Instructions)

Proposal - one (1) original plus three (3) copies

Front page of RFP- completed and signed

Front page(s) of any solicitation amendment – completed and signed

In a separate envelope:

Price Proposal Form - one (1) completed and submitted in a separate envelope using form provided in Appendix C

- submitted in a separate sealed envelope clearly marked "Price Proposal", and listing the Proponent firm's name

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pwl035  
N° CCC / CCC No. / N° VME - FMS

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## APPENDIX A - TEAM IDENTIFICATION

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pwl035  
N° CCC / CCC No./ N° VME - FMS

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## APPENDIX A - TEAM IDENTIFICATION FORMAT

For details on this format, please see SRE in the Request For Proposal.

The prime consultant and other members of the Consultant Team shall be, or 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.

Fill in all spaces provided on the form, except that Mechanical and Electrical/Controls personnel is to be listed only once, either under Prime Consultant or under Sub-consultant.

### I. Prime Consultant (Proponent) – Civil/Structural Engineer:

Firm or Joint Venture Name: .....

.....

.....

Key Individuals and provincial professional licensing status and/or professional accreditation:

#### Senior Team Leaders:

Project Manager:  
.....

Civil/Structural:  
.....

Mechanical:  
.....

Electrical/Controls:  
.....

#### Engineering Team Members:

Civil/Structural:  
.....

Civil/Structural:  
.....

Mechanical:  
.....

Mechanical:  
.....

Electrical/Controls:  
.....

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No./ N° VME - FMS

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Electrical/Controls:  
.....

**II. Key Sub Consultants / Specialists (if not listed under Prime Consultant):**

**Mechanical/Electrical/Controls**

Firm Name: .....  
.....  
.....

Key Individuals and provincial professional licensing status and/or professional accreditation:

Senior Team Leaders:

Mechanical:  
.....  
Electrical:  
.....

Engineering Team Members:

Mechanical:  
.....  
Mechanical:  
.....  
Electrical/Controls:  
.....  
Electrical/Controls:  
.....

Additional Information to be provided:

- i) Name of proponent, and name of Mechanical/Electrical/Controls sub-consultant, if used.
- ii) Copy of proponents Certificate of Authorization issued by Professional Engineers Ontario.
- iii) Names and roles of key personnel to be assigned to the project per Section a) above.
- iv) For the Senior Team Leaders, Engineering Team Members indicate current professional license status and affiliation, and/or how you intend to meet the Ontario professional licensing requirements.

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No. / N° VME - FMS

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- v) In the case of a joint venture identify the existing or proposed legal form of the joint venture (refer to R1410T General Instructions to Proponents, GI9 Limitation of Submissions).

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No./ N° VME - FMS

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## APPENDIX B - DECLARATION/CERTIFICATIONS FORM

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No. / N° VME - FMS

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## APPENDIX B - DECLARATION/CERTIFICATIONS FORM

**Project Title:**

**Name of Proponent:**

**Street Address:**

**Mailing Address:**

**Telephone Number:** (    )

**Fax Number:** (    )

**E-Mail:**

**Procurement Business Number:**

<b>Type of Organization:</b>	<b>Size of Organization:</b>
<input type="checkbox"/> Sole Proprietorship	Number of Employees _____
<input type="checkbox"/> Partnership	Graduate Architects / Professional Engineers _____
<input type="checkbox"/> Corporation	Other Professionals _____
<input type="checkbox"/> Joint Venture	Technical Support _____
	Other _____

## APPENDIX B - DECLARATION/CERTIFICATIONS FORM (CONT'D)

### Federal Contractors Program for Employment Equity - Certification

I, the Proponent, 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 proposal non-responsive, or will declare a consultant in default, if a certification is found to be untrue, whether during the proposal evaluation period or during the contract period. Canada will have the right to ask for additional information to verify the Proponent's certifications. Failure to comply with any request or requirement imposed by Canada may render the proposal 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: \_\_\_\_\_ (YY/MM/DD) (If left blank, the date will be deemed to be the bid closing date.)

Complete both A and B.

A. Check only one of the following:

- A1. The Proponent certifies having no work force in Canada.
- A2. The Proponent certifies being a public sector employer.
- A3. The Proponent certifies being a federally regulated employer being subject to the *Employment Equity Act*.
- A4. The Proponent 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 Proponent has a combined work force in Canada of 100 or more employees;  
and

## APPENDIX B - DECLARATION/CERTIFICATIONS FORM (CONT'D)

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

**OR**

- A5.2. The Proponent 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 Proponent is not a Joint Venture.

**OR**

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

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## APPENDIX B - DECLARATION/CERTIFICATIONS FORM (CONT'D)

### Former Public Servant (FPS) - Certification

Contracts awarded to former public servants (FPS) in receipt of a pension or of a lump sum payment must bear the closest public scrutiny, and reflect fairness in the spending of public funds. In order to comply with Treasury Board policies and directives on contracts awarded to FPS, proponents must provide the information required below before contract award. If the answer to the questions and, as applicable the information required have not been received by the time the evaluation of proposals is completed, Canada will inform the Proponent of a time frame within which to provide the information. Failure to comply with Canada's request and meet the requirement within the prescribed time frame will render the proposal non-responsive.

### Definitions

For the purposes of this clause,

"former public servant" is any former member of a department as defined in the *Financial Administration Act*, R.S., 1985, c. F-11, a former member of the Canadian Armed Forces or a former member of the Royal Canadian Mounted Police. A former public servant may be:

- (a) an individual;
- (b) an individual who has incorporated;
- (c) a partnership made of former public servants; or
- (d) a sole proprietorship or entity where the affected individual has a controlling or major interest in the entity.

"lump sum payment period" means the period measured in weeks of salary, for which payment has been made to facilitate the transition to retirement or to other employment as a result of the implementation of various programs to reduce the size of the Public Service. The lump sum payment period does not include the period of severance pay, which is measured in a like manner.

"pension" means a pension or annual allowance paid under the *Public Service Superannuation Act* (PSSA), R.S., 1985, c.P-36, and any increases paid pursuant to the *Supplementary Retirement Benefits Act*, R.S., 1985, c.S-24 as it affects the PSSA. It does not include pensions payable pursuant to the *Canadian Forces Superannuation Act*, R.S., 1985, c.C-17, the *Defence Services Pension Continuation Act*, 1970, c.D-3, the *Royal Canadian Mounted Police Pension Continuation Act*, 1970, c.R-10, and the *Royal Canadian Mounted Police Superannuation Act*, R.S., 1985, c.R-11, the *Members of Parliament Retiring Allowances Act*, R.S., 1985, c.M-5, and that portion of pension payable to the *Canada Pension Plan Act*, R.S., 1985, c.C-8.

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## APPENDIX B - DECLARATION/CERTIFICATIONS FORM (CONT'D)

### Former Public Servant in Receipt of a Pension

As per the above definitions, is the Proponent a FPS in receipt of a pension?

YES ( ) NO ( )

If so, the Proponent must provide the following information, for all FPS in receipt of a pension, as applicable:

- (a) name of former public servant;
- (b) date of termination of employment or retirement from the Public Service.

By providing this information, proponents agree that the successful Proponent's status, with respect to being a former public servant in receipt of a pension, will be reported on departmental websites as part of the published proactive disclosure reports in accordance with Contracting Policy Notice: 2012-2 and the Guidelines on the Proactive Disclosure of Contracts.

### Work Force Adjustment Directive

Is the Proponent a FPS who received a lump sum payment pursuant to the terms of a work force reduction program? YES ( ) NO ( )

If so, the Proponent must provide the following information:

- (a) name of former public servant;
- (b) conditions of the lump sum payment incentive;
- (c) date of termination of employment;
- (d) amount of lump sum payment;
- (e) rate of pay on which lump sum payment is based;
- (f) period of lump sum payment including start date, end date and number of weeks;
- (g) number and amount (professional fees) of other contracts subject to the restrictions of a work force adjustment program.

For all contracts awarded during the lump sum payment period, the total amount of fees that may be paid to a FPS who received a lump sum payment is \$5,000, including Applicable Taxes.

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No./ N° VME - FMS

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## APPENDIX B - DECLARATION/CERTIFICATIONS FORM (CONT'D)

### Name of Proponent:

#### DECLARATION:

I, the undersigned, being a principal of the proponent, hereby certify that the information given on this form and in the attached proposal is accurate to the best of my knowledge. If any proposal is submitted by a partnership or joint venture, then the following is required from each component entity.

..... name	..... signature
..... title	
I have authority to bind the Corporation / Partnership / Sole Proprietorship / Joint Venture	
..... name	..... signature
..... title	
I have authority to bind the Corporation / Partnership / Sole Proprietorship / Joint Venture	
..... name	..... signature
..... title	
I have authority to bind the Corporation / Partnership / Sole Proprietorship / Joint Venture	

During proposal evaluation period, PWGSC contact will be with the following person: \_\_\_\_\_.

Telephone Number: (    ) \_\_\_\_\_ Fax Number: (    ) \_\_\_\_\_

E-mail: \_\_\_\_\_

This Appendix "B" should be completed and submitted with the proposal, but may be submitted afterwards as follows: if Appendix "B" is not completed and submitted with the proposal, the Contracting Authority will inform the Proponent 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 proposal non-responsive.



N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No. / N° VME - FMS

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## APPENDIX C - PRICE PROPOSAL FORM

## APPENDIX C - PRICE PROPOSAL FORM

INSTRUCTIONS: Complete this Price Proposal Form and submit in a **separate sealed envelope** with the Name of Proponent, Name of Project, PWGSC Solicitation Number, and the words "PRICE PROPOSAL FORM" typed on the outside of the envelope. Price Proposals are not to include Applicable Taxes.

PROponents SHALL NOT ALTER THIS FORM

**Project Title:**

**Name of Proponent:**

**The following will form part of the evaluation process:**

### REQUIRED SERVICES

**Fixed Fee** (R1230D (2015-02-25), GC 5 - Terms of Payment)

SERVICES	FIXED FEE
<u>Site A – Brighton Road Swing Bridge</u>	
RS 1A      Analysis of Project Scope of Work	\$.....
RS 2A      Management of Consultant's In-House and External Resources and Services	\$.....
RS 3A      Investigations, Studies and Reports (Services)	\$.....
RS 4A      Estimating and Cost Planning	\$.....
RS 5A      Risk Management and Quality Management	\$.....
RS 6A      Design Concept	\$.....
RS 7A      Design Development	\$.....
RS 8A      Construction Documents, Pre-Tender Construction Cost Estimate, Risk Management Plan and Project Schedule	\$.....
RS 9A      Tender Call, Bid Evaluation and Construction Contract Award	\$.....

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pwl035  
N° CCC / CCC No./ N° VME - FMS

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RS 10A	Construction and Contract Administration	\$.....
RS 11A	Resident Site Services During Construction	<u>\$.....</u>

**TOTAL FIXED FEES SITE A** \$

Site B – Hamlet Swing & Fixed Bridges:

RS 1B	Analysis of Project Scope of Work	\$.....
RS 2B	Management of Consultant's In-House and External Resources and Services	\$.....
RS 3B	Investigations, Studies and Reports (Services)	\$.....
RS 4B	Estimating and Cost Planning	\$.....
RS 5B	Risk Management and Quality Management	\$.....
RS 6B	Design Concept	\$.....
RS 7B	Design Development	\$.....
RS 8B	Construction Documents, Pre-Tender Construction Cost Estimate, Risk Management Plan and Project Schedule	\$.....
RS 9B	Tender Call, Bid Evaluation and Construction Contract Award	\$.....
RS 10B	Construction and Contract Administration	\$.....
RS 11B	Resident Site Services During Construction	<u>\$.....</u>

**TOTAL FIXED FEES SITE B** \$

**MAXIMUM FIXED FEES (SITE A + SITE B)** \$.....<sup>1</sup>

**APPENDIX C - PRICE PROPOSAL FORM (CONT'D)**

**Time Based Fees (R1230D (2015-02-25), GC 5 - Terms of Payment)**

Site A – Brighton Road Swing Bridge

<b>RS 12A Post Construction Services*</b>	<b>ESTIMATED HOURS</b> Column A	<b>HOURLY RATES**</b> Column B	<b>TIME BASED FEE</b> Columns AxB
Project Manager	30	\$.....	\$.....
Civil/Structural Engineer	30	\$.....	\$.....
Mechanical Engineer	30	\$.....	\$.....
Electrical/Controls Engineer	30	\$.....	\$.....

**TOTAL TIME BASED FEES SITE A** \$ .....

Site B – Hamlet Swing & Fixed Bridges

<b>RS 12B Post Construction Services*</b>	<b>ESTIMATED HOURS</b> Column A	<b>HOURLY RATES**</b> Column B	<b>TIME BASED FEE</b> Columns AxB
Project Manager	30	\$.....	\$.....
Civil/Structural Engineer	30	\$.....	\$.....
Mechanical Engineer	30	\$.....	\$.....
Electrical/Controls Engineer	30	\$.....	\$.....

**TOTAL TIME BASED FEES SITE B** \$ .....

**MAXIMUM TIME BASED FEES (Site A & B)** \$.....<sup>2</sup>

\*Payment will be based on actual hours spent. Travel time and/or expenses will not be reimbursed separately (Refer to R1230D (2015-02-25), GC 5.12 – Disbursements).

\*\* All inclusive hourly rate is applicable to both normal working hours and any other shift work as required.

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No./ N° VME - FMS

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**Disbursements** (R1230D (2015-02-25), GC 5.12 Disbursements, article 2.d)

Site A - Brighton Road Swing Bridge:

<b>RS 3A</b>	Investigations, Studies and Reports	\$.....
<b>RS 10A</b>	Construction and Contract Administration	
	NACE Inspector	\$.....
	Material/Product and Performance Testing	<u>\$.....</u>
<b>TOTAL DISBURSEMENTS SITE A</b>		<b>\$.....</b>

Site B - Hamlet Swing & Fixed Bridges:

<b>RS 3B</b>	Investigations, Studies and Reports	\$.....
<b>RS 10B</b>	Construction and Contract Administration -	
	NACE Inspector	\$.....
	Material/Product and Performance Testing	<u>\$.....</u>
<b>TOTAL DISBURSEMENTS SITE B</b>		<b>\$.....</b>

**MAXIMUM AMOUNT FOR DISBURSEMENTS (Site A & B)** \$.....<sup>3</sup>

**Hourly Rates (for Evaluation Purposes)**

The Estimated Hours provided below are for evaluation purposes only. While the resulting Time Based Fee will not form part of the awarded contract value, the Hourly Rate may be used for future contract amendments should the services below be required beyond the stated construction period duration.

Site A – Brighton Road Swing Bridge:

<b>RS 10A Construction and Contract Administration – In excess of stated construction period duration***</b>	<b>ESTIMATED HOURS</b> Column A	<b>HOURLY RATE**</b> Column B	<b>TIME BASED FEE</b> Columns AxB
Civil/Structural Design Engineer	16	\$.....	\$.....

<b>RS 11A Resident Site Services During Construction – In excess of stated construction period duration***</b>	<b>ESTIMATED HOURS</b> Column A	<b>HOURLY RATE**</b> Column B	<b>TIME BASED FEE</b> Columns AxB
Full-time Site Representative	80	\$.....	\$.....

Site B – Hamlet Swing & Fixed Bridges:

<b>RS 10B Construction and Contract Administration – In excess of stated construction period duration***</b>	<b>ESTIMATED HOURS</b> Column A	<b>HOURLY RATE**</b> Column B	<b>TIME BASED FEE</b> Columns AxB
Civil/Structural Design Engineer	16	\$.....	\$.....

<b>RS 11B Resident Site Services During Construction – In excess of stated construction period duration***</b>	<b>ESTIMATED HOURS</b> Column A	<b>HOURLY RATE**</b> Column B	<b>TIME BASED FEE</b> Columns AxB
Full-time Site Representative	80	\$.....	\$.....

\*\* All inclusive hourly rate is applicable to both normal working hours and any other shift work as required.

\*\*\*Payment will be based on actual hours spent.

**TOTAL Estimated Time Based Fees** \$.....<sup>4</sup>

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No./ N° VME - FMS

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**TOTAL COST OF SERVICES FOR PROPOSAL EVALUATION PURPOSES**

Total Fixed Fee	\$.....	1
Total Time Based Fee	\$.....	2
Disbursements	\$.....	3
Hourly Rates (for Evaluation Purposes)	\$.....	4
Total Evaluated Fee	\$.....	

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**END OF PRICE PROPOSAL FORM**

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pwl035  
N° CCC / CCC No. / N° VME - FMS

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## **APPENDIX D – DOING BUSINESS WITH A&E ONTARIO REGION**

# **Doing Business with A&E**

## **Ontario Region**

### **Standing Offers**

## **Table of Content:**

**Section 1.....General**

**Section 2.....Architectural Design**

**Section 3.....Landscaping and Site Development**

**Section 4.....Specification Brief**

**Section 5.....Marine**

**Section 6.....Risk Management**

**Section 7A.....Civil Design**

**Section 7B.....Bridge Design**

**Section 8.....Structural Design**

**Section 9.....Mechanical Design**

**Section 10A..... Electrical Work Procedures**

**Section 10B..... General Electrical Design**

**Section 10C..... General Electrical Design (CSC) Correctional Service  
Canada**

**Section 11.....Cost Planning and Control**

**Section 12.....Elemental Cost Analysis**

**Section 13.....Time Management**

**Section 14.....Drawing Conversion to Portable Document Format (PDF)**

## **SECTION 1 GENERAL DESIGN, DOCUMENTATION AND SUBMISSION STANDARDS**

### **1.1 Introduction**

The purpose of this document is to help the consultants to perform their work while dealing with the Ontario Region of PWGSC. It is to complement the requirements stated in the main body of the RFP or the RFSO, in particular in the Project Brief and the Required Services sections. This document elaborates on specific items that are particular to the Ontario Region but in no way does it supersede the main clauses of the RFP or the RFSO.

The Consultant is responsible to ensure they receive from the PWGSC Project Manager, an updated copy of Appendix D current at the time of the call up on the standing offer.

### **1.2 Document Management**

All project documents are to be electronically distributed to project stakeholders through the use of a commercially available, secure internet, web based browser software application system. Documents must be distributed in pdf format, with an e-mail notification system to stakeholders. Individual pdf files must not exceed 4MB. Version and document control features are required to enable review of previous documents issued. The document system must be managed and operated by the consultant, who shall control secure access rights to project stakeholders identified by the PWGSC Project Manager.

### **1.3 Sustainability**

Use sustainable design principles to achieve a minimum building performance rating of:

1. New construction projects are to meet the standards of LEED Gold.
2. Major renovation projects ( $\pm 5M$  of construction cost) are to meet the standards of LEED Silver.
3. Heritage building projects are to meet the standards of "Sustainability Rating System for Heritage Buildings and Sites".
4. For all other projects, the principles of sustainability shall be followed.

Comply with PWGSC- Strategic Framework for Sustainability in Buildings, April 1, 2012.

### **1.4 Drawings**

The drawings are complementary to the specification. They should describe the extent of work. Do not rely on a mandatory site visit to complete the information. Notes such as "verify on site", "as instructed", "to be determined on site by Departmental Representative", will not generate accurate bids and may result in unnecessarily high bid prices. The drawings shall allow the Bidders to bid accurately and calculate all quantities. If quantities are impossible to show (i.e. cracks to be repaired) give a quantity for bid purposes.

Construction drawings should be strictly technical drawings, fully detailed and dimensioned, clearly and accurately drawn, complete with all necessary descriptive notes. On all drawings present the work to be done as clearly as possible. Draw details at sufficient scales to eliminate doubt as to the method of construction, materials and quantities required. Required sheet order: plans; elevations; main sections; and details. Avoid wasted space but ensure that sheets are not overcrowded or difficult to read.

Do not submit blank sheets in progress sets of drawings issued for review.

The terminology used should be consistent throughout the drawings and specification.

Design on a modular basis to take advantage of dimensional standardization and co-ordination.

Drawings have to be in metric only even if the project is to renovate an old building. Any references to imperial units will not be accepted.

Consultants MUST follow the "PWGSC CADD Standards" attached at the end or available electronically at:

- PWGSC's ftp site: <ftp://ftp.pwgsc.gc.ca/rps/Specifications/Drawings/CADD%20Standards/>
- On the web, at: <http://www.tpsgc-pwgsc.gc.ca/biens-property/cdao-cadd/index-eng.html>  
(this document refers to NCR contacts)

When prepared by Consultants, the final drawings (original) shall bear the Professional's seal and signature.

### **1.5 Standard Drawing Information**

PWGSC will provide the following standard items to the consultants with respect to CADD

- AutoCAD format Borders (14 sizes)
- Site legend w/ symbols
- AutoCAD plotting ctb (colour table) files
- Graphic Bar Scales and North Arrow in AutoCAD format
- AutoCAD template files

### **1.6 Detail / Section numbers**

Use the 3-part "bubble" provided in the supplied borders to reference details, sections, etc. The 3-part "bubble" will contain the detail / section number, the number of the drawing where it is required and the number of the drawing where it is detailed. This pattern MUST be adhered to.

### **1.7 Presentation Requirements**

Present drawings in sets comprising the applicable architectural, interior design, structural, mechanical, electrical, landscaping and civil drawings in that order. All drawings shall be of uniform standard size. Print with black lines on white paper. Staple or otherwise bind prints into sets. Where presentations exceed 20 sheets, the drawings for each discipline may be bound separately for convenience and ease of handling.

### **1.8 Title Sheets**

Title sheets may be used at the Consultant's discretion, for design presentations or on large sets of Construction drawings.

### **1.9 Indices**

Provide an index at the front of each set of drawings. Where a large number of sheets are involved, place the index on a title sheet or at the front of each set of the various disciplines. Include drawing indices in the specifications after the Table of Contents.

### **1.10 Legends**

Provide a legend of symbols, abbreviations, references, etc., on the front sheet of each set of drawings or, in large sets of drawings, immediately after the title sheet and index sheets. Coordinate abbreviations and acronyms with PWGSC Section 01 42 13.

### **1.11 Drawing Notes**

Indicate all materials, systems and products on the drawings by means of numbered notes.

Demolition Notes:	note number in a 7mm square box
Construction Notes:	note number in a 7mm diameter circle
Revision Notes:	note number in a 7mm triangle
Assembly Notes:	note number in a 10mm hexagon

adjacent to the appropriate location on the plan, section or detail with an arrow connecting the box, circle, triangle or hexagon to the specific material, system or product indicated on the drawing. Provide a list of drawing notes relating to the sequentially numbered notes on the right hand side of the drawing sheet adjacent to the title block. Minimum text size: 2mm. Do not repeat text that is already in the SACC or specification.

### **1.12 North Points**

On all plans include a north point. Orient all plans in the same direction for easy cross referencing. Wherever possible, lay out plans so that the north point is at the top of the sheet.

### **1.13 Abbreviation Standards**

Use text abbreviations with discretion, to ensure that there will be no misunderstanding on the drawings. Follow abbreviation list provided as part of specification standards from the ftp site. Co-ordinate with PWGSC Section 01 42 13 Abbreviations and Acronyms.

### **1.14 Drawing Symbols**

Follow generally accepted drawing conventions, understandable by the construction trades, if more symbols are required than are provided by PWGSC.

### **1.15 Drawing Scale**

For all drawings, including details, provide a graphic scale for each drawing and detail. PDF files shall be created to full plotted scale.

### **1.16 As-Built and Record Information**

As-built information is received from the Contractor. It contains drawings, specifications, shop drawings, submittals, samples, etc. It is noted as such by the Contractor.

Record drawings and specifications are updated originals prepared by the Consultants based on the information supplied by the Contractor in the as-built.

### **1.17 Shop Drawing Submittal Log**

Fill in and submit the PWGSC Ontario Region Shop Drawing Submittal Log with each application for

payment. Shop Drawing Submittal Log is available in MS Excel from the PWGSC ftp site at:  
<ftp://ftp.pwgsc.gc.ca/rps/Specifications/Master%20Schedules%20and%20Small%20Drawings/EXCEL/>

### 1.18 Bid Documents Format

All bid documents will be submitted by the consultant in the bid document files native electronic format as well as .pdf format, as follows:

PDF Properties:

1. Each pdf file must be of a uniform and standard pdf paper size within the contents of each file.

Drawings:

1. Each drawing is to be converted to a PDF file. 1 drawing per file.
2. The file shall be named with the drawing number and then the title of the drawing from the drawing title block (e.g. A01 - Architectural Cover Page)

Specifications:

1. The complete Project Specification is to be converted to one PDF file, with a pdf page size of 8.5" x 11", portrait orientation.. One (1) PDF per complete project specification, all Divisions. The file shall be named with the project number and then the word Specification (e.g. R.123456.001 Specification).
2. Where tables or schedules within the Specification do not conform to the 8.5" x 11" format, they are to be converted to PDF files of the appropriate sheet size and included in the submission as appendices. Identify such files as appendices in the Specification Table of Contents.
3. Any amendments shall be converted to a PDF file. Text should be converted into one file. Drawings shall be one drawing per PDF file. The name for each text file shall be "Amendment Number #." The name for each amendment drawing file shall be "Amendment Number # - Drawing XXX" (where XXX is the name of the drawing).

Creation of CD/DVDs (when specifically requested):

1. The files above shall be burned onto CD/DVD(s).
2. When the PDFs are burned onto the CD/DVD, folders shall be created. The folders will be "Drawings", "Specifications", and "Amendments". The Plans and Specifications - Table of Contents PDF will reside at the uppermost level with the three folders.
3. CD/DVDs should be labeled with the following information:
  - a) Description from the Drawing Title Block
  - b) Project Number
  - c) Solicitation Number
  - d) "Original Solicitation" OR "Amendment #X" OR "Addenda # X"
  - e) Number of CDs in this grouping (e.g. 1 of 3)

### 1.19 Principles of PWGSC Contract Documents

PWGSC's contract documents are based on common public procurement principles. PWGSC does not use Canadian Construction Document Committee (CCDC) documents. The terms and conditions are prepared and issued by PWGSC as well as other related bidding and contractual documents.

For information, the clauses are available on the following web sites: SACC at  
<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R>

and the CAD standards at <http://www.tpsgc-pwgsc.gc.ca/biens-property/cdao-cadd/index-eng.html> . Any questions should be directed to the PWGSC Project Manager.

## 1.20 Quality Assurance

Consultants are required to undertake their own quality control process and must review, correct and coordinate (between disciplines) their documents before sending them to PWGSC.

Submissions of the project manual that do not comply with the RFP design and submission requirements, and/or are not compliant to the current codes and standards may be subject to written complaints to the consultant's licensing and accreditation bodies such as the, OAA, AC (formerly RAIC), PEO, CIQS, AATO, OACETT, CSC - Construction Specifications Canada, consultant's liability insurance carrier, etc.

## 1.21 Fit-up Standards

The design for general-purpose office space accommodation for all Government of Canada departments or agencies is to follow and conform to the latest Fit-Up Standards including the selection of systems, materials, furnishings and equipment. Obtain the latest version of the "Government of Canada Workplace 2.0 Fit-Up Standards" from the PWGSC Project Manager.

Note that the breakdown of the cost estimate at each stage of delivery should reflect the funding accountabilities for the components of an accommodation project as described in the "A3.3 Fit-Up Components and Funding Accountabilities" chart in the "Government of Canada Workplace 2.0 Fit-Up Standards", i.e. Base building cost vs. Fit-Up Standard cost vs. other cost.

## 1.22 Heritage Value

The Treasury Board Heritage Building Policy states "Departments must manage buildings they administer so as to conserve their heritage character throughout their life cycles." Any modification considered to a Government of Canada building or site should value its architectural character, no matter how old or how new the building or site may be.

For a federal (Government of Canada) building that is designated as classified or recognized by the Federal Heritage Building Review Office (FHBRO), implement the project following a conservation approach based on accepted principles and practices as described in the "Standards and Guidelines for the Conservation of Historic Places in Canada."

## 1.23 Barrier Free Design for Disabled

Design buildings and grounds to make them accessible and usable by disabled persons, unless otherwise required in the Project Brief. Conform to CAN/CSA-B651-04(R2010), including making buildings and other facilities accessible to persons with a range of physical, sensory and cognitive disabilities. Adhere to specific client requirements as directed, and Correctional Service Canada (CSC) policy on accessibility for CSC projects.

Also conform to Treasury Board of Canada Secretariat Accessibility Standard for Real Property, web link: <http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12044&section=text>

## 1.24 Minimum Codes and Standards

The most stringent requirements of the following codes and standards shall apply:

National Building Code of Canada.  
National Fire Code of Canada.  
National Plumbing Code of Canada.  
Canada Labour Code Part II (Occupational Safety and Health).  
Fire Commissioner of Canada Standards.  
Federal Boiler Emission Regulations.  
Federal Environment Code of Practices.  
PWGSC Federal Office Building Standards.  
Treasury Board of Canada Secretariat Standards and Directives.  
Canadian Electrical Code.  
Canadian Standards Association Specifications, Standards and Guidelines.  
ANSI, ASHRAE, ASTM, AWMAC, FM, MPI, TSSA, ULC etc. Standards, Guidelines and Handbooks.  
Model National Energy Code of Canada for Buildings.  
Provincial Codes, Municipal Codes/By-Laws and Utility Authority Codes.

Additional codes and standards are detailed in the sections for specific disciplines.

### **1.25 Operating Costs**

Operating costs must be kept to a minimum and reflect the projected operating costs in the Cost Plan. This is to be achieved by compliance with the Energy Budget, selection of materials and equipment, requiring the minimum of operating personnel, and building finishes for easy maintenance, etc..

## **SECTION 2 ARCHITECTURAL DESIGN**

### **2.1 Review**

All designs must be reviewed by the Department and conform to the requirements of the Project Brief.

### **2.2 Principles**

The Department expects the Consultant to maintain a high standard of architectural design, based upon recognized contemporary design principles. All design elements, planning, architectural, engineering and landscaping, must be fully co-ordinated, and consistent in adherence to good design principles.

### **2.3 Economy**

Design strictly within the budget and in accordance with sound investment economics and operating and maintenance expenditures.

Design for the optimum ratio of net usable space to outside gross areas.

### **2.4 Flexibility**

Design for maximum flexibility in immediate and future use of space. Where possible, devise a building grid with column spacing, fenestration and service runs suited to flexible interior space arrangements.

### **2.5 Future Extension**

Design for future extension as determined by the Departmental Representative and ensure that permanent spaces, such as service rooms and duct spaces, etc., are sized for future additional capacity.

### **2.6 Quality**

Quality of materials and construction methods shall be commensurate with the type of building and the budget. Avoid experimental materials. Take into account the total life-cycling of the building.

### **2.7 Regulations**

Design shall comply with applicable Federal, Provincial and Municipal regulations and codes. In case of conflict, the most stringent requirements apply.

### **2.8 Design**

The Department expects imaginative design and good aesthetic expression throughout all projects. Design shall be compatible with adjacent buildings, or with the existing building in extension work.

### **2.9 Required Space**

Provide all rooms required to within 10% of the approved areas. Deviation from this requirement may entail redesign.

## **2.10 Ancillary Space**

Provide washrooms, janitor's rooms, furnace rooms, electrical panel and transformer rooms, storage rooms, freight and garbage holding areas, duct spaces and other building service space not specifically listed in the Project Brief, but essential to the efficient operation of the building.

## **2.11 Fit-up Standards**

In accordance with Section 1.

## **2.12 Heritage Value**

In accordance with Section 1.

## **2.13 Barrier Free Design for Disabled**

In accordance with Section 1.

## **2.14 Colour Schemes**

All colour schemes require PWGSC approval. Submit schemes in duplicate well in advance and so as not to delay the work of the Contractor. Colour schemes should include all surfaces and materials to be coloured on site, plus any items provided with a colour finish or texture during prefabrication. Indicate any untreated or natural-finish surfaces contributing to the overall aesthetic appearance of the project. To fully illustrate the scheme, provide PWGSC with actual samples (colour chips, material samples, etc..) of interior finishes that are to be installed. Revise the scheme if necessary to obtain final PWGSC approval. Ensure that the Contractor carries out the approved scheme. One copy of the approved scheme will be retained by PWGSC for verification of the final results on site.

## **2.15 Codes and Standards**

In accordance with Section 1.

## **SECTION 3 LANDSCAPING AND SITE DEVELOPMENT**

### **3.1 General Design**

The general design of the site and the landscaping layout is subject to the overall design requirements covered in the Project Brief.

Although the Department does not require elaborate and costly landscape layouts, the visual appearance of the external environment is considered of functional importance, forming a logical continuation of the building design. Relate all elements to each other, to human scale and to their general surroundings.

Include with concept submission a realistic representation of the proposed site lay-out. Provide cross-sections to indicate the 3-dimensional relationship.

### **3.2 Existing Features**

Preserve existing site features and integrate them with the new site design. This pertains not only to the use of existing trees, shrubs, rock and water, but also includes those elements, vistas, other buildings, outside the property lines which may have influence on the total space composition.

Insure preservation of all useful topsoil and the protection of all areas, grades, watercourses, etc. which should not be interfered with during construction operations.

The use of existing trees must depend on their health, life expectancy and risk of damage during construction. Their root systems, and the immediate grade above, should remain undisturbed. If changes of grade are required close to a tree, provide the proper measures for its continued health.

Obtain copy of "Tree and Shrub Preservation" Section 32 01 90.33 from the NMS Specification System and use as part of project specification.

### **3.3 Site Layout**

Design the site layout simultaneously with that of the building(s) to ensure optimum compatibility. Take into account all services, and areas scheduled for future building expansion, etc.

Use hard and soft landscaping to create desirable space organization, open and close areas, privacy, enclosure, exposure or emphasis of certain site aspects, views, etc. Co-ordinate the character and massing of grading, trees, shrubs, site structures, etc. with that of the building(s) and adjacent property.

Employ water efficient landscaping, maximize open space to reduce heat island effect in keeping with sustainable site guidelines. Take into account climatic factors, orientation, prevailing winds, snow drifting and the microclimate.

Control soil erosion, airborne dust generation and waterway sedimentation during construction activities.

Provide proper access and clearance to suit FCC and local fire regulations.

Face main entrances and main walkways towards the sun (south) to maximize ice-free conditions. This also applies to entrance canopies, balconies, and barrier-free parking.

### 3.4 Maintenance

Design to assure easy economical maintenance to suit an equipment-oriented maintenance program.

Arrange grading to ensure fast drainage, but avoid steep slopes. If these are inevitable, use a ground cover that reduces maintenance to a minimum. Avoid deep ditches with steep sides.

Where possible arrange planting, screening, berms, etc. to inhibit snow drifting that may occur across walkways, roads and parking areas.

In regions subject to heavy snowfall arrange roads and parking areas to allow maneuvering of fast moving snow plows. Provide storage space for snow beside parking lots.

Allow sufficient room for tractor power mowers, snow removers, etc. to maneuver. Keep grass areas large and simple with no awkward inaccessible corners.

Consider the use of mowing strips adjacent to all buildings, fences, etc. These are paved strips 380 mm wide to accommodate power mower wheels.

Provide adequate watering facilities. Generally hose bibbs, strategically placed, are sufficient for Federal projects. Underground sprinkler systems may only be used where justified by the complexity of the design, importance of the project, drought possibilities, etc. and as approved by the Departmental Representative.

Provide adequate on-site, under-cover storage facilities for maintenance equipment.

### 3.5 Circulation

Design the site circulation to provide for:

- .1 Pedestrian movement, including the disabled. (wheelchair, walker, scooter. Long white cane, etc.)
- .2 Automobile movement, unloading and parking, convenient highway access.
- .3 Service vehicles, convenient highway access, loading, unloading, turning and short term parking.
- .4 Bicycle parking.
- .5 Public transportation, drop-off and loading zones, when required.

Provide sufficient pedestrian areas to accommodate all traffic during peak circulation periods.

Keep the road system for vehicles to a minimum and avoid unnecessary paving of large areas. Provide visitors parking and barrier-free parking near main entrances, with convenient drop-off zones. Public transportation loading zones should preferably be close to building entrances. Bus traffic, when planned for on the site, should not interfere with peak traffic flow from parking areas.

### 3.6 Walkways

Walkways, including pedestrian ramps, shall be of non-slip concrete or asphalt, minimum 1500 mm wide; 1800 mm wide where mechanical snow removal equipment is to be used.

At least one walkway should give adequate access for disabled persons to each building. Basically this means that a wheelchair, power wheelchair, scooter, or a person who uses crutches, a walker, a long white cane or a guide dog can travel easily from the street or parking lot right into the building without having to negotiate raised curbs, steps or steep gradients, etc. Conform to CAN/CSA-B651-04(R2010), Accessible Design for the Built Environment.

Provide ample hard surfacing at building entrances. Consider the use of alternative surfacing such as hard-baked bricks, asphalt, paving blocks, concrete slabs with coloured or textured finishes. Surfaces shall stand up to snow removal operations and de-icing agents.

### **3.7 Parking**

Conform to local zoning ordinances.

Provide adequate parking for staff, visitors and service vehicles, and as required in the Project Brief.

Locate parking areas where they will not detract from the aesthetics of the building and landscaping, but will still be easily accessible and functional. Limit the walking distance to building entrances to 150 m. Up to 250 m may be approved in extreme circumstances. City of Toronto Accessibility Design Guidelines article 1.2.5 Parking, Policy, "Designated accessible parking space(s), whether external or internal, should be provided within 30 m of the main accessible entrance and/or any other accessible entrances." Check local bylaws for the municipality where the project is located.

Avoid large single parking lots. Use landscaped islands, screen planting and trees, providing they do not interfere with driver's vision or with snow removal and storage. Locate walks clear of the overhang of cars parked up to curbs. Use hard surfacing under such overhangs. Provide preferred parking for vanpools and carpools. Provide service areas large enough to maneuver trucks without excessive pavement. Minimize the need for backing-up.

At major bus stops with frequent stops and starts, consider concrete paving the bus stop if the street has asphalt paving.

### **3.8 Snow Clearing**

Design for ease of snow removal. Incorporate adequate snow storage areas, clear of low planting and graded for good run-off. Avoid the use of unnecessary curbs where snowfall is heavy, limit parking lots to 175 cars or less, and not more than 60 m in length, with storage areas at one end and/or on grass covered islands. Where snow storage space is limited, design lots slightly oversize to allow for temporary snow storage. Artificial mounds should not aggravate snow drifting problems, particularly across walks or paved areas.

### **3.9 Grading and Drainage**

Design finished grades to provide positive drainage of all lawns and paved areas, with a minimum of 2% for lawn areas. Allow no drainage of surface water onto neighbouring property unless approved by the Departmental Representative.

Use stormwater design principles for quality and quantity control of stormwater run off and ensure accepted pre-development peak discharges are not exceeded while promoting infiltration.

Treat unpaved slopes steeper than 3:1 (33%) with ground cover, riprap or use retaining walls. Grass is not recommended.

Consider the design value of grading to enhance visual effects and to achieve economy in the use of on-site material, although this may not be the prime consideration. Avoid the need to move large volumes of soil.

On-site material may be used to create visual barriers or mounds, acting as screens for the deflection of wind and noise, and for the guiding of traffic in desired directions. Use mounds only if the site is large enough to permit long naturally blending slopes. Round off the tops and bottoms of all slopes to avoid sharp transitions.

Design for fast drainage of areas where snow will be stockpiled. Direct the drainage towards gutters to minimize the effect of de-icing agents on lawns. Allow no drainage over sidewalks.

Locate ditches, swales and flumes where they will not detract from the visual effect of the site. Where their use or depths would be excessive, provide catchbasins. Design ditches to handle maximum run-off, but make them as shallow as possible for ease of maintenance.

Provide against possible ice blocking of drain/catch basin by having two drains not too far apart, thereby mitigating ponding of water on driveways and parking lots.

### **3.10 Retaining Walls**

Maintain a realistic cost relationship between foundation and above-ground construction of low retaining walls and walls for planters. Consider alternatives such as dry stone walls, concrete cribbing, flat foundation on gravel filled trench. Riprap may be used if compatible with the project.

### **3.11 Miscellaneous Site Features**

Design miscellaneous site features to complement the overall site treatment and relate their design and use of material to the main building(s). Common items are as follows:

**Site structures:** Co-ordinate the design, location and elevation of all supporting site structures such as transformers, kiosks, gas valves, storage bins for sand, de-icing agents, etc., to ensure compatibility with all project features. Large projects may require storage space for maintenance equipment and covered lunchroom facilities for personnel.

**Planters:** These may be included on large paved areas near entrances and in courtyards. Where they form part of a permanent structure, specify sufficient insulation to reduce frost penetration from the sides. Provide for a 150 mm layer of clean gravel and drainage holes. Locate holes to avoid straining walls or pavement and specify a geotextile to separate gravel and topsoil.

**Fencing and walls:** Co-ordinate the design of perimeter fencing, walls, site screens, decorative walls, etc., with the general landscaping treatment.

For ease of grass cutting, avoid use of retaining walls. Consider "sloping green carpet".

Furniture: Cater for public and/or personnel use of the site by provision of seating facilities, litter bins, drinking fountains, etc., as anticipated.

Car heater outlets: These should be inconspicuous and solidly supported. Their location shall not interfere with parking and snow removal. Use only when special permission for their use has been granted.

Signs: Base traffic signs on the "FIP - Federal Identity Program Manual" and the "Canadian Uniform Sign Manual" available from "Roads and Transportation Association of Canada", 875 Carling Avenue, Ottawa, Ontario. Conform to sign requirements for disabled persons. All signs shall be bilingual, simple, easy to read, consistent in mounting heights and not used unnecessarily.

Outdoor lighting: Provide outdoor lighting at strategic points, near entrance steps, walkways, loading ways, parking areas, and at those locations where regular evening traffic can be expected. Refer to the Project Directive for any special requirements for floodlighting, emergency and security lighting, etc. that may be required. Employ light pollution reduction strategies and apply zone specific classifications to determine site lighting criteria for safe light levels.

Flagpoles: Locate in prominent positions clearly visible to the public and generally related to the main entrance - at grade or attached to the face of the building directly above or near the main entrance, preferably inclined at approximately 45° from the wall face or where this is not possible, vertical to the wall face. Flagpoles must be easily accessible to permit operation under all weather conditions, and may require either paved approaches and steps if at grade level, or simple window or wall opening access if mounted on the building and not directly accessible from grade.

Select flagpole size from the following list, as appropriate:

<u>Flagpole</u>	<u>Flagpole Length</u>	<u>Flag Size (NIC)</u>
Free Standing	5 m to 7.750 m	914 mm x 1829 mm
Flagpole	9 m to 10.750 m	1143 mm x 2286 mm
Wall mounted	12.250 m to 13.750 m	1372 mm x 2793 mm
(Vertical)	15.250 m to 16.750 m	1600 mm x 3200 mm
Wall mounted	2.500 m to 3.750 m	914 mm x 1829 mm
(Outrigger, non braced)	4.500 m	1143 mm x 2286 mm

Flags shall not be included in construction contract (NIC).

Use only standard aluminum manufactured products complete with standard non-fouling hardware for ease of operation. Ensure that all flagpoles are properly protected against lightning. Illumination of flags: Not required on non-designated buildings. Designation shall be given by the Under Secretary of State, through Departmental Representative.

Special Features: Any special design features such as fountains, pools, elaborate courtyards, etc., require justification in terms of the project size, importance, prestige value, location and use, etc. and must be approved by the Departmental Representative.

### **3.12 Fine Artwork**

Where fine artwork is planned for the building exterior or to be free-standing on the site, its location and surroundings must be properly and continuously co-ordinated by the Consultant with the Artist. The

location of the artwork and the nature of its surroundings, approaches, viewpoints, etc., must achieve the optimum artistic effect. As a general rule, keep the artwork's surroundings simple and inconspicuous.

### **3.13 Topsoil, Lawns and Planting**

Refer to appropriate sections of the PWGSC Ontario Region amended National Master Specification and PWGSC In House Specification Sections 31 23 10, 31 23 11, 31 23 12 and 32 90 00. Copies are available upon request.

Existing site topsoil shall be re-used.

Plant material must be from areas with similar climatic conditions to the site, unless otherwise permitted in writing by the Departmental Representative. Planting plans should incorporate plant types best suited to the site, and most likely to transplant successfully and to give vigorous growth within the second year following transplant. The use of container stock is encouraged.

Avoid using trees for foundation planting, especially trees with long fibrous roots.

### **3.14 Instant Landscaping**

This is preferred, and means basically the special use of plant material to achieve an immediate landscaped effect as follows:

By planting trees and shrubs sufficiently large to guarantee quick establishment and vigorous growth. Do not, however, specify trees of such sizes that cost becomes prohibitive and survival doubtful.

By mass-planting of limited varieties.

By close spacing plant, etc. which can be thinned out later.

By planting fast growing trees in combination with slower growing, more permanent varieties. The faster growing trees may be thinned out or removed in later years when the permanent planting is large enough.

Reduce potable water consumption for landscape irrigation by adopting sustainable site principles such as recycled rainwater, and plant species factor.

## SECTION 4 SPECIFICATION BRIEF

### 4.1 Purpose of Section

The purpose of this document is to state specification policy and to provide a framework, format and reference information to assist the specifier in developing the project specifications. It gives additional detail to the information in the NPMS Specification Brief.

### 4.2 Definition

A specification is a written instruction describing type and quality of materials, products, equipment and fixtures; quality of workmanship; methods of fabrication, installation and erection; standards, test and code requirements; and specific sizes of materials. By contrast, the construction drawings present quantities of work and materials, dimensions, locations, form and building details, and show the scope of work.

### 4.3 Legal Status

Specifications are part of the legal contract between the Contractor and the Owner. They provide the basis for accepting or rejecting workmanship or products on site.

### 4.4 Division 00 - General Instructions to Bidders, General Conditions, Etc.

Read and understand the applicable General Instructions to Bidders, General Conditions and other related Division 00 contract documents listed in 4.14.

The SACC Manual references for Division 00 are available on the internet at:  
<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R> or  
<http://ccua-sacc.tpsgc-pwgsc.gc.ca/pub/rese-eng.jsp>

Construction Contract Administration Forms are available at:  
[http://publiservice-app.tpsgc-pwgsc.gc.ca/forms/text/search\\_for\\_forms-e.html](http://publiservice-app.tpsgc-pwgsc.gc.ca/forms/text/search_for_forms-e.html)  
for federal government employees; and

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/formulaires-forms-eng.html>  
for the public.

See the document entitled "Construction Contract Administration Forms Real Property Contracting".

### 4.5 National Master Specification

The National Master Specification (NMS) is a bilingual (English and French) database of master construction specification sections which is owned and managed by PWGSC. It was created in 1975 as a joint effort between several Government of Canada departments and Construction Specifications Canada. The text consists of wording likely to be required for a wide range of construction and/or renovation projects.

In preparing project specifications, the Consultant shall use the latest release of the NMS amended by PWGSC Ontario Region to the maximum extent to which it is applicable, as per PWGSC RPB Real Property Branch Policy on the Use of the National Master Specification NMS 2012 formerly Departmental Policy 039/2001-05-01, TB Minute 732202, subject to the Consultant's overriding responsibility for the final content of the project specification. Use PWGSC Ontario Region amended NMS sections and PWGSC Ontario Region Master Specifications: Architectural, Structural, Mechanical and Civil Minor Works and In-House specification masters available by copying down from the ftp site. The Consultant shall edit, assign new section numbers, amend, and supplement the PWGSC Ontario Region Amended NMS as the Consultant deems necessary to produce an appropriate project specification free from conflict and ambiguity, i.e. new sections not presently included in the NMS database. The Consultant shall be responsible for the cost of processing the project specifications in NMS Professional Specification Editing Software or MS Word 2010 using the Consultant's own or sub-contracted typing/word processing facilities.

The Consultant shall be responsible for all proofreading. Both the NMS and PWGSC Ontario Region Master Specifications follow CSC/CSI MasterFormat 2012 numbering. As of January 2005, the NMS renumbered the entire database in line with MasterFormat 2004 and now MasterFormat 2012 which uses 6, 8 and 10 digit section numbers instead of the previous 5 digit numbers, consisting of two numbers, a hard or connecting space, two more numbers, a hard or connecting space and two more numbers (for example, 01 11 00 instead of 01110). MasterFormat 2012, 2011, 2010 and 2004 divides the work into 50 divisions instead of the previous 16 divisions. In March 2007 the NMS began including 8 digit section numbers, consisting of two numbers, a hard or connecting space, two more numbers, a hard or connecting space, two more numbers, a period and two more numbers (for example, 01 11 00.01).

The Consultant is responsible for obtaining from any authorized supplier, the NMS User's Guide, and an updated version of the NMS specification sections that the Consultant requires in preparing the project specification. Use of the NMS system shall not relieve the Consultant of the responsibility for conforming to the approved time schedule.

#### **4.6 Regional Guide Specifications**

The Centre of Expertise, in some regions, maintains abridged versions of some NMS specifications and a number of other short form guide specifications for materials and equipment not covered by the NMS. These are available from the regional Specifications Offices.

The Consultant shall obtain the region's amended version of Division 01, which also includes requirements peculiar to the Region. The Consultant shall ensure that the Regional requirements of Division 01 sections appropriate to the project are incorporated into the appropriate NMS Division 01 sections. The PWGSC amended Division 01 sections on the ftp site already contain these revisions. Other regional abridged and short form specifications may be used at the Consultant's or the department's option. These are available on the ftp site.

As in the case with the NMS, the Consultant shall be entirely responsible for project specification accuracy, applicability of content, completeness, and correctness, whether or not prepared using the abridged or short form guide specifications referred to herein. This includes using reference standards designations,

dates, titles and technical content current as of the date of bidding. Consult the various standards writing organizations web sites.

#### 4.7 Specification Organization

Section Titles, Numbers and Format: Since its inception, the NMS structure has been and continues to be based on the "MasterFormat 2012" Master List of Section Titles and Numbers and SectionFormat 2008 which are jointly produced by the Construction Specifications Institution of the United States and Construction Specifications Canada. The 2012 NMS is currently based on MasterFormat 2012.(50 Divisions, 6 and 8 digit Section Numbers).

Type of Section: Narrowscope sections describing single units of work are preferred for more complex work; Broadscope sections may be more suitable for less complex work.

Format: Use the NMS wide page or 1/3 - 2/3 format consistently throughout the specification.

#### 4.8 Specifying Materials

The practice of specifying actual brand names, trade names, model numbers, etc., is against departmental policy except for very special circumstances. Some NMS sections incorporate trade names. For PWGSC delete the trade names from the NMS. The method of specifying materials and the use of trade names shall be as stated hereunder, and in the following order of preference:

- Specify by using recognized standards such as those produced by CGA, CGSB, CSA, and ULC, or by trade associations such as AWI/AWMAC/WI, CRCA, MPI and TTMAC. Use Canadian standards wherever possible.
- Where CGSB Qualified Product Lists are available that identify materials that meet requirements of relevant CGSB Standards, specify to restrict supply of materials to those on such lists.
- Current lists are available from: Canadian General Standards Board Sales Centre,
  - OTTAWA, Ontario K1A 1G6
  - Telephone: (613) 941-8703
  - Fax: (613) 941-8705
- Where no standards exist, specify by a non-restrictive, non-trade name "prescription" specification or by a "required performance" specification.
- Where no standards exist and where a suitable non-restrictive, non-trade name "prescription" specification or a "required performance" specification cannot be developed, specify by trade name. Include all trade names available under WTO, NAFTA and other trade agreements, of materials acceptable for the purpose intended, and in the case of equipment, identify by model number. The name, telephone number and web site of the manufacturer and distributor must also be included.
- Obtain written approval from the Departmental Representative's designated PWGSC Project Manager before: adding or deleting from list of trade names specified in NMS sections or PWGSC master specifications; specifying trade names in lieu of "prescription" or "performance" method used in NMS sections; or specifying trade names when writing "custom" (not NMS) sections.

Additionally, use trade names:

- Where only one specific material will fulfill the exact requirements of the project.
- Where specific materials are required to match existing materials.
- On projects of a special nature due to an unusual function or timing requirement such as emergency repairs.

List all trade names of materials acceptable for the purpose and make reference to the Instructions to Bidders for the method of approving alternative materials. Where trade names are specified in an

'Acceptable material' sub-paragraph following the complete generic performance criteria specification, list all available WTO, NAFTA and other trade agreements (not just Canadian) manufacturer's, their model numbers, the distributors and the complete telephone numbers including area code, fax number and website.

The Consultant shall read and apply the trade agreement clauses applicable to the project which are listed in the NAFTA article 1007 Technical Specifications, the WTO article VI Technical Specifications, and in the Agreement on Internal Trade Chapter 4 - General Rules Article 401: Reciprocal Non-Discrimination.

On certain projects, trade names or manufacturers' numbers may be included in the Hardware Section, as specifically instructed in writing by the RCMP Security Engineering Branch or Correctional Service Canada. Use the following format as a sub paragraph following the performance criteria paragraphs. Set up trade name acceptable material specifications as follows:

Acceptable Material:

1. ABC Co. Model [\_\_\_\_], manufactured by 123 Inc. 416-555-1234 fax 416-555-2234 www.123.com, distributed by 456 Inc 416-555-5678 fax 416-555-5566 www.456.com.
2. DEF Co. Model [\_\_\_\_], manufactured by 123 Inc. 416-555-1234 fax 416-555-2234 www.123.com, distributed by 456 Inc 416-555-5678 fax 416-555-5566 www.456.com.
3. GHI Co. Model [\_\_\_\_], manufactured by 123 Inc. 416-555-1234 fax 416-555-2234 www.123.com, distributed by 456 Inc 416-555-5678 fax 416-555-5566 www.456.com.
4. Alternative Materials: Approved by amendment in accordance with Instructions to Bidders. (Or instead of this wording with each list of trade names, include the following in Part 1 of Specification Sections in which trade names appear "Acceptable Materials: Where materials are specified by trade name refer to the General Instructions to Bidders for procedure to be followed in applying for approval; SACC Manual Clause ID R2410T for G114 Approval of Alternative Materials, or, SACC Manual Clause ID R2710T for G116 Approval of Alternative Materials.")

The reference to the General Instructions to Bidders in the above examples is necessary to remove any suggestion of partiality and to ensure that all suppliers are aware of the provision for alternative proposals during the tendering period. Do not use such phrases as "or equal", "similar to", "equivalent to", "to match" to provide for alternative materials. Use language identified in the NMS User's Guide.

Identify material as in product literature. Specific types and model numbers are required.

Do not use variations on above methods of specifying by trade name. One example is use of the phrase "Acceptable Manufacturers".

While this establishes the names of manufacturers who are acceptable it does not ensure that the actual material involved will be acceptable. Moreover, it does not allow for competition because there is no tie-in with the Instructions to Bidders which deal only with alternative "materials".

#### **4.9 Standards**

The following is a partial list of internet websites that may be used to check for the most current publications of standards that might be referenced in the construction specification document.

AA: [www.aluminum.org](http://www.aluminum.org)  
AAMA: [www.aamanet.org](http://www.aamanet.org)  
AMCA: [www.amca.org](http://www.amca.org)  
ANSI: [www.ansi.org](http://www.ansi.org)

API: [www.techstreet.com/info/api.html#hist](http://www.techstreet.com/info/api.html#hist)  
ARI: [www.ari.org](http://www.ari.org)  
ASHRAE: [www.ashrae.org](http://www.ashrae.org)  
ASME: [www.asme.org](http://www.asme.org)  
ASTM: [www.astm.org](http://www.astm.org)  
AWMAC: [www.awmac.com](http://www.awmac.com)  
BIFMA: [www.bifma.com](http://www.bifma.com)  
CGA: [www.cga.ca](http://www.cga.ca)  
CGSB: [www.pwgsc.gc.ca/cgsb/home/estore-e.html](http://www.pwgsc.gc.ca/cgsb/home/estore-e.html)  
CRCA: [www.roofingcanada.com](http://www.roofingcanada.com)  
CSA: [www.csa.ca](http://www.csa.ca)  
CSDMA: [www.csdma.org](http://www.csdma.org)  
EIA: [www.eia.org](http://www.eia.org)  
IEEE: [www.ieee.ca](http://www.ieee.ca)  
ISA: [www.isa.org](http://www.isa.org)  
ISO: [www.iso.ch](http://www.iso.ch)  
OPSS and OPSD: <http://www.raqsa.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage>  
MIA: [www.marble-institute.com](http://www.marble-institute.com)  
MPI: [www.specifypaint.com](http://www.specifypaint.com)  
NAAMM: [www.naamm.org](http://www.naamm.org)  
NEMA: [www.nema.org/](http://www.nema.org/)  
NFPA: [www.nfpa.org/catalog/catalog\\_home.asp?cookie%5Ftest=1](http://www.nfpa.org/catalog/catalog_home.asp?cookie%5Ftest=1)  
NLGA: [www.nlga.org](http://www.nlga.org)  
NSSN: [www.nssnorg](http://www.nssnorg)  
SAE: [www.sae.org](http://www.sae.org)  
SCC: [www.scc.ca/indexe.html](http://www.scc.ca/indexe.html)  
SMACNA: [www.smacna.org](http://www.smacna.org)  
SSPC: [www.sspc.org](http://www.sspc.org)  
TIA: [www.tiaonline.org](http://www.tiaonline.org)  
TTMAC: [www.ttmac.com](http://www.ttmac.com)  
ULC: [www.ulc.ca/standards](http://www.ulc.ca/standards)  
UL: [www.ul.com](http://www.ul.com)

General reference of standards: [www.cssinfo.com/search.html](http://www.cssinfo.com/search.html) and [www.techstreet.com](http://www.techstreet.com)

For metal manufacturers: [www.retailsource.com/index.html](http://www.retailsource.com/index.html)

For other website addresses of industry trade and manufacturer associations, use internet advanced searches.

Standards within NMS sections are not always the most current. The responsibility to ensure that the latest standards current as of the date of bidding are used remains the responsibility of the consultant; include current standard designation, date, title and technical content.

The NMS Secretariat can also be reached on the web at [www.nms-ddn.ca](http://www.nms-ddn.ca)

#### **4.10 Canadian Materials**

Specify Canadian materials to the fullest extent procurable, consistent with proper economy and the expeditious carrying out of the work. Consider km from raw material source and fabricated product source

to project. Coordinate with latest LEED and Green Globes requirements, the PWGSC Green Policy and any client's green policy.

#### 4.11 Cash Allowances

Construction contract documents should be complete and contain all of the requirements for contractual work. Cash allowances are to be used only under exceptional circumstances (i.e. utility companies) where no other method of specifying is appropriate. Obtain the Departmental Representative's designated PWGSC Project Manager's approval to use cash allowances. Use Section 01 21 00 Allowances (formerly section 01210 in MasterFormat 1995) of the NMS to specify cash allowances.

Refer to Section 6 Risk Management and Sections 11 and 12 Cost Planning and Control.

#### 4.12 Extended Warranties

It is the policy of PWGSC's Real Property Contracting Directorate (RPCD) to avoid extending warranties more than 24 months. Where it is necessary to extend the twelve month warranty period provided for in the General Conditions of the Contract, use the following wording in Part 1 of the applicable technical sections, under the heading "Warranty":

- "For the work of this Section [ ] the 12 months warranty period prescribed in General Conditions GC3.13 Warranty and Rectification of Defects in Work is extended to 24 months."
- Where the extended warranty is intended to apply to a particular part of a specification section modify the above as follows: "For [insulating glass units] the 12 month ... [ ] months."

Parts of the work for which extended warranties may be required are those, such as roofing and waterproofing, in which, based on past performance, defects are likely to appear after the twelve month warranty period provided for in the General Conditions.

#### 4.13 Terminology

Use the term "Departmental Representative" instead of PWGSC, Engineer, Owner, Consultant or Architect. Departmental Representative means the officer or employee of Her Majesty who is designated pursuant to the Bid and Acceptance Form and includes a person specially authorized by the Departmental Representative to perform, on the Departmental Representative's behalf, any of the Departmental Representative's functions under the contract and is so designated in writing to the Contractor. Wherever options: [Engineer], [Architect], [Consultant], [Owner], [Design Builder], [Departmental Representative] appears in NMS Sections, select the words "Departmental Representative". Use metric units.

The terminology used shall be consistent throughout the drawings and specifications.

#### 4.14 Specification Documentation

Front and Back Cover: by Department.

Amendments (if required): by Consultant. Department to provide format, and to sign and distribute.

Special amendments: by Department, copies of the current special amendments are available from the regional Specifications Section.

Instructions to Bidders: by Department.

Bid and Acceptance Form: by Department.

Standard Construction Contract Documents for Major Works: by Department, consisting of:

General Instructions to Bidders, SACC Manual Clause ID R2710T  
Bid and Acceptance Form,  
GC1 General Provisions, SACC Manual Clause ID R2810D  
GC2 Administration of the Contract, SACC Manual Clause ID R2820D  
GC3 Execution and Control of the Work, SACC Manual Clause ID R2830D  
GC4 Protective Measures, SACC Manual Clause ID R2840D  
GC5 Terms of Payment, SACC Manual Clause ID R2850D  
GC6 Delays and Changes in the Work, SACC Manual Clause ID R2860D  
GC7 Default, Suspension or Termination of the Contract, SACC Manual Clause ID R2870D  
GC8 Dispute Resolution – Arbitration (Generally for Contracts between \$100,000 and \$5,000,000), SACC Manual Clause ID R2880D  
GC8 Dispute Resolution – Mediation (Generally for Contracts greater than \$5,000,000), SACC Manual Clause ID R2882D  
GC9 Contract Security, SACC Manual Clause ID R2890D  
GC10 Insurance, SACC Manual Clause ID R2900D  
Insurance Terms, SACC Manual Clause ID R2910D  
Fair Wages and Hours of Labour - Labour Conditions, SACC Manual Clause ID R2940D (formerly R0203D Labour Conditions "D")

Allowable Costs for Contract Changes Under GC6.4.1, SACC Manual Clause ID R2950D and for Minor Works: by Department, consisting of:

General Instructions to Bidders under \$100,000, SACC Manual Clause ID R2410T  
Bid and Acceptance Form,  
GC1 General Provisions, SACC Manual Clause ID R2810D  
GC2 Administration of the Contract, SACC Manual Clause ID R2820D  
GC3 Execution and Control of the Work, SACC Manual Clause ID R2830D  
GC4 Protective Measures, SACC Manual Clause ID R2840D  
GC5 Terms of Payment under \$100,000, SACC Manual Clause ID R2550D  
GC6 Delays and Changes in the Work, SACC Manual Clause ID R2860D  
GC7 Default, Suspension or Termination of the Contract, SACC Manual Clause ID R2870D  
GC8 Dispute Resolution (Generally for Contracts under \$100,000), SACC Manual Clause ID R2884D  
GC9 Insurance under \$100,000, SACC Manual Clause ID R2590D  
Fair Wages and Hours of Labour - Labour Conditions SACC Manual Clause ID R2940D (formerly R0203D Labour Conditions "D")  
Allowable Costs for Contract Changes Under GC6.4.1, SACC Manual Clause ID R2950D

The SACC Manual references for Division 00 are available on the internet at <http://ccua-sacc.tpsgc-pwgsc.gc.ca/pub/rqqr.do?lang+eng&sec0=5&sec1=R>

Documents listed are incorporated by reference only. The SACC Manual references for Division 00 are available on the internet as specified in clause 4.4.

#### New Terms:

- The term “Canada” shall henceforth be used in place of “Her Majesty”, “Minister” and “Engineer”.
- The term “Departmental Representative” is defined as the person exercising the roles and attributes of Canada under the contract and replaces the term “Engineer”.
- The term “Certificate of Substantial Performance” replaces the term “Interim Certificate of Completion”.
- The term “Certificate of Completion” replaces “Final Certificate of Completion”.

List of Contents, Index of Specification and Divisions 01 to 50 (MasterFormat 2012) (formerly 01 to 16 under MasterFormat 95) and Drawings: by Consultant based on attached examples.

#### 4.15 Typing Format

Refer to the NMS for approved wide page and 1/3-2/3 page format and numbering method. Use consistent format throughout the project specification. Print on 216 mm x 280 mm (8-1/2” x 11”) white bond paper, 11 or 12 point TT Courier New font. Do not use smaller fonts as they are not legible.

Every page shall have the Project Number, the Section title, the six digit Section number, the page number and the project date. Obtain sample from the specification reviewer before proceeding with specifications. The header and/or footer shall not show the consultant's name and address, the project title or the project street address.

The Consultant shall hand over specifications in both hard paper copy and soft electronic copy compatible with **NMSEdit Professional version 3.00.01G** or **MS Word 2010** and **PDF** on CD/DVD/USB/ftp of the project specifications, title page, amendments, etc. Verify the software version currently in use at PWGSC on award of consulting contract. Submit small drawings, i.e. abbreviations, room, colour, door and hardware schedules, notes, unit price tables when applicable, etc. in MS Excel/MS Word or Lotus 123 as per PWGSC Ontario Region electronic masters.

#### 4.16 FTP File Transfer Protocol

PWGSC Ontario Region master specifications and PWGSC Ontario Region amended NMS sections are available to copy to your computer from our ftp site at <ftp://ftp.pwgsc.gc.ca/> Navigate through folders:

- **rps/Specifications /Master Specifications/NMSEdit Professional Master Specs/** or
- **rps/Specifications /Master Specifications/RTF Master Specs** or
- **rps/Specifications /Master Specifications/PDF Master Specs.**

Copy contents of the NMSEdit Professional or RTF Master Specifications folder to your computer. These master specifications are to be used to create your project specification document.

#### 4.17 Printing and Binding

The Department is responsible for printing and binding. Provide Department with one sided, camera ready paper original of specification. In NMS Professional with 11 point font, use binding margins 0.75 Left and 0.75 right and page width of 6.74. With 12 point font use binding margins 0.50 Left and 0.50 right. Ensure pdf files have the correct binding margins for two sided printing.

#### 4.18 Bidding Information

Instructions to Bidders: Provide Department with a list of significant trades including costs. The Department will then determine which trades, if any, will be tendered through the Bid Depository.

Bid and Acceptance Form: Provide Department with a list of unit, separate, and alternative prices to be included.

Amendments: Provide Department with amendment in Departmental format in MS Word and pdf. The term Addenda was discontinued in June 2007. This terminology is currently under review.

#### **4.19 PWGSC Ontario Region Master Specifications**

One electronic copy of each applicable PWGSC section will be provided by PWGSC, Ontario Region, by ftp site. The PWGSC Ontario Region Master Specifications and Ontario Region amended NMS master specifications are available by copying/downloading from ftp.pwgsc.gc.ca/rps/specifications. These .spp specifications are only compatible with **NMSEdit Professional v3.00.01G** or later specification processing software and the **rtf** version for **MS Word** is somewhat compatible with other word processing software. Verify software version currently in use at PWGSC on award of consulting contract. Masters are also available in **pdf** on the ftp site.

PWGSC Ontario Region will supply small drawing masters, i.e., abbreviations, room, colour, door and hardware schedules, notes, etc. in Lotus 123 and MS Excel/Word.

Contact PWGSC Ontario Region, Senior Specification Officer, Cathy Ferren-Palmer at 416-512-5971 or by email at Cathy.Ferren-Palmer@pwgsc-tpsgc.gc.ca or Dan Covey at 416-512-5942 or by email at Dan.Covey@pwgsc-tpsgc.gc.ca. Files are stored in NMS Professional specification writing software, rtf, pdf, and are not available in any other word processing formats. You can save the specifications in other formats but you must submit your projects specifications to PWGSC Ontario Region in file formats compatible with NMS Professional as a \*.spp file, rtf or MS Word doc/docx. You can download the PWGSC specification masters from the ftp site specified in 4.16 above.

#### **4.20 Fixed/Stipulated Price Contract - Lump Sum Contract**

Use the 'Bid and Acceptance Form - Lump Sum'. Delete all "Measurement for Payment", "Measurement Procedures" and "Payment Procedures" paragraphs from Heavy Civil Engineering sections of NMS, if such sections are used with other sections of NMS for Lump Sum Contracts.

#### **4.21 Unit Price Contract**

Use the 'Bid and Acceptance Form - Unit Price'. The majority of Heavy Civil engineering projects are tendered as Unit Price Contracts. To accommodate this, the Heavy Civil sections of the NMS include unit price measurements under Part one of each section in "Measurement Procedures".

The remaining sections of the NMS and PWGSC Ontario Region in-house masters are written for fixed price contracts and therefore do not include "Measurement Procedures" clauses. When combining both systems in a project, ensure only one method of payment is specified.

Unless otherwise instructed by the Departmental Representative's designated PWGSC Project Manager, contracts are written for heavy civil engineering are written on the Unit Price basis and Payment Procedures paragraphs apply. Add the Measurement Procedures paragraphs to the remaining sections when combining with Heavy Civil Engineering sections.

#### **4.22 Combined Lump Sum and Unit Price Contract**

Use the 'Bid and Acceptance Form - Combined Price' when a portion of the work involves unit prices. The unit price table should only be used for labour, tooling or materials when the quantity cannot be accurately determined prior to execution of the work. The unit price table is not to be used to obtain a cost breakdown for lump sum work.

#### **4.23 Fire Protection Policies and Standards**

Consult and comply with the Federal Fire Protection and Standards and Other Documents as published by Human Resources and Skills Development Canada. Documents can be found at:  
[http://www.hrsdc.gc.ca/eng/labour/fire\\_protection/policies\\_standards/index.shtml](http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/index.shtml)

#### **4.24 Designated Substances**

For existing buildings and all sites, include the Designated Substances Survey report results in Division 01. Edit the project site conditions list extensively in Section 01 35 29.06. Save the Designated Substances Survey as a separate pdf. If hardcopy is included in the project manual, bind into the specification as an appendix. This will satisfy the requirements of the Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, O. Reg. 213/91 as amended and O. Reg. 490/09, Designated Substances.

#### **4.25 WHMIS**

Comply with the requirements of the Workplace Hazardous Materials Information Systems (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and the provision of material safety data sheets acceptable to Labour Canada.

#### **4.26 PCB Disposal**

Comply with Ontario Regulation 309. Use PWGSC amended NMS specification Section 02 84 00 Management of Toxic Waste.

#### **4.27 Environmental Requirements**

Comply with Federal and Provincial Acts, Codes, Regulations, Guidelines and Codes of Practice including but not limited to:

- CEPA - Canadian Environmental Protection Act 1988.
- Federal Halocarbon Regulations 2003 and EPAM.
- Guidelines for Emissions from Commercial/Industrial Boilers and Process Heaters; Code of Practice for the Reduction of CFC Emissions from Refrigeration and Air Conditioning Systems 1990; New Source Performance Standards for Stationary Combustion Turbines 1990; CEPA Guidelines for Storage Tanks Containing Petroleum Products 1992; CCME Code of Practice for UST Systems Containing Petroleum Products 1989.
- FA - Fisheries Act.
- TDGA - Transportation of Dangerous Goods Act.
- NWPA - Navigable Waters Protection Act.
- MBCA - Migratory Birds Convention Act.
- PCPA - Pest Control Products Act.
- IRIA - International River Improvements Act.

- ECOLOGO - Environment Canada, Environmental Choice Program, Guidelines and Certified Products Lists.

#### **4.28 Waste Disposal**

Comply with waste reduction plans, recycling, reuse, sale to reuse stores, etc. as specified in PWGSC Ontario Region masters. Co-ordinate section 01 11 01 with 02 42 92 in MasterFormat 2012 for minor works and sections 01 74 20 etc. in MasterFormat 2012 with 02 42 92, 02 42 93 and 02 41 Series and 02 42 Series sections in MasterFormat 2012 for major works.

Use deconstruction rather than demolition to the maximum extent possible. The goal is to divert 90 to 95% of deconstruction, demolition and construction waste from landfill. Carefully deconstructed items shall be reused, recycled, sold to reuse stores, factory refurbished, etc. in accordance with the waste reduction workplan.

Specify as many details as possible of the waste reduction workplan in the Contract Documents. Do not leave it up to the Contractor to decide. Where the destination of products is known, specify where the material is going with name, complete street address, phone number and email address. Refer to PWGSC Ontario Region Sections 02 41 19 and 02 42 92 Deconstruction of Structures for detailed deconstruction specs, and Section 02 42 93 Deconstruction and Waste Products Workplan Summary.

#### **4.29 Door Hardware**

Door hardware shall be specified and scheduled using the ANSI/BHMA numbers and symbols for type, grade, function, finish, etc. in accordance with PWGSC specifications, NMS specifications, and the Door and Hardware Institute - DHI "Sequence and Format for the Hardware Schedule, June 1984". Use the Lotus 123 or MS Excel/Word small drawing files listed above. Other formats WILL NOT be accepted. Project files must be compatible with our storage and retrieval systems such as DM/EDRM.

Do not use trade names and/or manufacturer's model numbers in the hardware specifications or schedules unless directed to do so IN WRITING by the Departmental Representative for specialty hardware items.

#### **4.30 Epoxy Coatings**

Use PWGSC Ontario Region Section 09 96 00 for all epoxy and urethane floor, wall and ceiling coatings.

#### **4.31 Painting**

Specify paints using the MPI - Master Painters Institute, Architectural Painting Specification Manual, latest edition plus amendments.

Lead paint: use PWGSC amended NMS Sections 02 83 10, 02 83 11, 02 83 12, 02 83 15 or 02 83 20.

Repainting of heavy civil structures/bridges, etc., use Section 09 97 17 with MOT and SSPC/NACE standards.

#### **4.32 Sealants**

Use PWGSC Section 07 90 00 Joint Sealing and Lotus 123 or MS Excel spreadsheet. Specify Environmental Choice Program, Ecologo sealants. Use SWRI validated sealants to the maximum extent possible.

### 4.33 Asbestos Abatement

Comply with Ontario Regulations 278/05 for asbestos abatement and Regulation 309 to transport, deliver and deposit asbestos waste. Use PWGSC amended NMS Sections 02 82 00.01, 02 82 01.02 and 02 82 00.03 as required.

### 4.34 Projects with a 33%, 66% and 100% Submission

33% Submission: submit hard copy to Departmental Representative for:

- List of Contents for all divisions and sections in this project.

66% Submission: submit hard copy and electronic copy to the Departmental Representative for:

- List of Contents for all divisions, Division 01 sections and a rough edit of specialty sections, such as, Asbestos Abatement, Guano Removal, Removal and Disposal of Underground Fuel Oil Tanks, Lead Paint Removal, Finish Hardware, Epoxy Flooring and Automatic Controls.
- One hard copy and one pdf of the Designated Substances Survey Report.
- One copy of draft Hardware Schedule, Door and Frame Schedule, and Door and Frame Types.
- One hard copy of window calculations from AAMA/WDMA/CSA-101/I.S.2/A440-08, North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights and AAMA/WDMA/CSA-101/I.S.2/A440S1-09, Canadian Supplement to AAMA/WDMA/CSA-101/I.S.2/A440-08, North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights - Figure A.1 Checklist for Selecting Performance Levels for Windows, Doors, and Unit Skylights, revised July 2009.

100% Submission: submit hard copy and electronic copy compatible with NMSEDIT PROFESSIONAL or MS Word or rtf and in PDF format (one NMS Professional spp or MS Word doc/docx or rtf and one pdf for whole spec) to the Departmental Representative for:

- Final Specification Title Sheet, List of Contents and all specification sections.

### 4.35 Projects with a 50% and 100% Submission

50% Submission: submit hard copy to Departmental Representative for:

- List of Contents for all divisions and sections in this project, Division 01 sections and a rough edit of specialty sections, such as, Asbestos Abatement, Guano Removal, Removal and Disposal of Underground Fuel Oil Tanks, Lead Paint Removal, Finish Hardware, Epoxy Flooring and Automatic Controls. (one NMS Professional spp or MS Word doc/docx or rtf and one pdf for whole spec)
- One hard copy and one pdf of the Designated Substances Survey Report.
- One copy of draft Hardware Schedule, Door and Frame Schedule, and Door and Frame Types.
- One hard copy of window calculations from AAMA/WDMA/CSA-101/I.S.2/A440-08, North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights and AAMA/WDMA/CSA-101/I.S.2/A440S1-09, Canadian Supplement to AAMA/WDMA/CSA-101/I.S.2/A440-05, North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights - Figure A.1 Checklist for Selecting Performance Levels for Windows, Doors, and Unit Skylights, revised July 2009.

100% Submission: submit hard copy and electronic copy compatible with NMSEDIT PROFESSIONAL or MS Word or rtf and in PDF format (one NMS Professional spp or MS Word doc/docx or rtf and one pdf for whole spec) to the Departmental Representative for:

- Final Specification Title Sheet, List of Contents and all specification sections.

### 4.36 As-Built and Record Specifications

Submit paper copy and electronic copy compatible with NMS EDIT PROFESSIONAL or MS Word or rtf and in PDF format to the Departmental Representative of as-built and record specifications. (one NMS Professional spp or MS Word doc/docx or rtf and one pdf for whole spec)

**4.37 Specification List of Contents Example**

**SPECIFICATIONS:** Note that NMS Edit Professional or MS Word macros creates the list of contents.

		.....NO. OF	
<u>DIVISION</u>	<u>SECTION</u>	.....	<u>PAGES</u>

DIVISION 01 - GENERAL REQUIREMENTS

01 11 00	SUMMARY OF WORK.....	15
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DIVISION 02...      **List all Sections and number of pages.**

DIVISION 03...

DIVISION 04...

DIVISION 05...

...continue to DIVISION 50 The List of Contents is generated automatically by NMS Professional or MS Word macros.

**4.38 Quality Assurance/Quality Control and Non-Compliant Documents**

Submissions of the project manual that do not comply with the RFP design and submission requirements including Appendix D - Doing Business Section 4 Specification Brief, and/or are not compliant to the current codes and standards may be subject to written complaints to the consultant’s licensing and accreditation bodies such as the, OAA, AC(formerly RAIC), PEO, CIQS, AATO, OACETT, CSC - Construction Specifications Canada, consultant’s liability insurance carrier, etc.

Consultants shall submit the names and qualifications of all specification writers in each discipline that have worked on the project, including the total number of hours each individual has charged to the project.

## **SECTION 5 MARINE**

### **5.1 General**

All design criteria shall be in accordance with the current edition of reference codes and standards.

For material properties (both physical and chemical), methods of fabrication, tests, etc. reference should be made to the latest editions of CSA the Canadian Standards Association Standards and CGSB the Canadian General Standards Board Specifications, give the standard number and date of the issue, etc.

### **5.2 Regulations**

Design shall comply with applicable Federal, Provincial and Municipal regulations and codes. In case of conflict, the most stringent requirements apply.

### **5.3 Design for Marine Engineering**

PWGSC Review: The design alternatives and costs shall first be reviewed by PWGSC who will involve other regulatory bodies in the review as required.

All Marine Engineering Designs must comply with current Federal and Provincial Acts, Codes, Regulations, Guidelines and Codes of Practice including but not limited to:

- National Building Code of Canada (NBC).
- Ontario Building Code (OBC) .
- Canadian Concrete, Steel, Wood, Aluminum, other relevant Codes and marine and dredging best practices.

The Consultant shall discuss design loads with Public Works and Government Services Canada Marine Engineers before formulating his proposals.

The Consultant shall submit marine proposals for consideration and review by Public Works and Government Services Canada. These proposals shall contain the following information:

- General description of the project.
- Design loads.
- Comparative cost analysis of alternative layouts.
- Recommended layout.

Prior to commencement of working drawings, the Consultant shall submit for consideration by Departmental Representative the following data:

- Design criteria for marine structures.
- Site access and dredging and dredge disposal alternatives.
- Other relevant information as necessary.

The Consultant shall include on the drawings:

- Design criteria and assumptions.
- Design live loads, including berthing and mooring loads for the structures.
- Foundation design bearing pressures..

#### **5.4 Soils Investigation**

A soils report and/or sediment sampling report will be prepared for PWGSC. PWGSC will require the marine consultant to establish what additional soil testing information is required immediately after approval of the concept design. The consultant shall arrange for final soils investigator acceptable to the Department.

#### **5.5 Drawings**

Drawings shall be produced in accordance with Section 1.

#### **5.6 Specifications**

Specifications in accordance with Section 4.

Comply with Section 4, Article 4.20 for lump sum contracts, Article 4.21 for unit price contracts, or Article 4.22 for combined lump sum and unit price contracts.

#### **5.7 Testing and Inspection**

A Departmental Representative may be appointed and paid by PWGSC to ensure that the work is performed in accordance with Plans and Specifications and to maintain records of the blow counts for each pile (if applicable).

A testing company will be engaged for testing materials material used in the works, including environmental testing, where necessary.

## 5.8 As-Built and Record Information

As-built information shall be submitted by the Contractor and shall contain drawings, specifications, shop drawings, submittals, samples, etc. As-built submittals shall be noted as such by the Contractor.

Record drawings and specifications are updated originals prepared by the Consultants based on the information supplied by the Contractor in the as-built.

Provide an Environmental Mitigation Record report for the project.

## 5.9 Work Measurement for Unit Price Contracts

Measure and record quantities of labour and materials involved, if work is based on unit prices, for verification of monthly progress claims and the Final Certificate of Measurement.

When a Contemplated Change Notice is to be issued based on Unit Prices, keep accurate account of the work. Record dimensions and quantities.

Record number of workers on site and hours worked daily.

## 5.10 Bid Documents Format:

Bid documents format shall be produced in accordance with Section 1.

## SECTION 6 RISK MANAGEMENT

The Consultant will provide the necessary information required by the Departmental Representative to create and update the Risk Management Plan throughout the project.

### 6.1 Definitions

#### **Procurement Plan:**

Formal submission for approval to enter into a contract and composed of a (1) cost estimate of the requirement (including cash allowances, and design, estimating and inflation allowances), (2) a contingency and, (3) an anticipated amendment amount.

#### **Allowances:**

Additional resources included in an estimate to cover the cost of known but undefined requirements for an individual activity, work item, account or sub account: design allowance, estimating allowance, inflation allowance and other allowances specifically identified are part of a cost estimate

#### **Cash Allowances:**

A specific amount to be used for specific work item or service.

- Cash Allowance Construction: additional resources included in an estimate to cover the cost of known but undefined requirements whose probability of occurrence is high. This allowance is specifically identified in a cost estimate.
- Cash Allowance Consultant: additional services included in an estimate to cover the cost of known but undefined requirements whose probability of occurrence is high. This allowance is specifically identified in a cost estimate.

**Risk Allowance:**

Anticipated monetary value of risk events, due to the complexity of the project, market conditions, competitiveness, and timing of project; contingencies are likely to happen and do not form part of cost estimates.

**Anticipated Amendments:**

This is basically the pre-authorization of amending authority to a certain level. Individual contract amendments within this authority must still be approved by the appropriate level of contracting authority.

The total amount of the Anticipated Amendment to a project cost estimate is determined as the summation of the Expected Monetary Value of risk events reasonably expected to occur during the life cycle of a project.

**Risk Management:**

The art and science of identifying, analyzing, and responding to risk factors throughout the life of a project and in the best interests of its objectives. (PMBOK)

**Risk Event:**

A discrete occurrence that may effect the project for better or worse (i.e. late delivery of a piece of equipment is a "risk event" that may cause a schedule delay).

**Probability:**

The likelihood that an event will occur (i.e. Low, Medium, High).

**Impact:**

The result of the occurrence of an event on the project either positive or negative. (i.e. a schedule delay as a result of late delivery of a piece of equipment may have a high negative impact on a project; increased access to a construction site due to early departure of occupants in an office space may have a positive impact on a project).

The Impact of individual Risk Events can be qualified as low, medium, high or quantified in terms of time, cost (immediate cost or in-service cost (O&M)) or performance.

**High risk\*:** A project (or element of a project) may be assessed as high risk if one or more hazards exist in a significant way and, unless mitigated, would result in probable failure to achieve project objectives.

**Medium risk\*:** A project (or element of a project) may be assessed as medium risk if some hazards exist but have been mitigated to the point that allocated resources and focused risk management planning should prevent significant negative effect on the attainment of project objectives.

**Low risk\*:** A project (or element of a project) should be assessed as low risk if hazards do not exist or have been reduced to the point where routine project management control should be capable of preventing any negative effect on the attainment of project objectives.

\*per Treasury Board Secretariat Manuals Chapter 2-2 Project Management

**EMV:** Expected monetary value of risk event (i.e. cost or saving to the project if risk event occurs)

## 6.2 Risk Management Checklist

Probability, impact, overall risk, risk response and risk allowance are to be determined for each item listed below which is applicable to the project. Applicable items will be identified by the Departmental Representative.

#### Resources External to Project Management Team

- ◆ Planning Resources and Performance
  - errors and omissions
  - low accuracy of estimates (allowances)
  - data inadequacies
  - level of liability insurance
  - potential for misinterpretation / misunderstanding of documents
  - planning inexperience
- ◆ Construction Resources Required & Performance
  - level of liability insurance
  - design versus execution methods
  - suitability of execution methods to design
  - commissioning issues (start up / turnover difficulties)
  - contractor construction strategy
  - reputation of contractor
  - contractor financial stability
  - contractor inexperience
  - resources obtained less qualified than desired
  - availability / suitability / performance of resource

#### Project Scope Delivery

- ◆ Delivery of Specified Requirement
  - accuracy of client requirements in terms of cost/ schedule / performance / quality and ability to interface with existing environment
  - conflicting client priorities
  - low level of client knowledge
  - Y2K compliance
- ◆ Unstated Client Requirements
  - completeness of client requirements in terms of cost/ schedule / performance / quality and ability to interface with existing environment
  - restricted working conditions
  - opportunities for changes / positive impact
- ◆ Stakeholder Requirements, Stated and Unstated
  - low involvement of user groups in scope of definition
  - interface with existing systems
  - restricted working conditions
  - operational needs

#### Site / Asset / Building Actual Conditions

- ◆ Actual Physical Environment
  - availability / accuracy of as built documentation and existing condition reports
  - high variability / low stability of soils
  - potential for soil contamination
  - presence of hazardous materials
  - availability / access to site
  - presence of other contractors on site
  - climate (winter conditions, rain, wind, water levels)

Government / PWGSC / Client / Context

- ◆ Impact on Adjacent Areas Actual
  - impact on adjacent areas (land / tenants/ traffic / operations)
- ◆ Impact from External Sources
  - legal lawsuits, patent rights, licensing, etc.
  - political impacts including visibility of project
  - social sensibilities
  - potential strikes
  - market risks
  - bad press (media coverage)
- ◆ Impact from Unanticipated Regulatory Change
  - environmental legislation and environmental screening
  - potential changes to Acts, Codes and Regulations
  - municipal building / occupancy permit issues
- ◆ Procedures Known
  - suitability of bid documents
  - suitability of contracting method
  - delays in bidding process
  - client internal coordination
  - change order process

Plan Approval / Design Reviews

- approvals may be required from Client, PWGSC, Treasury Board, FHBRO, Fire Commissioner, Police, Emergency Services, Municipalities, Cities, etc.
- absence of Investment Analysis
- unstable / changing client organization
- heritage building issues
- health and safety issues
- potential for “hold orders”
- design review delays (client / PWGSC / TBS / other)
- approval delays (client / PWGSC / TBS / other)

## **SECTION 7A CIVIL DESIGN**

### **7A.1 Review**

All designs must be reviewed by the Department and conform to the requirements of the Project Brief or Terms of Reference.

### **7A.2 Principles**

The Department expects the Consultant to maintain a high standard of civil design, based upon recognized contemporary design principles. All design elements, planning, civil and municipal engineering and landscaping, must be fully co-ordinated, and consistent in adherence to good design principles.

### **7A.3 Economy**

Design strictly within the budget and in accordance with sound investment economics and operating and maintenance expenditures.

### **7A.4 Quality**

Quality of materials and construction methods shall be commensurate with the type of infrastructure and the budget. Avoid experimental materials. Take into account the total life-cycling of the infrastructure.

## 7A.5 Regulations

Design shall comply with applicable Federal, Provincial and Municipal regulations and codes. In case of conflict, the most stringent requirements apply.

## 7A.6 Design General

PWGSC Review: The design alternatives and costs shall first be reviewed by PWGSC who will involve other regulatory bodies in the review as required.

Environment Canada Approval: The design shall satisfy Environment Canada. Public Works and Government Services Canada will arrange for a review of the proposed alternative and the design work through the office of Environment Canada, Federal Program Division. Environment Canada will arrange to have the design reviewed by other agencies.

Client Review: As the client is the user of the site and systems, and must maintain it in good working order to the satisfaction of all regulatory agencies, it is essential to involve the client through all the stages of review and decision.

## 7A.7 Design for Civil and Municipal Engineering

All Civil and Municipal Engineering Designs must comply with current Federal and Provincial Acts, Codes, Regulations, Guidelines and Codes of Practice including but not limited to:

- Guidelines for Canadian Drinking Water Quality (GCDWQ), 2008.
- Safe Drinking Water Act 2003-(SDWA).
- Recommended Standards for Water Works, (Ten State Standards) - 2007 Edition.
- Recommended Standards for Bathing Beaches, (Ten State Standards) - 1990 Edition
- Recommended Standards for Individual Sewage System, (Ten State Standards) - 1980 Edition
- Recommended Standards for Waste Water Facilities, (Ten State Standards) - 2004 Edition
- Recommended Standards for Swimming Pool Design and Operation, (Ten State Standards) - 1996 Edition.
- American Waterworks Association (AWWA) Standards.
- National Building Code of Canada (NBC).
- Ontario Building Code (OBC).
- Canada Standards Association (CSA).
- American Society for Testing and Materials International (ASTM).
- Canadian Environmental Protection Act (CEPA) -1999.
- Transportation of Dangerous Goods Act (TDGA)-1992.
- Canadian General Standards Board (CGSB).
- OPSS Ontario Provincial Standard Specifications (OPSS).
- OPSD Ontario Provincial Standard Drawings (OPSD).
- Canada Labour Code, Part II.
- National Fire Code of Canada (NFC).
- National Plumbing Code (NPC).
- Underwriter Laboratories of Canada (ULC).
- American National Standards Institute (ANSI) NSF/60 and NSF/61.
- National Fire Protection Association (NFPA).
- Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments, Environment Canada (Most Current version).
- Federal Environmental Assessment Process, Environment Canada.

Use the current versions of Ontario Provincial Standard Specifications (OPSS) and Ontario Provincial Standard Drawings (OPSD) to maximum extent possible.

Province of Ontario:

- .1 Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, O. Reg. 628/05 as amended, Designated substance-Asbestos on construction projects and in buildings & repairs operations, O. Reg. 278/05.
- .2 Workplace Safety and Insurance Act, 1997.

Provincial/Territorial guidelines and regulations govern, except where they are less stringent than those of the federal government, such as the following:

- Ontario Ministry of the Environment (MOE) (Effluent criteria, Certificate of Approval of Sewage and Water Works, Air).
- Ontario Ministry of Natural Resources (MNR).
- Ontario Ministry of Labour (MOL).
- Technical Standards and Safety Act (TSSA).
- Digester Gas Code CAN/CGA-B105-M93(R2007).
- Ontario Regulation 346 - General Air Pollution

Ontario Ministry of the Environment Design Guidelines (Most current versions)

1. Guidelines for the Design of Water Treatment Works.
2. Guidelines for the Design of Sewage Treatment Works.
3. Guidelines for the Design of Sanitary Sewage Systems.
4. Guidelines for the Design of Storm Sewers.
5. Guidelines for the Design of Water Distribution Systems.
6. Guidelines for the Design of Water Storage Facilities.
7. Noise and Air Emission Guidelines.

Other Applicable Regulations or Acts

1. Regulations for Construction Projects.
2. Workplace Hazardous Material Information System (WHMIS) Regulation, R.R.O. 1990, Reg. 860 (as amended by O. Reg. 356/91; and O. Reg. 36/93).
3. Occupational Health and Safety Act, Regulations for Construction projects, O. Reg. 213/91 (as am. By O. Reg. 631/94), Part II – General Construction.
4. Occupational Health and Safety Act, Industrial Establishments Regulation, R.R.O. 1990, Reg. 851 as amended, Part I – Safety Regulations.
5. Canada Labour Code, Canada Occupational Safety and Health Regulations, SOR/86-304, as amended, Part XI – Confined Spaces.
6. Technical Standards and Safety Act, 2000 (TSSA).
7. National Fire Protection Association (NFPA).

## **7A.8 Barrier Free Design for Disabled**

In accordance with Section 1.

Design grounds to make them accessible and usable by disabled persons, unless otherwise required in the Project Brief. Conform to CAN/CSA-B651-04(R2010), Accessible Design for the Built Environment and for CSC projects, the Correctional Service Canada policy on accessibility. This includes making buildings and other facilities accessible to persons with a range of physical, sensory and cognitive disabilities.

### **7A.9 Drawings**

Drawings shall be produced in accordance with Section 1.

### **7A.10 Specifications**

Specifications in accordance with Section 4.

Comply with Section 4, Article 4.20 for lump sum contracts, Article 4.21 for unit price contracts, or Article 4.22 for combined lump sum and unit price contracts.

### **7A.11 As-Built and Record Information**

In accordance with Section 1.

### **7A.12 Bid Documents Format**

In accordance with Section 1.

### **7A.13 Work Measurement for Unit Price Contracts**

Measure and record quantities of labour and materials involved, if work is based on unit prices, for verification of monthly progress claims and the Final Certificate of Measurement.

When a Contemplated Change Notice is to be issued based on Unit Prices, keep accurate account of the work. Record dimensions and quantities.

Record number of workers on site and hours worked daily.

## **SECTION 7B BRIDGE DESIGN**

### **7B.1 General**

For general and technical requirements for Bridge design, refer to following documents:

- Request for Standing Offer for Bridges
- Standing Offer for Bridges.



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## SECTION 8 STRUCTURAL DESIGN GENERAL REQUIREMENTS

### 8.1 General

All design criteria shall be in accordance with the current edition of National Building Code of Canada, its supplements and the relevant Canadian Standards Association Standards. If local or municipal codes and by-laws are more stringent, they shall take precedence.

For material properties (both physical and chemical), methods of fabrication, tests, etc. reference should be made to the latest editions of CSA the Canadian Standards Association Standards and CGSB the Canadian General Standards Board Specifications, give the standard number and date of the issue, etc.

### 8.2 Design

The Consultant shall discuss design loads with Public Works and Government Services Canada Structural Engineers before formulating his proposals.

The Consultant shall submit structural system proposals for consideration and review by Public Works and Government Services Canada. These proposals shall contain the following information:

- General description of the building.
- Design loads.
- Comparative cost analysis of several alternative structural systems, comprising superstructure and foundations.
- Recommended structural systems, compatible with the other systems proposed, i.e., architectural, mechanical, electrical, etc.

Prior to commencement of working drawings, the Consultant shall submit for consideration by Departmental Representative the following data:

- Design and location of expansion joints with temperature ranges, etc. as assumed.
- Design criteria for basement and retaining wall.
- Methods of shoring for excavations.
- Provisions for interfacing for phased construction projects.
- Other relevant information as necessary.

Public Works and Government Services Structural Engineers may require the submission of detailed analysis and design of any structural components, with sufficient time allowed for their review and approval before their inclusion on the drawings.

The Consultant shall submit at the completion of the design, a legible set of neatly bound notes with contents indexed. These notes shall provide the detailed analysis and design of all the significant aspects of the structure including the following.

- Design criteria and assumptions.
- Design live loads and dead loads throughout the structure, in adequate detail to permit the check of individual areas.
- Column, elevator core and footing design gravity loads throughout the building, including separation of dead loads, live loads and reduced live loads.
- Footing loads.
- Lateral forces and lateral forces analysis.
- Torsion analysis.
- Aspects of the design, other than those listed above, which Government Services or the Consultant would place in any especially important category.

### 8.3 Soils Investigation

A preliminary soils report will be prepared for PWGSC and copies will be made available as soon as they are ready. PWGSC will require the structural consultant to establish what additional soil testing information is required immediately after approval of the concept design. The consultant shall arrange for final soils investigator acceptable to the Department. The cost will be borne by the Department.

The soil consultant's recommendations, discussions, considerations, requirements and conclusions shall be submitted separately from soil data.

Drawings and diagrams forming part of soil data shall not exceed 216 mm x 279 mm in size or multiples thereof.

### 8.4 Live Loads

Floor areas to be used for General Office purposes, whether open-landscaped or divided by moveable partitions, shall be designed for a uniformly distributed live load of 3 kPa plus a uniformly distributed 1 kPa moveable partition allowance.

In the design of any floor slab, beams or girders, the 3 kPa uniformly distributed live load shall not be modified by reduction factors based on tributary area.

In the calculation of live loads on columns, no reduction factor for tributary area shall be applied to the uniformly distributed live load, for the top two office floors of multi-storey buildings.

Basement, main floor, corridors, assembly areas and fire refuge areas shall be designed for a uniformly distributed live load of 5 kPa.

Normal file registry areas shall be designed for a uniformly distributed live load of 5 kPa.

Mechanical equipment rooms and storage areas shall be designed for a minimum of 7.5 kPa.

For roof snow loading, Wind Exposure Factor shall be taken as 1.0.

### 8.5 Structural Drawings

Drawings shall be fully dimensioned. Weighted lines shall be employed and sections shall be cross-referenced, using the "PWGSC CADD Standards".

The following drawings shall be provided:

- Foundation plan.
- Floor and Roof Framing Plans.
- Column schedules containing the following information:
  - Datums as noted on structural plans.
  - Column loads at footings (dead and live).
  - Column sizes.
  - Vertical reinforcement, ties, dowels, etc.
  - Baseplate and anchor bolt details.
  - Size and footings.
- Live loads, partition, ceiling, floor finish and mechanical equipment allowances.

- Type of waterproofing and details to show effectiveness of same.
- General notes, including:
- Design Codes used.
- Lateral forces.
- Allowable bearing pressures.

### **8.6 Testing and Inspection**

A resident Departmental Representative may be appointed and paid by PWGSC to ensure that the structure is built in accordance with Plans and Specifications and to maintain records of the blow counts for each pile (if applicable).

A testing company will be engaged and paid for by PWGSC for testing concrete, soils compaction, pile load tests (if applicable) and structural steel work (e.g. bolting, welding, etc.)

The structural consultant will be expected to make periodic visits to the site, as later agreed with the Departmental Representative.

### **8.7 As-Built and Record Information**

In accordance with Section 1.

## **SECTION 9 MECHANICAL DESIGN**

### **9.1 General**

Read and understand the applicable General Conditions listed in Section 4.

This section stipulates the standards for design of building HVAC, fire protection, and plumbing systems.

Provide systems to meet the design requirement with least annual owning and operating cost.

Mechanical systems shall be compatible and co-ordinated with the architectural, structural, electrical and other project systems.

Systems and equipment shall be fail-safe consistent with required reliability of service.

Provide heating, ventilation and air conditioning systems that:

- Have the flexibility and capacity required to meet the requirements of intended use of space after the premises have been occupied.
- Have individual temperature controls and start/stop schedules for each room and each zone which have unique load variations and occupied hours.
- Have the capability of introduction of 100% outside air to permit flushing out the building, dilution of contaminants, and use of "free cooling" for energy conservation.

Provide plumbing systems in compliance with the National Plumbing Code and Ontario Plumbing Code.

Provide fire protection systems to meet the requirements of the Fire Commissioner of Canada Standards, the National Fire Code and Canada Labour Code.

### **9.2 Project Specifics**

Refer to the Project Brief.

The Consultant shall review the operational requirements and applicable code requirements.

The Consultant shall develop alternative schemes with sufficient documentation to support the recommended systems and equipment for providing mechanical services to meet the requirements.

For office renovation projects, the Consultant shall review existing mechanical installation and documentation. Assess, evaluate, and make recommendations, for the upgrade of existing mechanical systems to accommodate new office layout.

### **9.3 System Applications**

In accordance with project requirements, justify system selection and its design on the basis of performance, service and maintenance, and the total owning and operating cost.

Systems shall be capable of automatically maintaining space comfort conditions for all building load variations during the heating and cooling seasons.

Use outdoor air as free cooling source whenever economically feasible.

Avoid recirculation of exhaust air with outside air by properly locating intakes and outlets.

Use heat recovery systems for all air exhausted when such measures prove to be economical, as determined by life cycle costing.

#### **9.4 Building Loads and Energy Estimates**

Building load calculations and energy estimates shall be carried out using a computerized load and energy simulation program. This shall be a commercially available program and approved for use by PWGSC. Refer to Required Services (RS) sections for additional requirements.

The energy analysis program shall simulate all energy consumed in the building on a hourly basis for a full year.

The building energy analysis with input and output summaries shall be submitted with the concept design submission; revise and resubmitted with the design development submission and each of the 30%, 66%, and 99% construction document submissions. The updating shall reflect all the latest architectural and engineering changes to the project.

#### **9.5 Energy Consumption Budget**

Energy consumption budgets shall be established for all building projects.

Investigate and present for review a minimum of three viable and different concept options for each project. The options shall be evaluated based on building life cycle costs which will include initial capital cost plus annual energy operation and maintenance costs.

The analyses shall be based on annual energy consumptions and take into account climatic data, building architecture, clients' operational requirements and system and equipment data. Total energy consumed in the building shall be expressed in kWh per m<sup>2</sup>.

Design HVAC systems to exceed Model National Energy Code of Canada for Building 2011.

#### **9.6 Codes and Standards**

In accordance with Section 1.

#### **9.7 Federal Halocarbon Regulations (FHR 2003) and Environmental Protection Alternative Measures (EPAM)**

All Consultants, Contractors and Subcontractors responsible for undertaking work related to equipment containing halocarbons are to be aware of the requirements prescribed under the Federal Halocarbon Regulations, 2003, and are to ensure compliance to the FHR 2003 as part of the EPAM.

#### **9.8 Fire Protection Requirements**

In addition to the National Building Code, Ontario Building Code, National Fire Code and NFPA Standards, fire protection is subject to the requirements of Fire Commissioner of Canada Standards issued by HRDC - Labour Program/Fire Protection for general storage, fire extinguishers and sprinkler systems.

Comply with the requirements of the Fire Commissioner of Canada. Fire protection systems are to be subject to the final inspection and test of the Fire Commissioner of Canada.

## 9.9 Plumbing Requirements

Provide complete plumbing systems including sanitary and storm drainage, domestic hot and cold water piping, and plumbing fixtures.

Drinking fountains shall be bi-level and shall provide drinking water at less than 13°C and shall be located no more than 30 m from any workstation on each and every floor.

Provide adequate supply of domestic hot water at constant temperature of 38°C to lavatories, showers and sinks.

Plumbing systems shall conform to the requirements of the National Plumbing Code 2005 and Ontario Plumbing Code 2010.

## 9.10 Heating, Ventilation, and Air Conditioning (HVAC) Requirements

Outside Design Criteria: Take outside design conditions from National Building Code and base on January 1% outdoor Winter design and July 2.5% outdoor Summer design temperatures.

## 9.11 Space Comfort Standards

### General:

- The following comfort standards apply to air conditioning in general office type occupancy where sedentary adult activity may be expected. Requirements for other types of occupancy or for environments related to standards other than for human comfort to be as per latest published data in ASHRAE handbooks.
- Outdoor air ventilation rates shall be based on the latest edition of ASHRAE Standard 62.1-2004 "Ventilation for Acceptable Indoor Air Quality" unless special requirements or regulations dictate otherwise.
- Unless noted otherwise, conform to or exceed CSA Z204-94(R1999), "Guideline for Managing Indoor Air Quality in Office Buildings".

### Temperatures:

- During occupied periods, and in the occupied zone, a minimum temperature of 21°C when heating, and a maximum of 24°C when cooling shall be maintained. The rate of change of dry bulb temperature is not to exceed 2°C per hour within the specified limited. The vertical temperature difference measured from 100 mm and 1700 mm above finished floor shall not exceed 3°C.
- The occupied zone is defined as the space volume between the floor and 1800 mm from the floor and more than 600 mm from walls or perimeter heating/cooling equipment.
- The average conductive heat loss at winter design temperature combining both glass and wall heat losses from zone exterior surfaces should not exceed 25 watts/m<sup>2</sup>.
- Provide wall fin radiation heaters below all exterior windows in the building.
- Floor surface temperature: between 18°C and 29°C.

### Relative Humidity:

- Maintain relative humidity between 30% (winter design) and 60% (summer design) at any point in an occupied zone.
- Rate of change of relative humidity at any point in the occupied zone is not to exceed 20% RH per hour within the above specified limits.

**Filtration:**

- All supply air (i.e. recirculated air plus outside air) shall pass through filters having ASHRAE minimum efficiency of MERV II or better.

**Ventilation:**

- Ventilation is defined as the supply of clean, odour and contaminant free air to a space in sufficient quantities to dilute and remove space generated air contaminants and odours and to maintain the occupant oxygen requirements.
- Generally, outside air is considered to be contaminant free air suitable for ventilation purposes. Outside air intakes shall not be located in the vicinity of loading dock or any high pollutant area. Exhaust air outlets shall be properly located to prevent entrainment in outside air intakes.
- Except for outdoor make-up air to replace exhaust air, ventilation requirements are related to people. A ventilation rate of 10.0 L/s of outside air per person is adequate for occupant comfort, provided sufficient total air is circulated in the space to dilute contaminants. The ventilation rate calculated on a per occupant basis is not to be less than 1.0 L/s/m<sup>2</sup> of gross zone floor area.
- Measurement of CO<sub>2</sub> concentration: Provide CO<sub>2</sub> sensor in the space or in the return air stream for monitoring CO<sub>2</sub> concentration. CO<sub>2</sub> sensor shall not be used by the air flow controls to reduce the outside air flow rate to below the minimum requirement of 10 L/s per person.

**Air Circulation:**

- Total primary air supply for general occupancy areas to be designed at not less than 4 L/s/m<sup>2</sup> of floor area or 6 air changes per hour.
- Total primary air supply to high occupant density areas, i.e. conference rooms, board rooms, high density workstation areas (high density occupancy is defined as a workstation with its foot print being less than 10m<sup>2</sup> ), etc. to be designed at not less than 7.7 L/s/m<sup>2</sup> of floor area or 10 air changes per hour.
- Maintain air motion at velocities between 0.05 m/s and 0.15 m/s during Winter heating operation, and between 0.05 m/s and 0.23 m/s during Summer cooling operation in an occupied zone unless noted otherwise.

**Acoustic Duct Liner:**

- The air side of duct liner shall be coated with acrylic coating treated with anti-microbial agent to resist microbial growth.

As a minimum, office areas with regular density occupancy (the net occupiable space of each workstation is greater than 10 m<sup>2</sup>) shall have HVAC zoning as follows for individual zone temperature controls:

- Each private office.
- Maximum of 50 m<sup>2</sup> perimeter area with the same load profile along the same exposure. Perimeter area is defined as an area within 5 m of the outside wall.
- Maximum of 100 m<sup>2</sup> interior area with the same load profile.

Mechanical exhaust systems shall be provided to meet the following minimum requirements:

- Washroom or Janitor Closet: 10 L/s per m<sup>2</sup> of floor area; at least 25 L/s per sanitary fixture.
- Shower Room: 10 L/s per m<sup>2</sup> of floor area; at least 20 L/s per shower head.
- Enclosed Parking Garage: 7.5 L/s per m<sup>2</sup>.
- Conform to current Canada Labour Code Part II.
- Make-up air for the above exhaust systems may be obtained from the adjacent corridors and offices.

- Provide dedicated exhaust systems for photocopier areas to maintain VOCs concentration not to exceed 3mg/ m<sup>3</sup> , and exhaust directly to the outdoors.
- Provide a separate exhaust facility with individual speed control and ON/OFF switch for the lunch room.
- Maintain negative air pressures within the garage area in relation to surrounding building areas.

Mechanical system noise shall conform to the following Noise Criteria (NC) levels:

Conference, meeting rooms	25-35 NC
Teleconference rooms	25 NC max.
Private offices	25-35 NC
General open area offices	30-40 NC
Public area, corridors	40-45 NC

- Noises shall be free from annoying, recognizable characteristics such as rumble, hiss, tones, and variability of noise patterns.

### 9.12 Lan Room A/C

Provide continuous air conditioning to maintain temperature in LAN rooms and telecommunication rooms not to exceed 24°C at all times (24 hours/7 days per week).

### 9.13 TAB

Testing, adjusting and balancing of air distribution and hydronic systems performed by the Contractor shall be verified. The Consultant shall verify the results of not less than 20% of all reported measurements.

### 9.14 Building Automatic Control System Requirements

The networked Building Automation Systems (BAS) including the building Energy Monitoring and Control System (EMCS) shall be designed by a qualified control systems specialist recognized in this field.

As a minimum the drawings and specifications for the controlled systems shall include:

- An English language narrative sequence of operation.
- Mechanical control schematics.
- EMCS network architecture.
- DDC Input/Output Point Schedules in PWGSC format.

At the preliminary design briefing the Consultant shall obtain a copy of the current PWGSC Automatic Control System Master Specification Sections. The Consultant shall review and edit the PWGSC Automatic Control System Master Specifications.

### 9.15 Commissioning

PWGSC Commissioning Manager (or its representative) will overview all commissioning activities, review and approve all commissioning documents, overview Functional Performance Testing and O&M Training, and review the accuracy of all reported results. Commissioning shall be done to the approval of the PWGSC Commissioning Manager.

Unless noted otherwise, the Design Consultant shall have an overall responsibility for preparation of design intent and design criteria documents, preparation of Commissioning Specifications, preparation of

commissioning plan, system startup verification form, functional performance test forms, review of shop drawings, inspection of construction, verification of commissioning testing including installation testing, equipment starting and testing, system starting and testing, review TAB reports, review and approval of "As built" drawings and O&M Manuals, preparation of Systems Operating Manual, Maintenance Manual, and preparation of Commissioning Report.

Refer to Required Services (RS 7) for the additional commissioning responsibilities and key commissioning activities of the Design Consultant.

## 9.16 Drawing Requirements

Refer to PWGSC CADD Standards.

Numbering, size, symbols, title blocks, etc.:

- Number sheets consecutively, commencing with the Plot or Site Dwg. as M-1. Show the mechanical subject in the appropriate title block space, e.g. "Plumbing and Drainage", "Heating", "Air Conditioning and Ventilation", "Sprinkler System", "Details", etc.
- Do not combine Plumbing and Heating on one drawing unless the size and simplicity of the project make this feasible.
- Mechanical drawings shall be the same size as the Architectural Final Working Drawings for the project. Generally, the required size of pre-printed sheets for Working Drawings will be determined by the Departmental Representative.
- Room and area reference on mechanical drawings must in all cases show the room designation as used on "Room Finish Schedule".
- Consolidate notes on the right-hand side of the sheet.

Scale and room identification:

- Scale: All drawings must be legible and must include sufficient information to permit accurate bidding and installation.
- When the scale of plans is 1:50 all branches of the mechanical work (plumbing, air-conditioning, heating, etc.) may be shown on one plan, provided that these systems are not too complex.
- When the scale of plans is 1:100 a separate set of floor plans shall be made for each branch of the mechanical work, except that heating and air conditioning may be shown on one set of plans.
- A scale of plans smaller than 1:100 shall not be used.
- All boiler rooms, machine rooms, equipment rooms, etc. and all congested areas shall be fully detailed on the plans, and sections with all equipment that might be involved in interferences shown, and drawn to a scale not smaller than 1:50.
- Identical floors: Where floors are identical architecturally, typical floor plans may be used for mechanical work only where the complete floor is identical and riser diagrams clearly show all changes involved. Typical plans are not allowed, i.e. no "similar wings", "right-or-left-handed".
- Room numbers: Show all room numbers on mechanical drawings to facilitate co-ordination and cross-reference with those shown on architectural and electrical drawings.

Drawing Requirements:

- Each set of drawings, namely, plumbing, heating, air conditioning, etc. must give scales, floor elevations and compass points, column grids, column numbers and titles. The elevation of the lowest floor shall be shown. Drawings shall show elevation of all main pipes and ducts.
- Piping riser diagrams and system flow diagrams shall be provided for all multi-storey buildings and shall include all piping sizes not clearly indicated on floor plans and details. Single line piping diagrams shall be provided to indicate connections to all system components, together with pipe size schedules where various sizes of units employ the same diagram. Flow diagrams shall show all equipment in true sequence

showing piping, valves, control valves, strainers, pressure gauges, thermostats, etc. Identify equipment on these diagrams using nomenclature corresponding to that used in the appropriate equipment schedules.

- When using three or more similar pieces of equipment, all pertinent information as to size, capacity, etc. shall be shown in a schedule.
- Cross sections of mechanical rooms shall relate to the operator's view in mechanical room. Clearly diagram each system to show intent of system and method of operation and control.

Piping and Ducting Location:

- The piping and ducting shall be shown, as nearly as possible, in the location where it is to be actually installed. Conceal all piping, ducting and other services in ceilings, chases, shafts, furred out spaces or partitions, except in basement or storage areas not occupied by personnel.
- Piping of any description shall not be located in any space used as switchboard (switch-gear) or transformer room or electrical closet.
- As far as possible, no piping or ductwork shall be run above switchboards, motor control centres or surface mounted panelboards located in mechanical equipment rooms. Where piping for any service must run above such equipment, a drip pan shall be specified.
- Water and waste pipes shall not be located in exterior walls where there is danger and freezing.
- Pipes, ducts or other utilities shall not be embedded in the fireproofing of any column or other structural member or between the fireproofing and the structural member protected.

Pipe Sleeves: The structural or the architectural drawings must show the pipe sleeves for all pipes passing through footings of exterior walls below grade. The elevations of sleeves must be given.

Waterproofed Floors:

- Where floors are waterproofed, all pits, cleanout manholes, trenches, etc. shall be kept to a minimum, i.e. thicken slab to contain waste pipes under basement or in the case of large drains, consider waterproofed trenches.
- Drainage piping required in slabs subjected to hydrostatic pressure shall be co-ordinated with the structural design.

Checking of Drawings:

- Drawings must be checked for completeness, clarity, interferences with structural features and with electrical equipment, and agreement with the architectural drawings.
- A large part of the checking, particularly the interferences between the mechanical and electrical systems and the structural features, can be made during the preparation of the drawings.

"As Built" Drawings and Specifications: Specify that each mechanical subcontractor shall record, on one set of white prints all changes, alterations, as well as any additions as covered by authorized "Change Orders" at the same time approval is received from the prime Consultant. This shall include rerouted lines, located ducts, valves and equipment.

## 9.17 Specification Requirements

Specifications in accordance with Section 4.

At the 33% submission of working documents, provide outline specifications for all systems and principle system components and equipment. Provide the outline specifications with manufacturers literature about principal equipment and system components proposed for use in this project.

The specifications with table of contents shall consist of typed and edited PWGSC Ontario Region amended NMS and in house specification sections.

## 9.18 Design Submission Requirements

Design Concept Submission:

- Submit design intent and design criteria document. Provide the following information for each room in the building:
- User's function and requirements.
- Estimated maximum occupancy.
- Indoor summer design conditions.
- Indoor winter design conditions.
- Outdoor air supply ventilation rate per person.

Provide a description of proposed mechanical options. Provide the following information for each proposed option:

- An economic and technical explanation of the reason for the proposed mechanical systems.
- A copy of building energy analysis with input and output summaries.

Design Development Submission:

- Produce the preliminary designs based on the approved concept.
- Provide system flow diagrams and EMCS network architecture. Describe the mechanical systems, the components of each system, the operation of each system, and the updated energy analysis summaries.

Submissions of Construction Documents:

- The 33% submission shall include floor plans showing routing of major HVAC, plumbing and fire protection systems, piping riser diagrams and system flow diagrams, EMCS network architecture, outline mechanical specifications, and the updated energy analysis summaries.
- The 66% submission shall include updated 33% submission plus mechanical room layout drawings, mechanical control schematics, DDC Input/Output Point Schedules, equipment schedules, and mechanical specification sections, and the updated energy analysis summaries.
- The 99% submission shall include: Plans and Specifications detailing the requirements for the construction. Updated design intent and design criteria document. Updated energy analysis summaries.

Refer to Required Services (RS) for additional requirements.

## 9.19 As-Built and Record Information

In accordance with Section 1.

## **SECTION 10A ELECTRICAL WORK PROCEDURES**

### **10A.1 Site Characteristics**

Visit the site and evaluate its characteristics.

### **10A.2 Meetings and Schedule**

Attend all meetings throughout the entire Work project development period.

Assist in establishing work schedules for electrical work compatible with other disciplines.

### **10A.3 Concept Submission**

Submit information necessary to allow evaluation of the basic design concept with the Concept Submission.

Submit drawings illustrating the final concept including:

- Distribution diagram showing single line diagrams to distribution centres.
- Floor plans complete with locations of major electrical equipment and distribution centres.
- Lighting layouts.
- Power outlets.
- Ceiling distribution systems for lighting, power and telecommunications.
- Elevator control room plan and preliminary details.
- List of standard PWGSC details to be utilized.
- Telephone rooms, conduits and telecommunication cable systems requirements and layout.

Provide draft specification sections. Request PWGSC Ontario Region amended NMS and in house master specification sections suitable for the project for guidance.

Provide the initial cost estimate of electrical work for the Project Cost Plan in accordance with Sections 11 and 12.

### **10A.4 Design Synopsis**

Provide a design synopsis with the final concept design, describing the electrical work in sufficient detail for assessment and approval by the Departmental Representative.

### **10A.5 Working Documents**

Upon approval of the final design concept start the working documents; drawing sizes, lettering, electrical symbols, etc. to match the architectural.

### **10A.6 Design Submission**

Provide drawings showing advanced development of the following:

- Single line diagram of the power circuits with their metering and protection, including:
- Complete rating of equipment.
- Ratios and connections of CT's and PT's.
- Description of relays when used.
- Maximum short circuit levels on which design is based.
- Identification and size of services.
- Connected load and estimated maximum demand on each load centre.
- Electrical plans with:
- Floor elevations and room identification.
- Legend of all symbols used.
- Circuit numbers at outlets and control switching identified.
- All conduit and wire sizes except for minimum sizes which should be given in the specification.
- A panel schedule with loadings for each panel.
- Telephone conduits system layout for ceiling/floor distribution.
- Intercom system empty conduit layout.
- Riser diagrams for lighting, power, telephone and telecommunication cable systems, fire alarm and other systems.
- Elementary control diagrams for each system.
- Schedule for motor and controls.
- Complete lighting layout and fixture schedule clearly indicating methods of circuiting, switching and fixture mounting.
- Electric heating layout and schedule.

Provide the following data:

- Total connected load.
- Maximum demand and diversity factors.
- Sizing of standby load.
- Short-circuit requirements and calculations showing the ratings of equipment used.

Provide draft specifications.

Provide an intermediate cost estimate in accordance with Sections 11 and 12.

### **10A.7 100% Submission**

This should be complete working documents subject to final review by the Departmental Representative. Provide the following:

- Complete working drawings and specification for bidding purposes.
- Final cost estimate in accordance with Sections 11 and 12.

### **10A.8 Final Submission**

After review of the 100% documents by the Department, make all required revisions and provide the following:

- Bid documents in accordance with Section 1.
- Confirmation of final cost estimate in accordance with Sections 11 and 12.

#### **10A.9 Inspection Authority Submission**

Submit and obtain approval on plans and specifications required by the Inspection Authority before bid call.

#### **10A.10 Bid Call Period**

Provide necessary advice to the Departmental Representative during bid calls, including amendments, bid evaluation, etc.

#### **10A.11 Construction, Instruction and Supervision**

Attend the Construction Briefing Meeting and subsequent project meetings as necessary. Inspect electrical work and materials and provide constant supervision of construction to ensure compliance with the contract documents.

Participate in the interim and final inspection process.

Assist in the electrical portion of the project schedule.

#### **10A.12 Progress Reports and Payment Claims**

Report weekly to the Prime Consultant on the progress of electrical work.

Examine Contractor's claims for electrical work and advise the Prime Consultant.

#### **10A.13 Inspection Certificates**

Prior to take-over, obtain from the Contractor all inspection certificates confirming that installed electrical work conforms with specifications and regulations.

#### **10A.14 Operation and Maintenance Manuals**

Review Operation and Maintenance Data Manuals submitted by the Contractor.

Prepare and submit to the Departmental Representative, Preventive Maintenance Manuals and Operation Instructions Manuals, in accordance with RFP.

#### **10A.15 As-Built and Record Information**

In accordance with Section 1.

## **SECTION 10B ELECTRICAL DESIGN GENERAL ELECTRICAL DESIGN**

### **10B.1 Design Basis**

Base the electrical design on providing the following features at the most economical cost, considering both investment and operating expenditures:

- Safety to personnel during operation and maintenance.
- Ease of maintenance for equipment maintained by non-specialized personnel.
- Flexibility and reliability of electrical services.
- Proper co-ordination of all elements of the system as to:
  - Insulation levels.
  - Interrupting capacities.
  - Protective relaying.
  - Mechanical strength.
- Energy conservation with respect to system and equipment and their operation.

### **10B.2 Codes and Standards**

In accordance with Section 1.

Electrical work to conform with the Canadian Electrical Code CSA C22.1-2012, Part 1, Ontario Electrical Safety Code 2012 and all bulletins, Canada Labour Code Parts IV and VI and applicable local codes and regulations.

Require CSA certification on equipment.

Specify applicable standards for equipment, i.e., EEMAC, CSA, ULC, ASTM, NFPA, ANSI, etc.

### **10B.3 Materials and Equipment**

Require Canadian products where economically feasible. Avoid specifying trade names.

Specify that within 30 days after contract award the Contractor submits for approval of the Departmental Representative 5 complete lists of all materials and equipment that he intends to use in the Contract.

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#### **10B.4 Fees and Permits**

Specify that the Contractor pay fees and obtain permits as required by authorities having jurisdiction.

#### **10B.5 Nameplates**

For major equipment specify plastic white on black sandwich type nameplates be attached with metal screws; letters to be minimum 10 mm high.

Use plastic nameplates (adhesive-applied) for receptacle and switch cover plates in laboratories and other work areas.

Provide the Contractor with co-ordinated nameplate titles.

#### **10B.6 Poke Through Wiring**

Electrical power to any floor area is to be supplied from electrical panels on that floor to avoid the use of "poke through" wiring.

#### **10B.7 Incoming Electrical Services**

Underground: generally, underground service is preferred and use where required to conform to local practice. Cable and installation should be to the approval of the local Power Supply and Inspection Authorities. Provide spare ducts for future additions or maintenance.

Overhead: overhead service may be economically acceptable for small buildings.

Carry out economic analysis and submit:

- An analysis of the capital investment on equipment and long-term electrical energy cost for purchasing energy at utility voltage level against purchasing energy at higher voltage levels, taking into account energy losses in equipment such as service transformers.
- An estimate of the equipment and installation cost for the proposed electrical system.
- A calculation for the interest, at the current interest rate as furnished by Bank of Canada, on the difference in investment on alternative concepts of the electrical system.

Primary service equipment: Include protective devices, instrument transformers, metering equipment and other requirements of the local Supply Authority.

Well in advance discuss with the local PUC the size and type of service required. Obtain from the PUC the three phase symmetrical short circuit fault level at the incoming end of their service to determine the interrupting capacity of their service equipment.

Obtain from the local PUC data regarding point of connection, service characteristics and requirements, extent and cost of work provided by the Authority, type of service required (overhead or underground), whether a transformer vault is required and reasons therefore, and the best method of metering (primary or secondary, etc.).

Obtain approval from the local Supply Authority and Inspection Authority having jurisdiction for the proposed service entrance equipment, switchgear, duct-manhole systems, transformers, overhead systems and associated equipment.

Existing services: obtain locations of all buried service such as electrical, telephone lines, water and sewer lines, gas mains, etc. Specify that the Contractor take adequate protective measures before any digging operations commence.

Duct systems: determine the size and location of incoming ducts for electricity, telephones, fire alarms, etc., and indicate them in the working documents.

### **10B.8 Transformer**

Dry type transformers are preferred for primary voltages of 5 kV or lower where insulation, co-ordination and protection satisfactory to the Power Supply Authority can be obtained. Provide lightning arrestors.

Liquid cooled transformers are preferable above 5 kV although dry type may be used if approved by the Power Authority. Check BIL requirements.

Establish transformer noise levels which will not cause interference in working areas.

Specify standards to establish quality, tests and performance.

### **10B.9 Capacity of Electrical Service**

Allow for 100% lighting load plus an appropriate demand factor on the remaining load based on operating characteristics.

The main service should provide for minimum 50% expansion.

### **10B.10 Transformer Vaults**

Allow for future expansion.

Provide an independent ventilation system (gravity where possible) with intake and exhaust direct to the outside.

### **10B.11 Switchgear Assemblies**

Use metal-enclosed assemblies with drawout circuit breakers where current, voltage and short circuit characteristics are within their limits.

Incorporate H.R.C. current limiting fuses into circuit breakers on circuits requiring high short circuit protection.

Provide a co-ordination study to justify selection of fuses and breakers.

Specify standards to establish quality, tests and performance.

### **10B.12 Distribution Levels**

Submit for Departmental approval a study of load requirements taking into account the overall plan.

120/240 volt power may be required to serve specific items of equipment.

A 208Y/120 volt, three-phase, four-wire system for lighting, receptacles and power is usually satisfactory for smaller buildings.

From the load and type of building make an economic study to determine if the use of a 600/347 volt system is warranted.

### **10B.13 Panelboards**

Use circuit breaker type panelboards for motors, power equipment and lighting.

Circuit breakers to be of the bolt-on type. Multiple breakers to have single handle. Tie-bars not allowed.

Switch and fuse units may be used for high short circuit protection.

Specify standards to establish quality, tests and performance.

Mains or bussing to be made of copper.

Specify that each circuit shall be clearly labeled in a typewritten directory with a clear plastic cover.

Branch circuit panelboards to be fitted with lock type doors.

Specify minimum interrupting capacity rating.

Include a minimum of 20% spare breakers, and in laboratory and workshop areas provide space for 30% more.

Recessed panelboards should have additional spare, empty conduits extending to ceiling spaces.

Comply with PWGSC Advisory Notice on Counterfeit-Labelled Moulded Case Circuit Breakers issued June 28, 2012.

### **10B.14 Wiring Methods**

Specify that either rigid steel or aluminum conduit be used for panel feeders, for 600 volt equipment, and in other locations required by the Canadian Electrical Code and local regulations.

PVC or FRE conduit may be used for underground work. Conduit embedded in concrete must not be aluminum.

Electrical metallic tubing, EMT, may be used in locations approved by the Canadian Electrical Code and local regulations. Provide insulated green ground conductor in EMT conduits.

For motors and equipment subject to vibrations or movement provide flexible connections of liquid-tight flexible metal conduit.

Specify conduits to be installed neatly with adequate bracing and clearances from adjacent equipment, and maintaining watertight penetration of walls and floors.

Wire size to be No. 12 AWG minimum for power or lighting circuits. Minimum conduit size for power and lighting circuits shall be 20 mm dia.

Conductors to be copper.

Conceal conduit and wiring in finished areas.

Permanent tags should be provided to feeders at pull and junction boxes.

### **10B.15 Ceiling Distribution System**

Power System:

- Provide an electrical distribution system above the suspended T-bar ceiling with duplex receptacles to accommodate downfeed service poles. A minimum of (4) four duplex receptacles shall be spaced at 3.5 m (maximum) center to center, both ways. Connect no more than six (6) receptacles to a 15A circuit.
- Identify each receptacle with the panel and circuit number on red dymo tape.
- Receptacle boxes shall be securely fastened to the slab above and must not be installed more than 600 mm above T-bar ceiling.
- An insulated ground wire shall be installed in each conduit and grounded to the common panel ground.
- Where electrified screens are installed, provide a power distribution system in the ceiling space complete with junction boxes to Code requirement, one for each 40 square meter area with 208/120V, 3 Ph, 8 wire 4 circuit system in each box.

### **10B.16 Equipment Connections**

Indicate on the working drawings wiring for motors, control equipment and other electrical equipment installed under other Divisions. Do not include low voltage (below 50 volts) wiring.

Extend wiring to equipment furnished by the Department.

### **10B.17 Switches and Receptacles**

Switches for lighting to be specification grade AC rated 15/20 ampere, 120/347 volts, ganged where possible and mounted at maximum 1200 mm centre from finished floor.

Receptacles to be specification grade U-ground type, triple wiping contacts, rated 15 A, 125 volt, mounted minimum 400 mm centre above finished floor.

In lunch room provide above the counter two 15 A, 125 V duplex receptacles; each to be split wired and with a pilot light and switch.

In laboratory and shop areas:

- In areas where benches or counter tops may be located receptacles not part of the furniture should be mounted 1.0 m above the floor and spaced 1.5 m apart.
- Use a minimum of one 30 A, 240 volt receptacle per laboratory.
- Connect not more than 2 duplex receptacles to a circuit for bench receptacles.

Ratings of other receptacles as indicated or required.

### **10B.18 Corrosion Resistant Finishes**

Cover plates, surface-mounted outlet boxes, etc., located in areas where corrosive materials may be used must have suitable corrosion resistance. In laboratories, ensure that finishes on electrical equipment cover plates and surface mounted outlet boxes match the finishes on mechanical fittings.

### **10B.19 Motor**

Co-ordinate control sequences to provide starters and other auxiliary control equipment with the proper characteristics and features to obtain the performance intended.

Provide disconnect switches, starters and auxiliary control equipment which are not an integral part of packaged units described in equipment specifications but which are required for performance and sequence of operation of equipment specified under other Divisions.

Motors 400 W and over are to be three-phase.

Check that the voltage drop due to motor starting is within limits acceptable to the local utility. If required, use a reduced- voltage starter.

Provide motors with thermal-overload protection of the manual reset type. Built-in overloads in the motor are not acceptable. Specify that protection be co-ordinated with motor characteristics.

Single phase motors to be controlled by manual starters and not by tumbler switches. Motor starters are not to be supplied from lighting panelboards if at all possible.

Automatic-control devices such as thermostats, floats or pressure switches may control the starting and stopping of motors directly, if designed and rated for that purpose, otherwise use a magnetic starter.

When a manual-automatic operation is required, use a "Manual-off-Automatic" selector switch. Connect the selector switch so that only the normal automatic regulating control devices will be bypassed when the switch is in manual position. Connect safety control devices, such as low or high pressure cutouts, high temperature cutouts, motor overload, etc., in the control circuit in both the Manual and Automatic positions of the selector switch.

For three-phase motor starters provide:

- Magnetically operated motor starter.
- Fused control transformer for all 110 volt control.
- Manual-off-Automatic selector switch where remote control is used.
- Preferred: combination starters. Acceptable: starters with separate disconnect devices.
- Motor starter disconnecting devices to be manually operated and to be load-break fused switches or air circuit breakers.

Control devices in individual special purpose enclosures should be mounted in groups.

Co-ordinate all motor controls with the Mechanical Consultant.

### **10B.20 Motor Control Centres**

Use motor control centers where they provide an economical and practical grouping of controls. Centres should be free-standing structures. Use combination starters. Mount centres on continuous mounting channels on raised concrete pads. Wall mount type may be used for groups of up to four starters. Identify each circuit by a black laminated plastic nameplate with white letters. Specify control centres as per EEMAC Standard for class and type.

#### **10B.21 Motor Equipment Feeders**

In open equipment areas consider the advantages of running motor equipment feeders from overhead rather than up through floor slabs.

#### **10B.22 Underfloor Ducts or Raised Floors**

Underfloor duct or raised floor systems for power, telephones and intercom may be used in office areas, but not in laboratory areas. Submit a cost estimate and preliminary layout at Concept Stage Submission, if considered feasible.

#### **10B.23 Telecommunication Systems**

Provide an empty conduit system for voice and data communication systems directly from the main building communications room or the building communications riser room on the same floor to the communications room in the tenant space to suit.

Where plenum cable system is provided for voice and data communication systems in the ceiling space, ensure that these cables are properly supported from the structural ceiling slab and not laid on top of ceiling tiles.

Where required for security and/or physical protection purposes, provide an empty zone conduit system for telephone and data communication systems with each zone conduit serving a bay area of maximum 50 m<sup>2</sup>. Provide 50 mm EMT conduits with plastic end bushings and nylon pull strings. Provide long radius 90a bends and pulling points as required by telecommunication systems companies.

#### **10B.24 Intercommunication Systems**

Provide an intercom system or empty conduit system only for an intercom system. Submit proposed layout at the Design Stage Submission.

#### **10B.25 Elevators**

Conform to the National Building Code, Canada Labour Code Part IV, local regulations, ASME A17.1-2010/CSA B44-10 Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks and CAN/CSA-B651-04(R2010), Accessible Design for the Built Environment or CAN/CSA-B355-09 Lifts for Persons with Physical Disabilities.

Provide elevators, dumbwaiters, and escalators only where they can be justified as functional requirements of the building.

Where groups of units are involved, submit an elevator analysis to indicate the performance of the system proposed.

Direct plunger hydraulic elevators may be used for elevators serving 2 or 3 stops provided ground conditions do not introduce serious difficulties in installing the cylinder.

Provide fire fighters service if required by the codes.

#### **10B.26 Clocks**

Provide manual reset clocks and clock outlets in strategic areas such as main lobbies, corridors, general offices and conference rooms. Use an automatically supervised clock system in large buildings where economically justified.

#### **10B.27 Fire Alarm System**

General: Depending on the size of the building provide a fire alarm system in accordance with the National Building Code and Treasury Board Personnel Management Manual, Occupational Safety and Health, Chapter 3-4 "Standards for Fire Alarm Systems" 01-02-92. Installation to CAN/ULC-S524-06. Verification of Alarm System to CAN/ULC-S537-04. Inspection and Testing of Alarm System to CAN/ULC-S536-04.

Fire alarm system to be multiplex or hardwired to suit the project. Submit cost comparison with preliminary layout at concept stage submission.

#### **10B.28 Voice Communication System**

Conform to requirements of the National Building Code and the Treasury Board Manual, Personnel Management Manual, Occupational Safety and Health, Chapter 3-4, Standard for Fire Alarm System, 01-02-92. Depending on the size of the building, provide a voice communication system in conjunction with the fire alarm system.

The design, inspection and testing is to be subject to the approval of the FC.

#### **10B.29 Standby Power**

If a standby electrical generating set is required provide specific requirements here.

Provide a standby electrical generating set to supply emergency power for 12 hours minimum.

Emergency power supply shall be in accordance with CAN/CSA-C282-09, Emergency Electrical Power Supply for Buildings.

Enclose generator room with non-combustible materials having a 2 hour fire rating and by Underwriters Laboratories labeled 1-1/2 hour fire rated doors.

Install diesel engine in accordance with the requirements of the NFPA 37-2010.

Fuel supply and piping system is to be in accordance with National Fire Code of Canada, NFC 2010.

Standby lighting, power panels and circuits shall be provided for future connection to standby generator even if generator is not required at the design stage.

Receptacles connected to emergency system to be colour coded red for ready identification.

### **10B.30 Lighting General**

Lighting systems to be designed to provide the required illumination levels with ease of luminaire relocation, lighting control and lighting maintenance with no damage occurring to components. Refer to PWGSC Office Lighting Design Standard and Application Guidelines, April 2012 for detailed information not contained in this section.

Ceiling surfaces to have a 80% minimum reflectance, a minimum NRC rating of 0.8 as per ASTM C423-09a test standard titled Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method and conform to ~~CAN/CSB 92.1 M85 of the National Standards of Canada, titled Acoustical Units, Prefabricated.~~

Leave a minimum ceiling depth of 220 mm for ceiling recessed luminaire installation, unless otherwise determined by PWGSC.

Submit co-ordination drawings showing worst cases of ceiling space requirements and clearances for structural, mechanical and electrical components.

Provide exterior security lighting for drives, walks, parking areas, entrance/exit doors and other strategic locations. Exterior lighting to be controlled by timer or photocell. Provide manual by-pass switches.

Provide the Department with detail calculations of light intensities to support the design.

### **10B.31 Lighting Levels**

For each room or area determine the task performed and provide minimum maintained average illumination levels to meet Labour Canada Regulations and PWGSC Standard, IESNA recommended lighting levels and Tables 1 and 2 attached at the bottom of this section. These levels may be achieved by using non-uniform task ambient lighting layouts.

In cases where visual task description, furniture layout and office layout is unavailable, a minimum base illumination level of 750 lux average maintained over the entire work space is to be used.

Minimum to average illumination ratio to be 0.8 or better over the entire working area.

Provide local switching for enclosed rooms, e.g., private offices, conference rooms, training rooms, etc. For large areas provide local switching arrangements to conveniently control and conserve energy.

### **10B.32 Lighting Power Allowances**

Conform to ANSI/ASHRAE 90.1-2010 (SI) requirements.

While individual areas may deviate from the ANSI/ASHRAE recommended values, the total power budget for lighting shall not exceed 22 watts per square metre, unless otherwise determined by PWGSC.

### **10B.33 Energy Consumption**

Conform to ANSI/ASHRAE 90.1-2010 (SI) requirements.

### **10B.34 Luminaires**

Fluorescent luminaires is preferred for indoor applications. Depending on the luminaire design, these luminaires shall be capable of accommodating up to 76 mm high metal louvres. The use of incandescent luminaires is limited to applications where questions of aesthetics, ultraviolet emission and lighting control requires it. Use compact fluorescent lamps where possible.

The use of HID luminaires is limited to support and utility spaces. Special dispensation of this use limitation can be obtained from the PWGSC Regional Electrical Engineer, provided the requirements of PWGSC requirements are met.

For outdoor applications the use of HID luminaires is preferred.

Illustrate all fixtures on the working drawings or standard details sheets and specify in detail the quality of material, construction and standard of performance required. Manufacturer's name and catalogue numbers are not allowed in contract documents.

Specify fluorescent luminaires either 300 mm or 500 mm width to suit ceiling modules for recessed installation.

### **10B.35 Ballasts**

For fluorescent fixtures, use electronic type, rapid start, energy efficient, high power factor, with THD not exceeding 15, and sound rated A ballasts, having low current crest factor (less than 1.8) and wired to maximize energy efficiency. Electronic ballasts must be the type approved by PWGSC, Provincial and local Hydro authorities for energy efficiency and harmonic criteria.

HID's ballasts to meet or exceed the performance requirements of ANSI C82.4-2002, and to be suitable for the lamp and temperature specified.

### **10B.36 Lamps**

Provide lamps of the best quality available. Generally, fluorescent lamps to be rapid start, 32 watts T8 3500 K. Incandescent lamps are to be for 130 volt operation. Specify initial and average lumens and rated life.

Specify 3500 K fluorescent lamps for new installations and major renovations.

### **10B.37 Lighting Controls**

Manual controls:

- These may be line switches, low voltage switches, time switches, photo controls and contactors. They should be located to maximize convenience and load control.
- Circuit breakers and light contactors are not to be used as localized manual lighting controls.

Microprocessor lighting controls:

- May be operated from a central master control unit, have field distributed control panels for zone control and local "on-off" controls. Programming functions can be assigned from the main console unit and/or assigned from field control panels. Local control can be achieved via a wall switch or telephone line.

### **10B.38 Emergency Lighting**

Provide sufficient emergency lighting to permit a safe evacuation. Emergency lighting systems must be installed in accordance with Canada Labour Code Part IV and PWGSC Standard Office Lighting Design Standard and Application Guidelines, April 2012.

Emergency battery lighting units must be performance certified by CSA as meeting CSA C22.2 No.141-10, Emergency Lighting Equipment.

#### **10B.39 Exit Signs**

Exit and paths of exit travel are to be indicated by electrically illuminated full panel bilingual exit signs. Size of lettering to meet the National Building local Fire Department and CAN/CSA-C860-11, and photoluminescent exit signs to CAN/ULC-S572-10. Performance of Internally Lighted Exit signs requirements. Connect electrified Exit Signs to emergency power system.

If there is no provision for a standby generator, connect to emergency battery units.

#### **10B.40 Heating**

Co-ordinate heating with mechanical and architectural design. If electrical heating is used, ensure that the heating units specified provide the required wattage but do not exceed specified values. Integrate the heating controls with the total environmental aspect of the building.

#### **10B.41 Transient Voltage Surge Suppressors (TVSS)**

TVSS is to be fully applicable for the purpose of protecting all facility AC electrical circuits from the hazardous effects of transient voltages. These transients may be generated externally by lightning induced energies, utility load factor corrections, and substation switching or they can be internally generated due to inductive and/or capacitive load switching.

#### **10B.42 Lightning Protection**

Determine the necessity of installing lightning protection. If required, provide protection to meet CAN/CSA-B72-M87(R2008), latest provincial Lightning Rods Act, provincial or local regulation, the requirements of Provincial Fire Marshal.

#### **10B.43 Security System**

Provide an alarm system against unauthorized entry of the premises and certain secure areas. Use door switches and alarms plus an electronic intrusion alarm system.

#### **10B.44 Lighting Levels**

Table 1 - Recommended Levels of Illumination (Interior).

##### TABLE 1

Illumination levels for interior office spaces, expressed as minimum acceptable values of maintained average horizontal lux levels over  
a) the working plane at each work station and

b) at floor level for support spaces. Refer to IESNA Illuminance Surveying techniques for field measurements.

Description of Task	Illumination (lx) 10 lx = 1 dalx
High Contrast Visual Task (4) (7)	600
Low Contrast Visual Task (5) (7)	1,000
VDT use (3)	300-500 (1)(2)
Filing work (6)	300
Circulation areas immediate to task areas	200
Public spaces, lounges, waiting areas	100-200
Notice Boards	300
Conference, training rooms	300-600 (1)
Corridors	100
Cafeteria - dining (9)	75
Cafeteria - food display, serving, cashier (9)	300
Food preparation (9)	500
Washrooms (8)	200
Powder room - grooming (8)	300
Stairways	100

Note

- (1) Provide flexible and/or dimmable lighting levels.
- (2) VDT task in conjunction with paper oriented task requiring greater illumination will conform to the requirements of the latter.
- (3) For guidance in lighting design for VDT spaces see publication PWGSC Design Guide "Office Lighting for Video Display Terminals".
- (4) Typically found in private offices, clerical work and accounting offices.
- (5) Typically found in drafting offices, mapping and artwork offices.
- (6) Typically visual tasks of high contrast and large size, or tasks of intermittent visual nature.
- (7) For general office spaces with undetermined task use 750 lux and a minimum to average ratio of 0.8. and is the actual sink top.
- (8) The reference plane is the actual sink top.
- (9) The reference plane is the actual table top, counter top or serving surface.

**10B.44 Lighting Levels**

Table 2 - Recommended Levels of Illumination (Exterior).

TABLE 2

Illumination levels for exterior commercial office building spaces, expressed as minimum acceptable values of maintained average horizontal lux levels over usable area and at pavement level. Refer to IESNA Illuminance Survey techniques for field measurements.

Description of Task	Illumination Level (lux) (1)	Uniformity Ratio
<u>OPEN PARKING</u>		
Vehicular traffic low activity	10	4:1
Vehicular traffic, moderate-high activity	20	4:1

Vehicular intersections	30	3:1
Pedestrian walkways	10	N/A
Pedestrian walkways and vehicular intersection	30	3:1
Other area	10	N/A
<b><u>COVERED PARKING</u></b>		
General parking and pedestrian areas	50	4:1
Ramps and corners	100	3:1
Entrance area (Note 2)	500	N/A
<b><u>BUILDING FLOODLIGHTING</u></b>		
Building façade (vertical illumination)	100-300	4:1

Note

1. Provide photocell control with manual bypass.
2. The entrance area is defined as the portal or physical entrance to the covered portion of the parking structure and 15 m beyond the edge of the covering into the structure.

**10B.45 As-Built and Record Information**

As-built information is received from the Contractor. It contains drawings, specifications, shop drawings, submittals, samples, etc. It is noted as such by the Contractor.

Record drawings and specifications are updated originals prepared by the Consultants based on the information supplied by the Contractor in the as-built.

## **SECTION 10C GENERAL ELECTRICAL DESIGN (CSC) Correctional Service Canada**

### **10C.1 Design Basis**

Base the electrical design on providing the following features at the most economical cost, considering both investment and operating expenditures:

- Safety to personnel during operation and maintenance.
- Ease of maintenance for equipment maintained by non-specialized personnel.
- Flexibility and reliability of electrical services.
- Proper co-ordination of all elements of the system as to:
  - Insulation levels
  - Interrupting capacities
  - Protective relaying
  - Mechanical strength
- Energy conservation with respect to system and equipment and their operation.

### **10C.2 Codes and Standards**

In accordance with Section 1.

Electrical work to conform with the Canadian Electrical Code CSA C22.1-2012, Part 1, Ontario Electrical Safety Code 2012 and all bulletins, Canada Labour Code Parts IV and VI and applicable local codes and regulations.

- Require CSA certification on equipment.
- Specify applicable standards for equipment, i.e., EEMAC, CSA, ULC, ASTM, NFPA, ANSI, etc.
- Correctional Service Canada Technical Criteria Document.
- The following Correctional Service Canada specifications:

CSC/DTE 80027 Issue 3	General Specification for Fixed Point Security Alarm for use in Federal Correctional Institutions.
CSC/DTE 77041 Issue 7	Statement of Work for Electronic Systems for the Correctional Service of Canada Institutions.
CSC/DTE 80006 Issue 6	Quality Control Specifications for the installation of Electronic Systems in Federal Correctional Institutions.
CSC/DTE 77013 Issue 4	Functional Specification for a closed circuit television system for use in Correctional Institutions.
DTE-02:02	Monochrome, Charged-Coupled Device (CCD) closed Circuit Television Camera.
DTE-02:03	Color, Charged-Coupled Device (CCD) closed Circuit Television Camera.
CSC/DTE 77018 Issue 4	Functional Specification for an Inmate Cell Call System for use in Federal Correctional Institutions.

### **10C.3 Materials and Equipment**

Require Canadian products where economically feasible. Avoid specifying trade names and manufacturer's catalogue numbers.

Specify that within 30 days after tender award the Contractor submits for approval of the Departmental Representative, 5 complete lists of all materials and equipment that he intends to use in the Contract.

### **10C.4 Fees and Permits**

Specify that the Contractor pay fees and obtain permits as required by authorities having jurisdiction.

#### **10C.5 Nameplates**

For major equipment specify plastic white on black sandwich type nameplates be attached with metal screws; letters to be minimum 10 mm high.

Use plastic nameplates (adhesive-applied) for receptacle and switch cover plates in laboratories and other work areas.

Provide the Contractor with coordinated nameplate titles.

#### **10C.6 Poke Through Wiring**

Electrical power to any floor area is to be supplied from electrical panels on that floor to avoid the use of "poke through" wiring.

#### **10C.7 Transformer**

Dry type transformers are preferred for Types primary voltages of 5 kV or lower where insulation, coordination and protection satisfactory to the Power Supply Authority can be obtained. Provide lightning arrestors.

Liquid cooled transformers are preferable above 5 kV although dry type may be used if approved by the Power Authority. Check BIL requirements.

Establish transformer noise levels which will not cause interference in working areas.

Specify standards to establish quality, tests and performance.

#### **10C.8 Capacity of Electrical Service**

Allow for 100% lighting load plus an appropriate demand factor on the remaining load based on operating characteristics.

The main service should provide for minimum 50% expansion.

#### **10C.9 Transformer Vaults**

Allow for future expansion.

Provide an independent ventilation system (gravity where possible) with intake and exhaust direct to the outside.

#### **10C.10 Distribution Levels**

Submit for Departmental approval a study of load requirements taking into account the overall plan.

120/240 volt power may be required to serve specific items of equipment.

A 208Y/120 volt, three-phase, four-wire system for lighting, receptacles and power is usually satisfactory for smaller buildings.

From the load and type of building make an economic study to determine if the use of a 600/347 volt system is warranted.

### **10C.11 Panelboards**

Use circuit breaker type panelboards for motors, power equipment and lighting.

Circuit breakers to be of the bolt-on type. Multipole breakers to have single handle. Tie-bars not allowed.

Switch and fuse units may be used for high short circuit protection.

Specify standards to establish quality, tests and performance.

Mains or bussing to be made of copper.

Specify that each circuit shall be clearly labeled in a typewritten directory with a clear plastic cover.

Branch circuit panelboards to be fitted with lock type doors.

Specify minimum interrupting capacity rating.

Include a minimum of 20% spare breakers, and in laboratory and workshop areas provide space for 30% more.

Recessed panelboards should have additional spare, empty conduits extending to ceiling spaces. Comply with PWGSC Advisory Notice on Counterfeit-Labelled Moulded Case Circuit Breakers issued June 28, 2012.

### **10C.12 Wiring Methods**

Specify that rigid steel conduit be used for panel feeders, for 600 volt equipment, and in other locations required by the Canadian Electrical Code and local regulations.

PVC or FRE conduit may be used for underground work. Conduit embedded in concrete must not be aluminum.

Electrical metallic tubing, EMT, may be used in locations approved by the Canadian Electrical Code and local regulations. Provide insulated green ground conductor in EMT conduits.

For motors and equipment subject to vibrations or movement provide flexible connections of liquid-tight flexible metal conduit.

Specify conduits shall be installed neatly with adequate bracing and clearances from adjacent equipment, and maintaining watertight penetration of walls and floors.

Wire size shall be No. 12 AWG minimum for power or lighting circuits. Minimum conduit size for power and lighting circuits shall be 20 mm dia.

Conductors shall be copper.

Conceal conduit and wiring in finished areas.

Permanent tags should be provided to feeders at pull and junction boxes.

### **10C.13 Ceiling Distribution**

In the ceiling space of office areas install a system of duplex receptacles to provide power to power poles. Minimum of 3 duplex receptacles to be placed on a grid of 3 m x 3 m. Connect no more than 6 duplex receptacles to a circuit.

Evaluate the flexibility and economics of providing a system of empty conduits to facilitate the distribution of telephone and telecommunications cables, or the installation of a cable tray system with cables approved for use in return air plenum.

Evaluate the versatility, convenience, technical and economic performance of available ceiling wiring systems, including the use of metal raceway and plug-in distribution system.

### **10C.14 Equipment Connections**

Indicate on the working drawings wiring for motors, control equipment and other electrical equipment installed under other Divisions. Do not include low voltage (below 50 volts) wiring.

Extend wiring to equipment furnished by the Department.

### **10C.15 Switches and Receptacles**

Switches for lighting to be specification grade AC rated 15/20 ampere, 120/347 volts, ganged where possible and mounted at 1400 mm centre from finished floor.

Receptacles to be specification grade U-ground type, triple wiping contacts, rated 15 A, 125 volt, mounted 300 mm above finished floor.

In lunch room provide above the counter two 15 A, 125 V duplex receptacles; each to be split wired and with a pilot light and switch.

In laboratory and shop areas:

- In areas where benches or counter tops may be located receptacles not part of the furniture should be mounted 1.0 m above the floor and spaced 1.5 m apart.
- Use a minimum of one 30 A, 240 volt receptacle per laboratory.
- Connect not more than 2 duplex receptacles to a circuit for bench receptacles.

Ratings of other receptacles as indicated or required.

### **10C.16 Corrosion Resistant Finishes**

Cover plates, surface-mounted outlet boxes, etc, located in areas where corrosive materials may be used must have suitable corrosion resistance. In laboratories, ensure that finishes on electrical equipment cover plates and surface mounted outlet boxes match the finishes on mechanical fittings.

## 10C.17 Motor Controls

Co-ordinate control sequences to provide starters and other auxiliary control equipment with the proper characteristics and features to obtain the performance intended.

Provide disconnect switches, starters and auxiliary control equipment which are not an integral part of packaged units described in equipment specifications but which are required for performance and sequence of operation of equipment specified under other Divisions.

Motors 400 W and over are to be three-phase.

Check that the voltage drop due to motor starting is within limits acceptable to the local utility. If required, use a reduced- voltage starter.

Provide motors with thermal-overload protection of the manual reset type. Built-in overloads in the motor are not acceptable. Specify that protection be co-ordinated with motor characteristics.

Single phase motors to be controlled by manual starters and not by tumbler switches.

Motor starters are not to be supplied from lighting panelboards if at all possible.

Automatic-control devices such as thermostats, floats or pressure switches may control the starting and stopping of motors directly, if designed and rated for that purpose, otherwise use a magnetic starter.

When a manual-automatic operation is required, use a "Manual-off-Automatic" selector switch. Connect the selector switch so that only the normal automatic regulating control devices will be bypassed when the switch is in manual position. Connect safety control devices, such as low or high pressure cutouts, high temperature cutouts, motor overload, etc, in the control circuit in both the Manual and Automatic positions of the selector switch.

For three-phase motor starters provide:

- Magnetically operated motor starter.
- Fused control transformer for all 110 volt control.
- Manual-off-Automatic selector switch where remote control is used.
- Preferred: combination starters. Acceptable: starters with separate disconnect devices.
- Motor starter disconnecting devices to be manually operated and to be load-break fused switches or air circuit breakers.

Control devices in individual special purpose enclosures should be mounted in groups.

Co-ordinate all motor controls with the Mechanical Consultant.

## 10C.18 Motor Control Centers

Use motor control centers where they provide an economical and practical grouping of controls. Centres should be free-standing structures. Use combination starters. Mount centres on continuous mounting channels on raised concrete pads. Wall mount type may be used for groups of up to four starters. Identify

each circuit by a black laminated plastic nameplate with white letters. Specify control centres as per EEMAC Standard for class and type.

#### **10C.19 Motor Equipment Feeders**

In open equipment areas consider the advantages of running motor equipment feeders from overhead rather than up through floor slabs.

#### **10C.20 Telephone and Data Communication Systems**

Provide an empty conduit system for the telephone and data communication systems.

#### **10C.21 Intercommunication Systems**

Provide an intercom system or empty conduit system only for an intercom system. Submit proposed layout at the Design Stage Submission.

#### **10C.22 Clocks**

Provide manual reset clocks and clock outlets in strategic areas such as main lobbies, corridors, general offices and conference rooms. Use an automatically supervised clock system in large buildings where economically justified.

#### **10C.23 Fire Alarm System**

General: Provide a fire alarm system in accordance with CSC Technical Criteria, the National Building Code and Treasury Board Personnel Management Manual, Occupational Safety and Health, Chapter 3-4 Standards for Fire Alarm Systems. Installation to CAN/ULC-S524-06. Verification of Alarm System to CAN/ULC-S537-04. Inspection and Testing of Alarm System to CAN/ULC-S537-04.

Fire alarm system to be compatible with the existing fire alarm system of the Institution. Submit cost comparison with preliminary layout at concept stage submission.

#### **10C.24 Standby Power**

SPEC NOTE: If a standby electrical generating set is required provide specific requirements here.

Provide a standby electrical generating set to supply emergency power for 12 hours minimum.

Emergency power supply shall be in accordance with CSA-C282-09, Emergency Electrical Power Supply for Buildings.

Enclose generator room with non-combustible materials having a 2 hour fire rating and by Underwriters Laboratories labeled 1-1/2 hour fire rated doors.

Install diesel engine in accordance with the requirements of the NFPA 37-2010, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines.

Fuel supply and piping system is to be in accordance with National Fire Code of Canada, NFC 2010.

Standby lighting, power panels and circuits shall be provided for future connection to standby generator even if generator is not required at the design stage.

Receptacles connected to emergency system to be colour coded red for ready identification.

### **10C.25 Lighting General**

Lighting systems to be designed to provide the required illumination levels with ease of luminaire relocation, lighting control and lighting maintenance with no damage occurring to components. Refer to PWGSC Office Lighting Design Standard & Application Guidelines, April 2012, for detailed information not contained in this section.

Ceiling surfaces to have a 80% minimum reflectance, a minimum NRC rating of 0.8 as per ASTM C423-09a test standard titled Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

Leave a minimum ceiling depth of 220 mm for ceiling recessed luminaire installation, unless otherwise determined by PWGSC.

Submit co-ordination drawings showing worst cases of ceiling space requirements and clearances for structural, mechanical and electrical components.

Provide the Department with detail calculations of light intensities to support the design.

### **10C.26 Lighting Levels**

For each room or area determine the task performed and provide minimum maintained average illumination levels to meet Canada Labour Code and PWGSC Standard, IESNA recommended lighting levels and Tables 1 and 2 attached at the bottom of this section. These levels may be achieved by using non-uniform task ambient lighting layouts.

In cases where visual task description, furniture layout and office layout is unavailable, a minimum base illumination level of 750 lux average maintained over the entire work space is to be used.

Minimum to average illumination ratio to be 0.8 or better over the entire working area.

Provide local switching for enclosed rooms, e.g., private offices, conference rooms, training rooms, etc. For large areas provide local switching arrangements to conveniently control and conserve energy.

### **10C.27 Lighting Power Allowances**

Conform to Model National Energy Code of Canada for Buildings 2011.

Whilst individual areas may deviate, the total power budget for lighting shall not exceed 22 watts per square meter, unless otherwise determined by PWGSC.

### **10C.28 Energy Consumption**

Conform to ANSI/ASHRAE-90.1-2010(SI) Energy Standard for Buildings Except Low-Rise Residential Buildings.

### **10C.29        Luminaires**

Fluorescent luminaires is preferred for indoor applications. Depending on the luminaire design, these luminaires shall be capable of accommodating up to 76 mm high metal louvers. The use of incandescent luminaires is limited to applications where questions of aesthetics, ultraviolet emission and lighting control requires it. Use compact fluorescent lamps where possible.

The use of HID luminaires is limited to support and utility spaces. Special dispensation of this use limitation can be obtained from the PWGSC Regional Electrical Engineer, provided the PWGSC requirements are met.

For outdoor applications the use of HID luminaires is preferred.

Illustrate all fixtures on the working drawings or standard details sheets and specify in detail the quality of material, construction and standard of performance required. Lenses to be ULC certified. Manufacturer's names and catalogue numbers are not allowed.

Fluorescent light fixtures should generally be 2 lamp. Specify either 300 mm or 500 mm width to suit ceiling modules for recessed installation.

### **10C.30        Ballasts**

For fluorescent fixtures, use electronic type, rapid start, energy efficient, high power factor, with THD not exceeding 15, and sound rated A ballasts, having low current crest factor (less than 1.8) and wired to maximize energy efficiency. Electronic ballasts must be the type approved by PWGSC, Provincial and local Hydro authorities for energy efficiency and harmonic criteria and suitable for T-8 lamps.

HID's ballasts to meet or exceed the performance requirements of ANSI C82.4-2002 and to be suitable for the lamp and temperature specified.

### **10C.31        Lamps**

Provide lamps of the best quality available. Generally, fluorescent lamps to be rapid start, 32 watts T8 3500 K. Incandescent lamps are to be for 130 volt operation. Specify initial and average lumens and rated life.

Specify 3500 K fluorescent lamps for new installations and major renovations.

### **10C.32        Lighting Controls**

Manual controls:

- These may be line switches, low voltage switches, time switches, photocontrols and contactors. They should be located to maximize convenience and load control.
- Circuit breakers and light contactors are not to be used as localized manual lighting controls.

Microprocessor lighting controls:

- May be operated from a central master control unit, have field distributed control panels for zone control and local "on-off" controls. Programming functions can be assigned from the main console unit and/or assigned from field control panels. Local control can be achieved via a wall switch or telephone line.

### **10C.33        Emergency Lighting**

Provide sufficient emergency lighting to permit a safe evacuation. Emergency lighting systems must be installed in accordance with Canada Labour Code Part IV, PWGSC Office Lighting Design Standard & Application Guidelines and CSC Technical Criteria.

Emergency battery lighting units must be performance certified by CSA as meeting CSA C22.2 No.141-10, Emergency Lighting Equipment.

#### **10C.34 Exit Signs**

Exit and paths of exit travel are to be indicated by electrically illuminated full panel LED bilingual exit signs. Size of lettering to meet the National Building Code and the local Fire Department and CAN/CSA-C860-11 and photoluminescent exit signs to CAN/ULC-S572-10. Connect electrified Exit Signs to emergency power system. If there is no provision for a standby generator, provide additional sockets and lamps and connect to emergency battery units.

#### **10C.35 Heating**

Co-ordinate heating with mechanical and architectural design. If electrical heating is used, ensure that the heating units specified provide the required wattage but do not exceed specified values. Integrate the heating controls with the total environmental aspect of the building.

#### **10C.36 Security System**

SPEC NOTE: Delete if not required.

Provide an alarm system against unauthorized entry of the premises and certain secure areas. Use door switches and alarms plus an electronic intrusion alarm system.

#### **10C.37 Fixed Point Alarm System**

[Provide a] [Modify existing] fixed point alarm system.

System must be compatible with the existing Pyrotronics system.

#### **10C.38 CCTV System**

[Provide a] [Modify existing] closed circuit television (CCTV) system.

#### **10C.39 Cell Call System**

[Provide a] [Modify existing] cell call system.

System must be compatible with the existing system.

#### **10C.40 Illumination Levels Interior**

##### TABLE 1

Illumination levels for interior office spaces, expressed as minimum acceptable values of maintained average horizontal lux levels over a) the working plane at each work station and b) at floor level for support spaces. Refer to IESNA Illuminance Surveying techniques for field measurements.

<u>Description of Task</u>	<u>Illumination (lx)</u> <u>10 lx = 1 dalx</u>
High Contrast Visual Task (4)(7)	500
Low Contrast Visual Task (5)(7)	1,000
VDT use (3)	300-500 (1)(2)
Filing work (6)	300
Circulation areas immediate to task areas	200
Public spaces, lounges, waiting areas	100-200
Notice Boards	300
Conference, training rooms	300-600 (1)
Corridors	100
Cafeteria - dining (9)	75
Cafeteria - food display, serving, cashier (9)	300
Food preparation (9)	500
Washrooms (8)	200
Powder room - grooming (8)	300
Stairways	100

Note

- (1) Provide flexible and/or dimmable lighting levels.
- (2) VDT task in conjunction with paper oriented task requiring greater illumination will conform to the requirements of the latter.
- (3) For guidance in lighting design for VDT spaces see publication PWGSC Design Guide "Office Lighting for Video Display Terminals".
- (4) Typically found in private offices, clerical work and accounting offices.
- (5) Typically found in drafting offices, mapping and artwork offices.
- (6) Typically visual tasks of high contrast and large size, or tasks of intermittent visual nature.
- (7) For general office spaces with undetermined task use 750 lux and a minimum to average ratio of 0.8. and is the actual sink top.
- (8) The reference plane is the actual sink top.
- (9) The reference plane is the actual table top, counter top or serving surface.

**10C.41 Illumination Levels Exterior**

TABLE 2

Illumination levels for exterior commercial office building spaces, expressed as minimum acceptable values of maintained average horizontal lux levels over usable area and at pavement level. Refer to IESNA Illuminance Survey techniques for field measurements.

<u>Description of Task Level</u>	<u>Illumination Level</u> <u>(lux) (1)</u>	<u>Uniformity Ratio</u>
<u>OPEN PARKING</u>		
Vehicular traffic low activity	10	4:1
Vehicular traffic, moderate-high activity	20	4.1
Vehicular intersections	30	3:1
Pedestrian walkways	10	N/A
Pedestrian walkways and vehicular intersection	30	3.1
Other area	10	N/A
<u>COVERED PARKING</u>		

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General parking and pedestrian areas	50	4:1
Ramps and corners	100	3:1
Entrance area (Note 2)	500	N/A
<b>BUILDING FLOODLIGHTING</b>		
Building facade (vertical illumination)	100-300	4:1

Notes:

- (1) Provide photocell control with manual bypass.
- (2) The entrance area is defined as the portal or physical entrance to the covered portion of the parking structure and 15 m beyond the edge of the covering into the structure.

## **SECTION 11 CONSTRUCTION COST PLANNING AND CONTROL**

### **11.1 Agreement Requirements**

The Consultant Agreement requires the Consultant to monitor the project construction cost from commencement of his work through to post- construction evaluation of the completed project.

### **11.2 Cost Plan**

The project cost plan is an application of cost criteria to the design, establishing a reasonable economic relationship between cost, quality, utility and appearance. It confirms the feasibility of producing the required accommodation within the construction cost limit, and provides a means of subsequent checking and control of overall expenditure.

The Cost Plan defines a certain amount of money for a certain quality of project in relation to the Basic Requirements.

### **11.3 Cost Control**

Provide cost control services during the design and construction documents development and during Bid period and initiate corrective action to ensure that the estimated project construction cost remains within the approved construction cost limit/budget.

Advise the Departmental Representative immediately if changes are required due to revised client requirements, etc. impact the Construction Cost Limit. Do not proceed with these changes until authorized by the Departmental Representative.

### **11.4 Classes of Estimates - Definitions**

#### **CLASSES OF CONSTRUCTION COST ESTIMATES USED BY PWGSC**

##### **A- PWGSC and Treasury Board**

In its dealings with Treasury Board on matters of project approvals, PWGSC uses two classes of estimates: indicative and substantive. The indicative estimate is the first one that is used (chronology-wise) and serves as the basis of Preliminary Project Approval by the Treasury Board. This estimate is also referred, within PWGSC, as a class "D" estimate. The substantive estimate is the second one that is used (again, chronology-wise) and serves as the basis of Effective Project Approval by the Treasury Board. This estimate is also referred, within PWGSC, as a class "B" estimate.

## **B- PWGSC and Consultant Agreements (for architects and engineers)**

In its dealings with architects and engineers, PWGSC uses four classes of estimates: classes "D", "C", "B" and "A". The Class "D" estimate is the first one that is used (chronology wise) and serves as the basis of the Construction Cost Estimate upon which an agreement between PWGSC and an architectural/engineering (A&E) consulting firm is entered into. The class "D" estimate is prepared by PWGSC and is used by the A&E firm during its performance of the 'Analysis of the Project Brief'. (This estimate compares to the indicative estimate). The Class "C" estimate is prepared by the firm as part of the 'Design Concept'. The Class "B" estimate is prepared by the firm as part of the 'Design Development'. (This estimate compares to the substantive estimate).

The Class "A" estimate is prepared by the firm as part of the 'Construction Documents, Pre-Bid Construction Cost Estimate and Project Schedule'. Definitions of classes "D", "C", "B" and "A" are as follows.

### **DESCRIPTION OF THE CLASSES OF ESTIMATES USED BY PWGSC FOR CONSTRUCTION COSTING OF BUILDINGS PROJECTS**

#### **Class "D" Estimate**

This estimate provides an indication of the total cost of the project, based on the user's functional requirements to the degree known at the time. It is based on historical cost data for similar work, suitably adjusted for such factors as: effect of inflation, location, risk, quality, size, and time. All related factors affecting cost are considered to the extent possible. Such an estimate is strictly an indication (rough order of magnitude) of the project total cost and completion date. This estimate is used to establish the indicative estimate required by the Treasury Board for Preliminary Project Approval. Expected degree of accuracy: 20%.

#### **Class "C" Estimate**

This estimate is prepared at the end of the Design Concept stage and is based on updated user requirements, general description of the end built works, preliminary site information and existing conditions, production, and takes into consideration construction experience and market conditions as well as basic implementation logistics. It includes costs for design, documentation, and construction supervision. Expected degree of accuracy: 15%.

#### **Class "B" Estimate**

This estimate is prepared at the end of Preliminary Design and is based upon data (on cost, time and construction) of a level of precision as is typically available when the design of the major systems and sub-systems of the facility (including outline specifications and preliminary drawings and models), as well as when the results of all site or installation investigations are completed. This estimate also makes allowance for all costs resulting from the anticipated schedule, expected market conditions and suitable level of contingencies. This estimate is used to establish the substantive estimate required by Treasury Board for Effective Project Approval. Expected degree of accuracy: 10%.

#### **Class "A" Estimate**

This estimate is based on the "B" estimate which has been updated concurrently with the development of Construction Documents and is submitted as a final pre-bid estimate. It requires that project systems be

designed and specified to near completion, and is based on a realistic construction schedule and accurate labour and material costs. This is the final estimate before bid call or construction start. Typically, the total forecast is presented in elemental format and includes all actual associated fees and costs. Expected degree of accuracy: 5%.

The Cost Plan must be within the authorized budget. Intermediate and Final Estimates should remain within the Cost Plan, unless (changes due to revised client requirements, etc., are authorized by the Department. Advise the Department immediately if such changes occur.

### **11.5 Construction Cost Estimate Submissions**

Provide the following Construction Cost Estimate Submissions:

- A Class "C" Estimate with each Design Concept Submission. The Consultant will also submit Class 'C' estimate for various options thus facilitating Departmental Representative's decision re: selecting the best options. The Consultant's submission will include variance analysis between the construction cost limit and Consultant's Class 'C' estimate with justification/substantiation of variances.
- A Class "B" Estimate with the Design Development and Outline Specifications of Design Systems Submission. The Consultant's submission will include variance analysis between the construction cost limit and Consultant's Class 'C' estimate with justification/substantiation of variances.
- An updated Class "B" Estimate with each submission of the updated Construction Documents at each stage of production specified, i.e. at 66% completion. Each submission will include variance analysis.
- A Class "A" Estimate with the 100% complete stage Construction Document.
- Each Class "C" Estimate shall consist of a completed Elemental Cost Analysis Form.
- Each Class "A" or "B" Estimate submission shall comprise of a completed Elemental Cost Analysis Form and the back-up sheets showing each Sub-Element Item of the work quantified and priced.

### **11.6 Cost Advice**

Provide cost advice, during the design stage, between cost estimate submissions. Evaluate cost of various options, as required, to facilitate Department's decision.

Provide cost advice during the construction stage. Prepare cost estimates for every change based on Contemplated Change Notice and submit to Departmental Representatives. This will assist in deciding on whether to proceed with a change or to assess Contractor's quotation. Evaluate Contractor's quotation and recommend for approval by Departmental Representatives.

### **11.7 Cost Estimating Specialist**

A Cost Consultant, employing Quantity Surveyors, shall provide the cost planning and estimating service for this project.

or

On staff or sub-consultant Quantity Surveyors or other Cost Estimating Specialists shall be used to perform the cost planning service for this project.

Provide details of the Cost Estimating Specialist's qualifications and experience for approval.

### **11.8 Cost Plan - Definition**

The Cost Plan is the construction cost estimate approved for funding for this project. This is the Class "B" Estimate that is prepared from the Preliminary Drawings and Outline of Design Systems.

The Cost Plan defines a certain amount of money for a certain quality of building in relation to the Basic Floor Area Requirements.

### **11.9 Classes of Estimates - Definitions**

- Classes of Estimates are defined as follows:

Class "D" Estimate: a cost estimate based upon unit costs derived from another building of similar type.

- Class "C" Estimate: a cost estimate based upon concept drawings, which represent one possible solution to the design of the project.

- Class "B" Estimate: a cost estimate based upon design development documents and an outline of design systems, or, 25%, 66%, to 95% complete Construction documents.

- Class "A" Estimate: a cost estimate based upon 100% complete construction documents, or, bid documents.

The Cost Plan must be within the authorized budget. Intermediate and Final Estimates should remain within the Cost Plan, unless (changes due to revised client requirements, etc., are authorized by the Department. Advise the Department immediately such changes occur.

### **11.10 Project Cost Analysis Form**

Submit costing information on the standard Analysis Form Project Cost Analysis form (see Sample). Include as much detail as possible, including back-up sheets showing each Sub-Element Item of the work quantified and priced.

### **11.11 Outside Gross Area and Volume Measurement**

To be measured in accordance with publication by the Canadian Institute of Quantity Surveyors "Measurement of Buildings by Area and Volume".

### **11.12 Construction Elements**

The following clauses provide a brief explanation of the construction elements listed in the Project Cost form Elemental Analysis.

#### **11.13 Element No. A1 Substructure**

A11 Normal foundations: foundation walls, footings and associated items, below lowest floor level.

A12 Basement: excavation and backfill.

A13 Special foundations: foundation items of a costly or abnormal nature that are customarily kept separate from Elements 1.1 and 1.2. These include: dewatering, underpinning; shoring; sheet piling; caissons; waterproofing; extra cost for rock excavation.

#### **11.14 Element No. A2 Structure**

A21 Lowest floor: lowest structural floor construction, including supporting beds and layers.

A22 Upper floor: upper floor construction, including columns.

A23 Roof: structural roof construction, including columns.

### **11.15 Element No. A3 Exterior Cladding**

A31 Walls below ground floor: exterior walls, from top of the normal foundations level to ground floor level. Basement walls may be taken down to footings, provided that this dimension is not more than 300 mm. below basement floor level.

A32 Walls above ground floor: exterior walls, from ground floor level to roof level. Include opening forming items. Parapet walls may be included, when materials are similar.

A33 Windows: windows and associated items, installed into openings in exterior walls.

A34 Roof covering: weatherproof roof finish and other items applied to roof structure, including parapets.

Exterior doors and screens: exterior doors, frames, hardware and associated items, together with glazed screens at entrances, installed into openings in exterior walls.

A35 Projections and recessed: items of work resulting from projections to, or recesses from, the general line of the exterior wall face. Typical items include: projecting balconies in their entirety; additional items resulting from recess balconies; canopies attached to the building; sunshades; soffits and framing to building overhangs; soffits, fascias and associated framing; eavestroughs and downpipes.

### **11.16 Element No. B1 Interior Partitions and Doors**

B11 Permanent partitions: internal permanent walls and partitions, and the framing component of framed partitions. Include opening forming items.

Glazed partitions: interior glazed partitions and screens, including doors and frames of similar materials.

B12 Movable partitions: interior movable partitions, including doors and frames of similar materials and the same proprietary make.

B12 Interior doors: interior doors, frames, hardware and associated items, installed into openings in interior walls and partitions.

### **11.17 Element No. B2 Interior Finishes**

B21 Floor finishes: floor finishes, other items and sleepers, applied on floor structures, in an interior space.

B22 Ceiling finishes: ceiling finishes, other items strapping and framing, applied to underside of, or beneath, structures, over an interior space.

B23 Wall finishes: wall finishes, other items and strapping, applied to exterior walls, interior walls, partitions or partition framing, in an interior space.

### **11.18 Element No. B3 Fittings and Equipment**

B31 Fittings and fixtures: built in items of a general nature. These include: miscellaneous metal items; cabinet work; chalkboards; tackboards; toilet partitions; washroom accessories; directories; lockers; shelving; rolling shutters; loading dock devices.

B32 Equipment: built in items to provide a specialized service. These include: kitchen and cafeteria; laboratory; hospital; gymnasium; cranes and hoists.

B33 Elevators and escalators: elevators and B34 escalators and other similar devices to move people and materials within a building.

### **11.19 Element No. C1 Mechanical**

C11 Plumbing and drainage: service systems to supply, heat, condition, distribute, use, collect and discharge water.

C12 Fire protection: service systems to provide built-in fire protection.

C13 Heating: service systems to provide heating for the building.

C13 Ventilating and air conditioning: service systems to supply, condition, distribute, ventilate and exhaust air.

C13 Refrigeration: service systems to provide refrigeration.

C13 Special equipment and piping: specialized service systems. These include: vacuum; compressed air; medical gases; fuel storage and supply; engine exhaust; central lubrication equipment; central liquid soap dispensing.

C14 Building controls: provision of controls to other service systems.

Mechanical overhead and profit: Mechanical Subcontractors' overhead and profit items, which include applicable General Conditions items.

### **11.20 Element No. C2 Electrical**

C21 Service systems provided by the Electrical Subtrade, for a building.

C21 Electric power: service systems to generate, supply, distribute and ground electric power.

C21 Uninterrupted power: service systems to provide an uninterrupted supply of electrical power.

C22 Electric lighting: service systems to provide electric lighting.

C22 Electric heating: service systems to provide electric heating for the building.

C23 Fire alarm: service systems to provide fire detection and alarm.

C23 Communications: service systems to provide for sound, imaging and data communication by electronic means.

Electrical overhead and profit: Electrical Subcontractor's overhead and profit items, which include applicable General Condition items.

### **11.21 Element No. D1 Site Development**

D11 Site work: development of the site, outside the building footprint area, of an Architectural or Structural nature.

D12 Mechanical site services: service systems of a Mechanical Subtrade type, including associated items, to the site, and up to one metre from the building perimeter.

D13 Electrical site services: service systems provided by the Electrical Subtrade, including associated items, to the site, and up to the exterior surface of the building.

### **11.22 Element No. D2 Ancillary Work**

D21 Demolition: demolition of existing buildings on site to make way for new construction work.

D22 Alterations: alterations to an existing building, which will become part of, or all of, the new facility.

### **11.23 Element No. Z1 Overhead and Profit**

Z11/Z12 General Contractor's overhead and profit items, which include General Condition items.

### **11.24 Element No. Z2 Contingencies**

Z21 Design development contingency: an allowance to provide for changes to, and development of, the project design, from the date of the estimate to the 100% complete working drawings and specifications stage. This contingency does not include for a basic and substantial change to the project initiated by the building owner.

Z22 Escalation contingency: an allowance to provide for forecasted variation in cost due to passing of time, from the date of the estimate to the anticipated bid date.

Z23 Escalation-during Construction: Once the Contract is signed, no escalation is applied.

Z24 Permits/Approvals: Municipal Building Permit; TSSA approval; HVAC permit, etc.

Z25 Construction Contingency-during construction. Department's allowance to cover unforeseen conditions and changes occurring during construction.

Z26 LEED Gold: 12% of Construction cost.

### **11.25 Contact**

For more information contact Mr. Spencer Jeyarajan 416-512-5945, fax 416-512-5535. Internet e-mail: [spencer.jeyarajan@pwgsc-tpsgc.gc.ca](mailto:spencer.jeyarajan@pwgsc-tpsgc.gc.ca)

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**SECTION 12 ELEMENTAL COST ANALYSIS**

Project Name: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Project Number: \_\_\_\_\_ Region: \_\_\_\_\_

Project Manager: \_\_\_\_\_

Consultants - Architectural: \_\_\_\_\_

Structural: \_\_\_\_\_

Mechanical: \_\_\_\_\_

Electrical: \_\_\_\_\_

Cost: \_\_\_\_\_

Design Stage Submission: \_\_\_\_\_

Class of Estimate: \_\_\_\_\_

Date of Cost Estimate Submission: \_\_\_\_\_

Basic Floor Area Requirements: \_\_\_\_\_

Gross Floor Area of New Construction: \_\_\_\_\_

Gross Floor Area of Renovations: \_\_\_\_\_

Project:		<b>PUBLIC WORKS AND GOVERNMENT SERVICES CANADA</b>				Report Date:		
Location:		<b>Ontario Region</b>				Page No.:		
Owner:		<b>ELEMENTAL CONSTRUCTION COST SUMMARY</b>				Bldg. Type:		
Consultant:						GFA		
Element	Ratio to GFA	Elemental Cost		Elemental Amount		Rate per m2		%
		Quantity	Unit Rate	Sub-Total	Total	Sub-Total	Total	
<b>A SHELL</b>								
<b>A1 SUBSTRUCTURE</b>								
A11 Foundations								
A12 Basement Excavation								
A13 Special Conditions								
<b>A2 STRUCTURE</b>								
A21 Lowest Floor Construction								
A22 Upper Floor Construction								
A23 Roof Construction								
<b>A3 EXTERIOR ENCLOSURE</b>								
A31 Walls Below Grade								
A32 Wall Above Grade								
A33 Windows & Entrances								
A34 Roof Coverings								
A35 Projections								
<b>B INTERIORS</b>								
<b>B1 PARTITIONS &amp; DOORS</b>								
B11 Partitions								
B12 Doors								
<b>B2 FINISHES</b>								
B21 Floor Finishes								
B22 Ceiling Finishes								
B23 Wall Finishes								
<b>B3 FITTINGS &amp; EQUIPMENT</b>								
B31 Fittings & Fixtures								
B32 Equipment								
B33 Elevators								
B34 Escalators								
<b>C SERVICES</b>								
<b>C1 MECHANICAL</b>								
C11 Plumbing & Drainage								
C12 Fire Protection								
C13 HVAC								
C14 Controls								
<b>C2 ELECTRICAL</b>								
C21 Services & Distribution								
C22 Lighting, Devices & Heating								
C23 Systems & Ancillaries								
<b>NET BUILDING CONSTRUCTION ESTIMATED COST - EXCLUDING SITE</b>								
<b>D SITE &amp; ANCILLARY WORK</b>								
<b>D1 SITE WORK</b>								
D11 Site Development								
D12 Mechanical Site Services								
D13 Electrical Site Services								
<b>D2 ANCILLARY WORK</b>								
D21 Demolitions								
D22 Alterations								
<b>NET BUILDING CONSTRUCTION ESTIMATED COST - INCLUDING SITE</b>								
<b>Z1 GENERAL REQUIREMENTS &amp; FEE</b>								
Z11 General Requirements								
Z12 Fee								
<b>TOTAL CONSTRUCTION COST ESTIMATE - EXCLUDING CONTINGENCIES</b>								
<b>Z2 ALLOWANCES</b>								
Z21 Design & Pricing Allowance								
Z22 Escalation-until tender call								
Z23 Escalation-during construction								
Z24 Permits/Approvals								
Z25 Construction Contingency								
<b>Risk Factors</b>								
<b>TOTAL CONSTRUCTION COST ESTIMATE -INCLUDING CONTINGENCIES + RISK FACTORS</b>								
<b>GOODS &amp; SERVICES TAX</b>								

---

## SECTION 13 TIME MANAGEMENT

### 13.1 Time Management, Planning, and Control

The Time Management, Planning, and Control Specialist (scheduler) shall provide a Project Planning and Control System (Control System) for Planning, Scheduling, Progress Monitoring and Reporting and a Time Management, Planning, and Control Report (Progress Report). It is required that a fully qualified and experienced Scheduler play a major role in providing services in the development and monitoring of the project schedule.

The scheduler will follow good industry practices for schedule development and maintenance as recognized by the Project Management Institute (PMI).

PWGSC - Ontario Region, presently utilizes Microsoft Project for its current Control Systems and any software used by the consultant should be fully integrated with these, using one of the many commercially available software packages.

### 13.2 Schedule Design

Project Schedules are used as a guide for execution of the project as well as to communicate to the project team when activities are to happen, based on network techniques using Critical Path Method (CPM).

When building a Control System you must consider:

1. The level of detail required for control and reporting;
2. The reporting cycle- monthly and what is identified in the Terms of Reference, but also includes Exception Reports;
3. That the duration must be in days;
4. What is required for reporting in the Project Teams Communications Plan and
5. The nomenclature and coding structure for naming and reporting requirements of activities, schedules and reports.

### 13.3 Schedule Development

For purposes of monitoring and reporting of project progress and ease of schedule review it is important to maintain a standard for all schedules and reports starting with the Work Breakdown Structure (WBS), identification of Milestones, naming of activities as well as schedule outputs and paper sizing and orientation.

### 13.4 Work Breakdown Structure

When developing the schedule the consultant needs to use PWGSC standards and practices. Two basic requirements are the National Project Management System (NPMS) and a Work Breakdown Structure (WBS), structured supporting the NPMS (Levels 1-4).

The WBS is as follows:

Level 1	Project Title (NPMS)
Level 2	Project Stage (NPMS)
Level 3	Project Phase (NPMS)
Level 4	Processes to meet Deliverables/Control Points Milestones (NPMS)

---

Level 5	Sub-Processes and Deliverables in support of Level 4
Level 6	Discrete activities. (Work Package)

Not all the Stages, Phases and Processes in the NPMS will be required on all the projects, however the structure remains the same.

### 13.5 Major and Minor Milestones

The Major Milestones are standard Deliverables and Control Points within NPMS and are required in all schedule development. These Milestones will be used in Management Reporting within PWGSC as well as used for monitoring project progress using Variance Analysis. The Minor milestones are process deliverables (Level 4) or sub-process deliverables (level 5) also used in Variance Analysis.

Each Milestone will also be assigned appropriate coding for Status Reporting and Management Reporting.

Milestones must have zero duration and are used for measuring project progress.

Milestones may also be external constraints such as the completion of an activity, exterior to the project, affecting the project.

### 13.6 Activities

All activities will need to be developed based on Project Objectives, Project Scope, Major and Minor Milestones, meetings with the project team and the scheduler's full understanding of the project and it's processes.

Subdivide the elements down into smaller more manageable pieces that organize and define the total scope of work in Levels 5-6 that can be scheduled, costed, monitored and controlled. This process will develop the Activity List for the project.

Each activity is a discrete element of work and is the responsibility of one person to perform.

Each activity will describe the work to be performed using a verb and noun combination (i.e. Review Design Development Report).

Activities should not have durations longer than 2 update cycles, with exception of activities not yet defined in a "Rolling Wave".

Each activity will be assigned at WBS level 6 and appropriately coded for Status Reporting and Management Reporting.

These elements will become activities, interdependently linked in Project Schedules.

### 13.7 Project Logic

Once the WBS, Milestones and Activity List have been developed the activities and milestones can be linked in a logical manner starting with a Project Start Milestone. Every activity and milestone must be linked in a logical manner using either a Finish to Start (FS), Finish to Finish (FF), Start to Start (SS) or Start to Finish (SF) relationship. There can be no open-ended activities or milestones.

A Finish to Start (FS) is the preferred relationship.

---

When developing relationships avoid the use of lags and constraints in place of activities and logic.

### **13.8 Activity Duration**

The activity duration (in days) is the estimated length of time it will take to accomplish a task.

Consideration needs to be taken in how many resources are needed and are available, to accomplish any activity. (Example: availability of Framers during a "Housing Boom".) Other factors are the type or skill level of the available resources, available hours of work, weather etc.

There will be several types of lists and schedules produced from this process, which will form part of the Progress Report.

### **13.9 Activity List**

An Activity List identifies all activities including milestones required to complete the whole project.

### **13.10 Milestone List**

A Milestone List identifies all project Major and Minor milestones.

### **13.11 Master Schedule**

A Master Schedule is a schedule used for reporting to management at WBS level 4 and 5 that identifies the major activities and milestones derived from the detailed schedule. Cash Flow projections can be assigned at WBS level 5 for monitoring the Spending Plan.

### **13.12 Detailed Project Schedule**

A Detailed Project Schedule is a schedule in reasonable detail (down to WBS Level 6 and 7) for progress monitoring and control, this will ensure that the schedule shall be in sufficient detail to ensure adequate planning and control.

### **13.13 Schedule Review and Approval**

Once the scheduler has identified and properly coded all the activities; put them into a logical order and then determined the appropriate durations. The scheduler can then analyze the schedule to see if the milestone dates meet the contractual requirements and then adjust the schedule accordingly by changing durations, resource leveling or changing logic.

When the schedule has been satisfactorily prepared the scheduler can present the detailed schedule to the Project Team for approval and be Baselined. There may be several iterations before the schedule meets with the Project Teams agreement and the contractual requirements.

The final agreed version must be copied and saved as the Baseline to monitor variances for reporting purposes.

### **13.14 Schedule Monitoring and Control**

Once Baselined the schedule can be better monitored, controlled and reports can be produced.

Monitoring is performed by, comparing the baseline activities % complete and milestone dates to the actual and forecast dates to identify the variance and record any potential delays, outstanding issues and concerns and provide options for dealing with any serious planning and scheduling issues in report form.

Analyze and report from early start sequence on all activities due to start, underway, or finished for the complete project.

There will be several reports generated from the analysis of the baseline schedule and will form part of the Time Management Report in the Required Services Sections (RS)

### **13.15 Progress Reports**

A Progress Report reflects the progress of each activity to the date of the report, any logic changes, both historic and planned, projections of progress and completion the actual start and finish dates of all activities being monitored.

The Progress Report includes:

A Narrative Report, detailing the work performed to date, comparing work progress to planned, and presenting current forecasts. This report should summarize the progress to date, explaining current and possible deviations and delays and the required actions to resolve delays and problems with respect to the Detail Schedule, and Critical Paths.

Narrative reporting begins with a statement on the general status of the project followed by a summarization of delays, potential problems and project status criticality, any potential delays, outstanding issues and concerns and options for dealing with any serious planning and scheduling issues.

A Variance Report, with supporting schedule documentation, detailing the work performed to date, comparing work progress to planned. This report should summarize the progress to date, explaining all causes of deviations and delays and the required actions to resolve delays and problems with respect to the Detail Schedule, and Critical Paths.

A Criticality Report identifying all activities and milestones with negative, zero and up to five days Total Float used as a first sort for ready identification of the critical, or near critical paths through the entire project.

Included in the Progress Report as attachments are: WBS chart, Activity Lists, Milestone Lists, Master Schedules, Detailed Project Schedule

### **13.16 Exception Report**

The Scheduler is to provide continuous monitoring and control, timely identification and early warning of all unforeseen or critical issues that affect or potentially affect the project.

If unforeseen or critical issues arise, the Scheduler will advise the Project Manager and submit proposed alternative solutions in the form of an Exception Report.

An Exception Report will include sufficient description and detail to clearly identify:

1. Scope Change: Identifying the nature, reason and total impact of all identified and potential project scope changes affecting the project.

2. Delays and accelerations: Identifying the nature, the reason and the total impact of all identified and potential duration variations.
3. Options Enabling a Return to the project baseline: Identifying the nature and potential effects of all identified options proposed to return the project within baselined duration.

### 13.17 Standard Submissions

At each submission or deliverable stage provide a complete and updated Progress Report, the contents of each report will vary with requirements and at each project phase. Typically a Progress Report has:

1. Executive Summary;
2. Narrative Report;
3. Variances Report;
4. Criticality Report;
5. Exception Report (as required)
6. Work Breakdown Structure Chart;
7. Activity List;
8. Milestone List;
9. Master Schedule with Cash Flow Projections;
10. Detail Project Schedule (Network Diagram or Bar Charts)

### 13.18 Schedule Outputs and Reporting Formats

The sheet sizing and orientation is more a suggestion that a role, changes to the paper format may vary to accommodate the information and column information required.

#### Progress Reports:

Paper Size: Letter

Paper Format: Portrait

Title Format: Project Title; Report Type; Print Date; Data Date; Revision Block

Body Text: Narratives for each report to match other reports generated in the D.S.S.

Variance Report Columns: Activity ID, Activity Name, Planned Finish, Revised Finish, Variance, Activity % Complete,

Criticality Report Columns: Activity ID, Activity Name, Duration, Start, Finish, Activity % Complete, Total Float.

#### Exception Reports:

Paper Size: Letter

Paper Format: Portrait

Title Format: Project Title; Report Type; Print Date; Data Date; Revision

Body Text: Narrative to match other reports generated in the D.S.S.

Paper Size: Letter

Paper Format: Landscape

Title Format: Project Title; Report Type; Print Date; Data Date; Revision

Columns: Activity ID, Activity Name, Duration, Remaining Duration, Start, Finish, Total Float.

#### Work Breakdown Structure (indent tree):

Paper Size: Letter

Paper Format: Portrait

Columns: WBS Code, WBS Name, Duration, Cost estimate, start and finish dates.

Footer Format: Project Title; Report Type; Print Date; Data Date; Revision Block

Activity Lists:

Paper Size: Letter

Paper Format: Portrait

Columns: Activity ID, Activity Name, Start, Finish, Predecessor, Successor.

Footer Format: Project Title; Report Type; Print Date; Data Date; Revision Block

Sort with Early Start, then Early Finish, then Activity ID and with the WBS.

Milestone Lists:

Paper Size: Letter

Paper Format: Portrait

Footer Format: Project Title; Report Type; Print Date; Data Date; Revision Block

Columns: Activity ID, Activity Name, Start, Finish.

Sort with Early Start, then Early Finish, then Activity ID and without the WBS.

Master Schedule (Bar Chart):

Paper Size: 11X17

Paper Format: Landscape

Footer Format: Project Title; Report Type; Print Date; Data Date; Revision Block

Columns: Activity ID, Activity Name, Duration, Activity % Complete, Start, Finish, Total Float.

Sort with Early Start, then Early Finish, then Activity ID and with the WBS.

Detailed Project Schedules (Bar Chart):

Paper Size: 11X17

Paper Format: Landscape

Footer Format: Project Title; Report Type; Print Date; Data Date; Revision Block

Columns: Activity ID, Activity Name, Duration, Activity % Complete, Start, Finish, Total Float.

Sort with Early Start, then Early Finish, then Activity ID and with the WBS.

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## **SECTION 14 DRAWING CONVERSION TO PORTABLE DOCUMENT FORMAT (PDF)**

Issued by: Real Property Contracting Directorate

PWGSC

May 2005 Last Updated: 2012-06-20 by PWGSC - Ontario Region

### **Preface**

Portable Document Format (PDF) is the standard format for documents that are posted on the Government Electronic Tendering System (GETS). Architectural and Engineering Consultants shall supply, in addition to native format files, electronic copies of drawings and specifications in PDF format for tendering Government of Canada (GoC) construction projects.

Create PDF drawing and specification files derived from the native software in which they were created. Scanning is only permissible in special circumstances, such as cases where no electronic version of a drawing being included in a construction tender package exists.

The information provided in this basic reference guide does not relieve consultants from following the established standards for the production of drawings and specifications. The sole purpose of this guide is to provide basic information on the PDF conversion process, bearing in mind that additional detailed technical information is available from the various software manufacturers.

### **14.1 Printer Drivers**

Adobe Acrobat provides two different printer drivers that are able to convert CADD drawing into PDF format; Acrobat PDF Writer and Acrobat Distiller. It is recommended that Acrobat Distiller be used to create PDF file of architectural and engineering drawings due to their size and complex graphical nature.

### **14.2 PDF Files Settings**

#### Security:

Files must not be password protected and must allow printing.

#### Drawing Orientation:

The final PDF drawing files must be displayed on the screen in the same direction that the users are intended to view them.

#### Font Type:

In order to avoid any problems during the conversion and to minimize the potential for font display errors, the fonts used for the production of construction drawings must be PostScript or True Type fonts.

#### Resolution:

Since the PDF files will be used for printing, it is recommended to select 600 dots per inch (dpi).

#### Scale:

When choosing the Plot scale in Adobe, it is important to choose the 1:1 scale to ensure the integrity of the scale from which the drawings were created in the CADD software.

### **14.3 Scanning**

Scanning is not recommended and should be done only when the drawing is not available electronically. When scanning a drawing, scan in real size (scale 1:1) to ensure that the scale remains intact in subsequent printing. Open each scanned drawing to verify and ensure that the resolution, scale and border are of an acceptable quality.

### **14.4 Final Checklist**

When the drawing file has gone through the PDF conversion, open and verify the following:

- That the sheet size displayed is what was intended to be created (the size is viewable in the lower left corner of the drawing).
- That the orientation of the sheet is correct.
- That the line types, line weights and fonts match the CADD drawing.
- That the PDF file is in black and white.
- That each drawing is a single PDF file.
- That the PDF file is not password protected and printable.

If all the items are verified, the PDF file is useable.

### **14.5 Additional Information**

For more information about the creation of PostScript and EPS files please refer to the User's Guide of the CADD software being used to produce the drawings. For more information about creating PDF file please refer to the Acrobat Distiller User's Guide and/or visit the Adobe Web site at [www.adobe.com](http://www.adobe.com) .

N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No. / N° VME - FMS

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## **APPENDIX E - Heritage Canals and Engineering Works CADD Standards Supplement**



# Heritage Canals and Engineering Works CADD Standards

Supplement to:

PWGSC National CADD Standard  
and  
CADD Guidelines for Consultants,  
PWGSC - Ontario Region





## TABLE OF CONTENTS

<b>INTRODUCTION .....</b>	<b>4</b>
<b>1.1 Contract Drawing Frame .....</b>	<b>5</b>
1.1.1 Drawing Number .....	6
1.1.2 Sheet Number.....	6
1.1.3 Professional Seal.....	7
1.1.4 Revisions.....	7
1.1.4.1 Drawing Issue .....	7
1.1.4.2 Drawing Change .....	7
1.1.5 Plotting of Filename, Path, Date, and Time.....	9
<b>1.2 Folder Structure.....</b>	<b>9</b>
1.2.1 Sub Folders .....	9
1.2.2 PDF Files .....	10
1.2.3 Drawing Clean Up .....	10
1.2.4 File Delivery .....	10
<b>1.3 CADD File Naming Conventions.....</b>	<b>10</b>
1.3.1 Reference Files.....	12
1.3.1.1 Making Reference Files Portable.....	12
1.3.2 Drawing File Layout.....	12
<b>1.4 Layers.....</b>	<b>13</b>
1.4.1.1 Layer Management .....	13
1.4.1.1.1 Primary Data .....	14
1.4.1.1.2 Supporting Data .....	14
1.4.1.2 Layer Naming Convention.....	15
1.4.1.3 Level Colours and Weights.....	15
<b>1.5 Annotation Scaling.....</b>	<b>16</b>
<b>1.6 Dimension Styles .....</b>	<b>16</b>
1.6.1 Guidelines for Dimensioning.....	17
1.6.1.1 Dimension Scale .....	18
<b>1.7 Text Style and Size .....</b>	<b>18</b>
1.7.1 Text Sizes (Heights).....	18
1.7.2 Text Style Naming Convention .....	19
1.7.3 Text Heights and Text Style Designations.....	20
<b>1.8 Blocks .....</b>	<b>20</b>
1.8.1 Block Library .....	21
1.8.2 Sections and Elevations .....	21
1.8.2.1 Symbol.....	21
1.8.2.2 Label .....	21
1.8.3 Details .....	22
1.8.3.1 Symbol.....	22
1.8.3.2 Label .....	22



<b>1.9</b>	<b>Patterns or Hatching.....</b>	<b>23</b>
<b>1.10</b>	<b>Element Offset Distances.....</b>	<b>23</b>
	<b>AS-BUILT DRAWINGS .....</b>	<b>24</b>
<b>2.0</b>	<b>Definitions.....</b>	<b>24</b>
<b>2.1</b>	<b>Procedure.....</b>	<b>24</b>
<b>2.2</b>	<b>Submission.....</b>	<b>24</b>

**APPENDIX A - ABBREVIATIONS, ACRONYMNS AND TERMS**



## INTRODUCTION

The Ontario Region, part of Public Works and Government Services Canada, maintain professional and technical services that support service management and service delivery in the areas of operations and maintenance, planning, design, renovation and construction of federal facilities. The Heritage Canals and Engineering Works (HCEW) group, of the Ontario Region, is one such service provider. HCEW provides specialized expertise in project delivery, structural engineering and heritage conservation.

This PWGSC CADD Standard Supplement – Heritage Canals and Engineering Works (HCEW), is to ensure consistent contract drawings, and uniform requirements for design deliverables. These standards must be read in conjunction with the PWGSC National CADD Standard and the CADD Guidelines for Consultants, PWGSC - Ontario Region. These documents can be found online or can be obtained from the contact person listed below

This document is intended as a guide to the creation of drawings associated with structural projects for HCEW only.

For information on this document, please contact:

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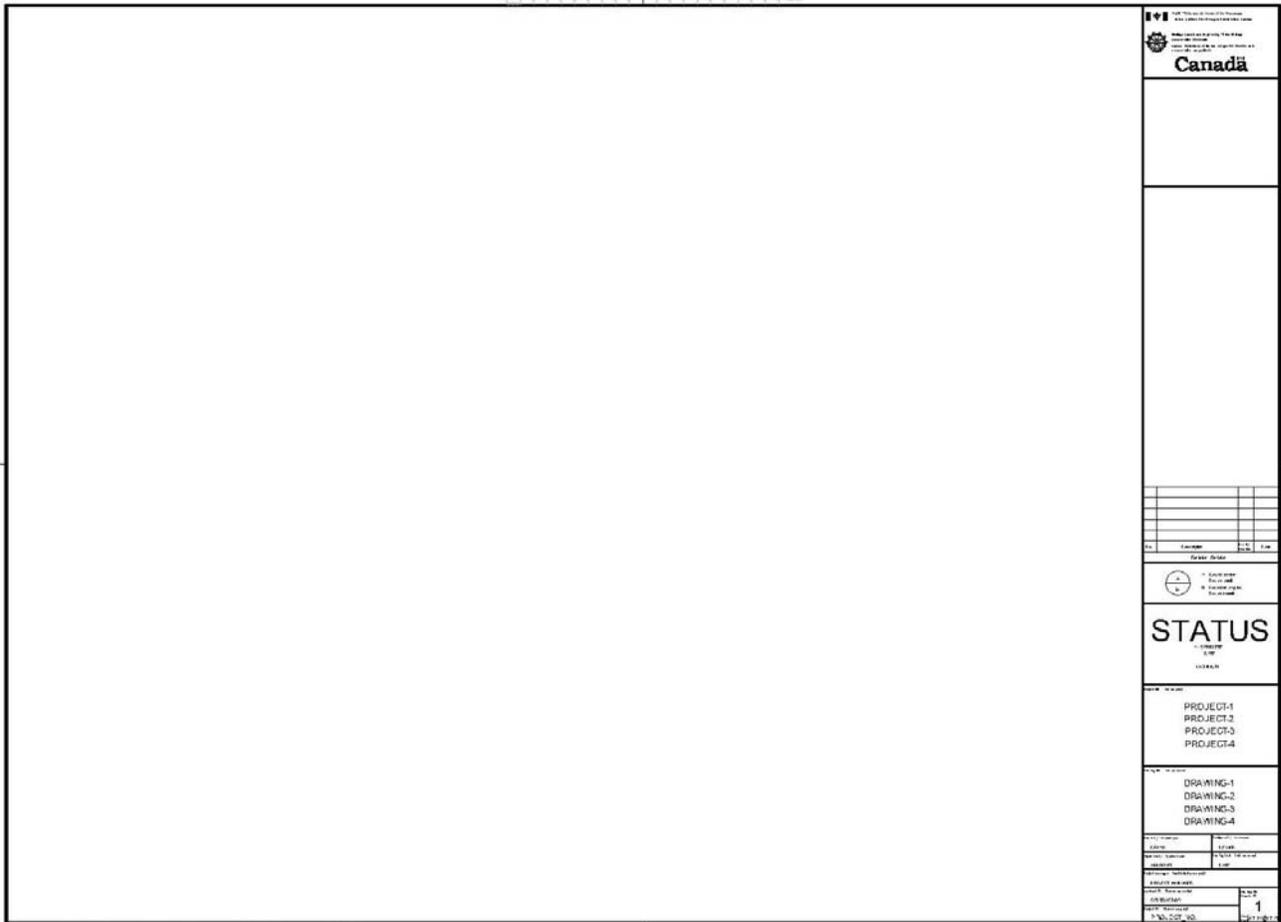




## 1.1 Contract Drawing Frame

A contract-drawing frame is available with the PWGSC National CADD Standards. This frame shall be used on all contract drawing sheets with the exception of the cover page. See Figure 1.

Figure 1





### 1.1.1 Drawing Number

The drawing number is a three digit number used to identify each drawing within the drawing package. The first drawing in the set (typically the cover sheet) will be numbered 000 and all subsequent drawings will be numbered sequentially and increase by one.

In a major multi-disciplinary project the project coordinator may decide to number the drawings sequentially but also give a block of numbers for each discipline such that the roadway drawings would be numbered starting from 100, the structural drawings would start at 200, the electrical starting at 300 etc... Other similar methods may be used providing the drawing set is numbered in a logical fashion.

Do not confuse the drawing number with the sheet number. For information about the sheet number, see Section 1.2.3.

Examples of drawing number in a typical structural drawing set:

000	Cover Sheet
100	General Arrangement
101	Abutment Removals
102	Abutment Repairs
103	Girder Removals and Repairs
104	Deck Removals
105	Deck Repairs
106	Sections and Details I
107	Sections and Details II
108	Standard Details I
109	Standard Details II
200	Electrical Plan
201	Electrical Removals
202	Electrical Details
300	Mechanical Plan
301	Mechanical Removals
302	Mechanical Details

### 1.1.2 Sheet Number

The sheet number area is broken into two parts (left and right). It's purpose is to define each drawings sequential order in the drawing set and the total number of sheets in the set.

The left side represents the number of the drawing sheet within the set and the right side represents the total number of drawing sheets in the set.

Once a project is nearing completion and you can be relatively assured that no more drawings will be added, you can begin the task of numbering the sheets.

The sheets are numbered beginning with the cover sheet (sheet number 0) and progress sequentially, increasing by one, to the last sheet.





### 1.1.3 Professional Seal

A professional seal and signature is required on Tender and Construction Issue drawings and any addendums or change orders. An electronic facsimile of a professional seal and signature is not acceptable. Only original printed copies will be accepted with professional stamp and signature.

### 1.1.4 Revisions

There are several stages a set of contract drawings go through from their inception until they are issued for as-built status. During the design and construction phases the drawings are issued at various stages and the history of the drawings are recorded in the revision area of the drawing frame.

A revision may refer to a type of drawing issue (tender, construction, as-built) or a type of drawing change (addendum or change order). See below for more details on each type of revision.

Each revision is given a number in the revision history beginning at one and incrementing by one for each subsequent revision. The number for each revision does not have to match on every drawing in the package (ie. the tender issue might be revision number three on one drawing and revision five on another).

Revisions shall be made to the digital CADD files only and a new set of drawings distributed as required. Hand drawn modifications are not permitted.

#### 1.1.4.1 Drawing Issue

During the course of any project, the drawings are issued at a series of milestones dictated by the type and scale of the project. The milestones may include but are not limited to the following;

- Issued for Client Review (may also include a percentage of completeness)
- Issued for Approval
- Issued for Tender
- Issued for Construction
- As-Built

It is not necessary to put a triangle around the revision number for drawing issues. The initials that accompany a revision are to identify the project manager that initiated the change.

#### 1.1.4.2 Drawing Change

A drawing change refers to a change to any or all of the contract drawings and is recorded only on the drawing(s) that are affected by the change.

After the tender issue and before the construction issue, any changes to the drawings that may affect the bidding process, are issued as addendums and logged as such in the revision area. If the changes don't affect the bidding process, there is no need to record the changes in the revision history, unless it is a change you want to specifically draw the contractor's attention to once the drawings are issued for construction.

After the construction issue and before the as-built issue, any changes to the drawings are issued as change orders and logged as such in the revision area of each drawing that is affected by the change order.





Drawing changes are identified by an octagon (or triangle) shape around the revision number, dated and briefly described in revision area. Revision octagon and number shall also be placed adjacent to the area on the drawing that was revised.

Should a drawing change be applicable to a large isolated portion of the drawing, a revision cloud can be used to surround the affected area and an octagon placed next to the cloud.

If the revision is general in nature and affects most of the drawing, you can put 'General Revision' in the revision history and, in this case, it is not necessary to put an octagon next to the areas on the drawing that are affected by the change.

Examples:

PLAN AND PROFILE 1

NO.	REVISIONS	BY	DATE
1	ISSUED FOR UTILITY CIRCULATION	S.T.P.	31/04/2007
2	ISSUED FOR MOE APPROVAL	S.T.P.	12/05/2007
3	ISSUED FOR TENDER	S.T.P.	05/08/2007
④	CD #4 REVISED	S.T.P.	26/06/2007
⑤	REVISED INV. MH NO. 3	S.T.P.	27/06/2007
6	ISSUED FOR CONSTRUCTION	S.T.P.	04/07/2007

PLAN AND PROFILE 2

NO.	REVISIONS	BY	DATE
1	ISSUED FOR UTILITY CIRCULATION	S.T.P.	31/04/2007
2	ISSUED FOR MOE APPROVAL	S.T.P.	12/05/2007
3	ISSUED FOR TENDER	S.T.P.	05/08/2007
④	RADIUS ADJUSTMENT - STA. 1+145	S.T.P.	26/06/2007
5	ISSUED FOR CONSTRUCTION	S.T.P.	04/07/2007



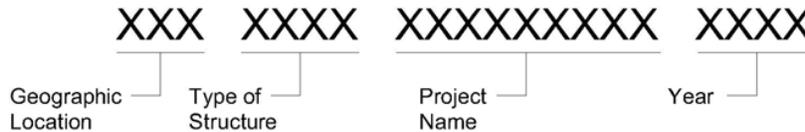


### 1.1.5 Plotting of Filename, Path, Date, and Time

Filename, path, date, and time are to appear on lower left corner of title block, outside of drawing frame. All submitted drawings shall include up-to-date plot date information.

## 1.2 Folder Structure

Design files related to a particular project should reside in a unique folder. The folder should consist of four distinct fields as follows.



**Geographic Location Field**                      **XXX XXXX XXXXXXXXXXXX XXXX**

The geographic location field represents the general geographical location of the project (ie. R for Rideau Canal, T for Trent Waterway, SSM for Sault Ste. Marie, etc...). This field can be one to three characters long or, in the case of a fort, may be omitted.

**Type of Structure Field**                      **xxx XXXX XXXXXXXXXXXX XXXX**

The type of structure field describes the type of structure (ie. Lock, Dam, Bridge, Weir, etc..) and typically ranges from three to six characters.

**Project Name Field**                      **xxx xxxx XXX XXXXX XXXX**

The third field consists of the project title.

**Year Field**                      **xxx xxxx XXXXXXXXXXXX XXXX**

The fourth field is the year the project was initiated.

Examples:                      **R Lock Jones Falls 2010**  
    **T Dam Swift Rapids 2000**  
    **SSM Lock Repairs 2010**

### 1.2.1 Sub Folders

A copy of the CADD files should be saved, in a separate sub-folder, as a record of each submission. Typical submissions are at the following stages of design; Preliminary Review, Tender, Construction and As-Built issues. Sub-folders should be identified with the corresponding submission type (ie. \Tender).



Example:

```
\\ Lock at Jones Falls 2010\Tender\105063-000-Cov.dgn
      \105063-base.dgn
      \105063-009-det2.dgn

...\\Construction\105063-000-Cov.dgn
      \105063-base.dgn
      \105063-009-det2.dgn

...\\As-Builts\105063-000-Cov.dgn
      \105063-base.dgn
      \105063-009-det2.dgn
```

## 1.2.2 PDF Files

Although CADD files must be saved in their native file format, HCEW recognizes that there are many advantages to PDF files and as such may also require PDF versions of the contract drawings.

If PDF files are required, then the following guidelines shall be adhered to.

- Plotted to scale.
- On B1 (707x1000mm) sheet.
- Able to be opened with Adobe Acrobat 5.0.
- Line styles and weights same as hard copies.

## 1.2.3 Drawing Clean Up

Before saving the CADD file for a major milestone, the files shall be purged and all unnecessary data (working lines etc...) shall be deleted. Ideally, only the title block and the data within should remain.

Also, the drawings shall not contain any electronic signatures or hyperlinks.

## 1.2.4 File Delivery

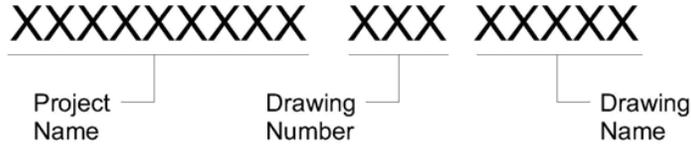
When CADD files are saved for major milestones, the references and all other supporting files, sketches and images shall be placed in the same folder as the contract drawing files. The folder name shall reflect the milestone for which it is being submitted.

## 1.3 CADD File Naming Conventions

The CADD file name contains distinctive naming fields to easily identify the project name, drawing number and drawing name.

The project manager will supply field one; fields two and three are filled in by the CADD operator that creates the file, using the following procedure :





**Project Name Field**                  XXXXXXXXXXXX    xxx    xxxxx

The project name field is populated with the name of the project, shortened or abbreviated, as required.

**Drawing Number Field**                  xxxxxxxxxxxx    **XXX**    xxxxx

The drawing number field is populated with the drawing number as found in the title block in the Dwg. No box. See Section 1.1.1 for a description of the drawing number.

**Drawing Name Field**                  xxxxxxxxxxxx    xxx    **XXXXX**

The drawing name is user-defined information pertaining to area, scope or content of the drawing. See the lists below for some common drawing name abbreviations.

The drawing name may include a number representing the number of drawings in a series of similar drawing types (i.e. **s&d3** where the 3 represents the third sections and details drawing). Where only one drawing of a given type exists, do not include a digit.

Typical drawing name abbreviations for reference files are as follows:

- base**                  - Base Information
- utility**                  - Utility Information

Typical drawing name abbreviations for contract drawing files are as follows:

- |  |                                       |
|--|---------------------------------------|
| <b>Cov</b> - Cover                       | <b>BmDim</b> - Beam Dimensions        |
| <b>GA</b> - General Arrangement          | <b>BmReinf</b> - Beam Reinforcing     |
| <b>Stage</b> - Construction Staging Plan | <b>BmDet</b> - Beam Details           |
| <b>Rem</b> - Removals                    | <b>DeckDim</b> - Deck Dimensions      |
| <b>Found</b> - Foundation Layout         | <b>DeckReinf</b> - Deck Reinforcing   |
| <b>FtgDim</b> - Footing Dimensions       | <b>DeckDet</b> - Deck Details         |
| <b>FtgReinf</b> - Footing Reinforcement  | <b>S&amp;D</b> - Sections and Details |
| <b>Abut</b> - Abutment                   | <b>Jnt</b> - Joint Details            |
| <b>NAbut</b> - North [West] Abutment     | <b>BWall</b> - Barrier Wall Details   |
| <b>NWW</b> - North [West] Wingwall       | <b>Rail</b> - Railing Details         |
| <b>SEAbut</b> - South [East] Abutment    | <b>Appro</b> - Approach Slab Details  |
| <b>SWWall</b> - South [East] Wingwall    | <b>Slope</b> - Slope Paving Details   |
| <b>wwall</b> - Wingwalls/Retaining Walls | <b>Stand</b> - Standard Details       |
| <b>PierDim</b> - Pier Dimensions         | <b>Elec</b> - Electrical              |
| <b>PierReinf</b> - Pier Reinforcement    | <b>Quant</b> - Quantity Sheet         |
| <b>Brg</b> - Bearings                    | <b>Land</b> - Landscaping             |



Examples of valid filenames :

<b>Crystal Lake - 107 - NWW.dgn</b>	Crystal Lake, drawing number 107, North West Wingwall drawing
<b>Ft. Henry - 102 - S&amp;D3.dgn</b>	Fort Henry, drawing number 102, Sections and Details, 3 <sup>rd</sup> drawing of type
<b>Redstone Lake - base.dgn</b>	Redstone Lake, Base drawing, reference file
<b>Maria St. - 101 - GA.dgn</b>	Maria St., drawing number 101, General Arrangement drawing
<b>Jones Falls - 102 - PierDim.dgn</b>	Jones Falls, drawing number 102, Pier Dimensions drawing

### 1.3.1 Reference Files

Reference files are CADD files that have been externally attached to another file (ie. the data is not part of the contract drawing file but is loaded each time the contract drawing file is opened), do not have title blocks and are not contract drawings on their own but do provide project data to other contract drawings.

Typically, data in a reference file is drawn at a scale of one and there is no limit to the size of the drawing area (ie. there is no title block to constrain the drawing area). The graphic elements are drawn once and then referenced into various contract-drawing files as required.

Depending on the scope of the project, there may be multiple reference files with data separated by discipline and/or by the type of data, such as, base mapping, utilities, removals and proposed construction.

When new milestone folders are created, all files including reference files should be copied into each folder.

References must not conceal other references within them. In other words a nest depth of one is the maximum that shall be permitted.

#### 1.3.1.1 Making Reference Files Portable

When project files are moved or copied to another location (ie. delivered to the HCEW), the folder path will inevitably change and the reference file path will be incorrect, resulting in a reference file that can't be loaded. To avoid this problem, follow these instructions.

Choose the "no path" option in the "path type" box when loading the reference.

### 1.3.2 Drawing File Layout

Drawing files are the electronic originals of the plotted contract drawings. Paper space layouts can be thought of as virtual sheets of paper, which are printed to produce hard-copy contract drawings. Using paper space to layout the contract drawing is generally recognized as the current industry standard for CADD drawing creation.





Design details are prepared as full size views, thus maintaining the geometric integrity of the design model (no scaling will be permitted). Data from model space is brought into the paper space layout via scaled layout view ports or as external references from other drawing files.

An optional, although less preferred alternative involves the preparation of contract drawings utilizing model space only. However, in either case the geometric integrity of the design model should be maintained (scaling of the design model elements to suit intended plot scale should be avoided).

Regardless of which method is used, it is important that the following guidelines be followed.

### **Paper space Layouts**

- In AutoCAD, insert the full size drawing sheet (including drawing frame and titleblock) at 0,0 in paperspace with zero rotation at a scale of 1:1 or use a prepared template.
- Use custom viewport scales for any views that are to be plotted at a different scale.
- All annotations and dimensioning must be done in the model space, the general notes however, can be placed directly on the paper space layout.
- Although multiple layouts can be created on a single drawing during the design phase, only one layout per Autocad file will be allowed upon final delivery to HCEW.

### **Model space only**

Although it is less desirable, model space only drawings may be accepted at this time provided the following;

- In AutoCAD, insert the full size drawing sheet (including drawing frame and titleblock) at 0,0 in model space at the desired scale with zero rotation or use a prepared template.
- All annotations and dimensioning must be done in model space.

## **1.4 Layers**

Layers are used to sort the data into logical groups based on common properties such as line weight or line type and/or what the entity represents in the real world.

The goal of any layering system is to create a balance between complexity and flexibility. The more complex a layering system is, the less efficient it will be and may actually be counter productive. The more flexible a system is (ie. fewer levels), the less data separation there will be and consequently it may be less intuitive for other users.

A list of typical structural levels can be found below. The levels in the list shall be sufficient for most projects but on occasion additional levels may be required. If additional levels are required, the following standards must be adhered to for the creation of the levels.

### **1.4.1.1 Layer Management**

There are two types of data to be considered when creating levels, primary data and supporting data. The difference between the two is quite significant in the complexity and number of levels required. See below for an explanation of primary and supporting data.

There are also two techniques used to separate data, regardless of whether it is primary or supporting data. The first technique is to have data placed on levels with all property settings set to 'bylevel' and would require additional levels for data requiring different settings. The second technique is to have all





similar data on the same level and allow for data to have different colour (weight) and line style assignments.

Regardless of which technique is used, the separating of data should be done in a logical manner that facilitates the creation of the drawing and the effort of dividing the data must not exceed the benefits gained.

#### **1.4.1.1.1 Primary Data**

Primary data is data that is required to be separated by what it represents in the real world and can be identified on the graphic screen without resorting to annotations. Line weights, line styles and colour are not a consideration when determining if data is primary or not.

An example of primary data in a structural drawing may be data in a base plan or data representing various utilities.

#### **1.4.1.1.2 Supporting Data**

Supporting data is data that is not required to be separated by what it represents in the real world but rather by its properties such as line weight and line style or based on the requirement to group similar elements to simplify the drafting process (ie. have fewer levels).

Typically, all of the drawing elements contained in the various sections and details that comprise a set of structural drawings can be considered as supporting data and thus be placed on levels to define similar properties only, rather than separate levels to define what the elements represent.

For example, drawing elements such as annotations, dimensions, line work, hatching etc. can be considered supporting data and separated accordingly; There would be a general text level, a general dimension level and a general hatching level etc. (ie. S-GEN-TEXT, S-GEN-DIM, S-GEN-HAT-0.25 etc...).

Similarly, general line work contained in the various sections and details do not need to be tied to a level defining what it represents, but rather viewed simply as general lines that are grouped according to their plotted line weight and/or line style (ie. S-GEN-LINE-0.25, S-GEN-LINE-0.50 etc...).

In some situations however, such as where better visibility control is required (freezing and thawing of levels), a mixed approach to level management may be used such that some elements are separated by what they represent and others grouped by their element properties.







separation by colour is required to aide in the drafting process such as for visual separation on the graphic screen.

Colour	Colour Number	Line Thickness (mm)	Colour Setting
Red	1	0.20mm	Black
Yellow	2	0.35mm	Black
Green	3	0.50mm	Black
Cyan	4	0.70mm	Black
Blue	5	1.0mm	Black
Magenta	6	0.20mm	Black
Dark Grey	8	0.13mm	Black
Light Grey	9 (30% screen)	0.20mm	Black
Grey	250 to 255	0.20mm	Use Object Colour
All Others	Varies	0.20mm	Black

## 1.5 Annotation Scaling

Annotation scaling is a feature that allows for annotations to be displayed, at the desired size, in a paper space view port, regardless of the scale of the view port.

Annotation scaling shall be used for all dimensions and annotations.

## 1.6 Dimension Styles

Dimension styles must adhere to the following standards:

- Standard dimension annotations shall be in millimeters and shall use the same unit setting throughout the contract set, with the following exceptions; stations, elevations and site plan dimensions, may be shown in metres.
- Use automatic dimensioning (associative dimensioning) wherever possible. An exception to this rule may be made when using dimensions for reinforcing steel detailing, although it is not preferred.
- All dimensioning shall be done in model space with annotation scaling turned on.
- Use filled arrowhead as the terminator for dimensions and leaders. The arrowhead must keep a length to width ratio of 3:1 (standard size of 3mm long x 1mm wide at a scale of 1:1).





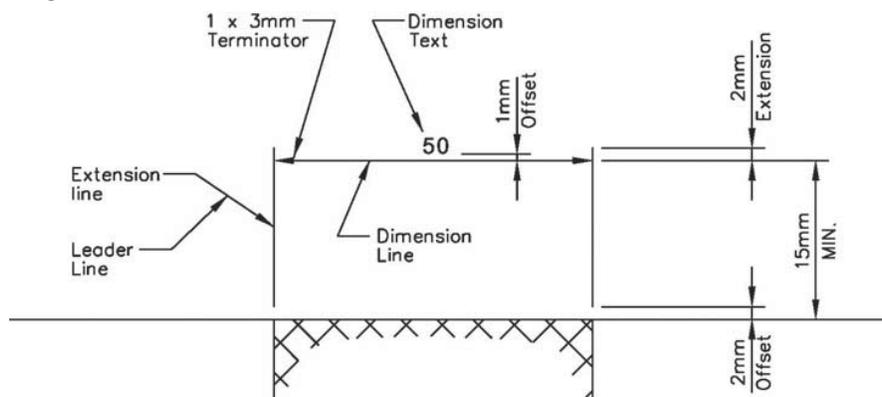
- The name given to additional styles must follow the naming convention outlined in Section 3.5.1 of the PWGSC National CADD Standards.
- All dimensions shall have the same size text as outlined in Section 1.3.6.1.
- Angular dimensions shall be expressed in decimal degrees.
- Line weight for all dimension elements, except annotations, shall be set to 0.20mm or colour red.

### 1.6.1 Guidelines for Dimensioning

The following are some basic guidelines to consider when dimensioning features for construction contract drawings: (for a more in-depth review, refer to CAN/CSA B78.2-86 – *Dimensioning and Tolerancing of Technical Drawings*.)

Dimension variables (dimension style settings) should be set to provide the following: (see diagram below);

- The primary dimension text should appear above and be aligned with the dimension line. A gap of approximately 1mm should be provided between the dimension line and the text.
- A 2mm gap should be provided between the end of the extension line and its origin.
- The extension line should 2mm beyond the dimension line (extension).
- Standard terminator to be a filled arrowhead with a length to width ratio of 3:1 (arrow head size for scale of 1 to be 3mm long by 1mm wide)
- Line weight of extension lines, dimension lines, leader lines and terminators to be 0.20mm



- Each element or element feature should only be dimensioned once and that dimension should be placed on the view that most clearly shows that element or feature. No more dimensions than are necessary to fabricate a particular element should be provided.
- Extensions that cross other dimension lines should be broken.





- Every effort should be made to avoid crossing dimension lines and is accomplished by placing the shortest dimensions close to the object and the overall dimension more remotely. (When crossing of a dimension line by a object line is unavoidable, neither line should be broken except to avoid interference with an arrowhead.
- As a general rule, dimension lines shall be placed outside a view using extension lines. On occasion however, dimension lines may be placed within a view and referenced to the object outline, in order avoid the use of long extension lines.
- Leader lines should be kept as short as is practical, not cross other lines and terminate with an arrowhead touching the feature (or closed dot when referencing a surface within a feature) and a 3mm long horizontal adjacent to the text.

All leader annotations to be left justified.

### 1.6.1.1 Dimension Scale

The following table illustrates the dimension scale factor for various standard drawing scales.

Dimension Scale																	
Drawing Scale	1:1	1:5	1:10	1:20	1:25	1:30	1:50	1:75	1:100	1:125	1:150	1:200	1:250	1:300	1:400	1:500	1:750
DIMENSION SCALE	1	5	10	20	25	30	50	75	100	125	150	200	250	300	400	500	750

## 1.7 Text Style and Size

True Type Arial shall be used for all drawings. Standard text sizes are listed below and the text sizes must be uniformly applied throughout the entire project.

A cell for centerline and plate symbols has been provided in the cell library for your convenience.

### 1.7.1 Text Sizes (Heights)

The range of standard text heights is available in Section 1.3.6.3. These sizes are based on soft conversions of the standard Leroy® Lettering System used in manual drafting and are cross-referenced in the following table for legacy purposes. The standard text height for typical annotations and dimensions on full size plots shall be 2.5mm. The minimum text height for drawings requiring half-size reproductions shall not be smaller than 2.0mm.

The following are examples of text sizes, as measured on a plotted full size drawing, for various applications:

Major Headings	5.0mm
Sub Headings	3.5mm
Notes and Dimensions	2.5mm





Existing Site Annotations 2.0mm

All text is to be uppercase with the exception of unit abbreviations (i.e. mm, m etc.). Condensed or extended versions of the font shall not be used and no customization of the font will be accepted. This however, does not preclude the application of “fitted text” or a minor adjustment in text width to suit a special requirement.

### 1.7.2 Text Style Naming Convention

When placing text on a drawing, minor changes to the settings may be required from one text element to the next. One method to make this process easier is to create text styles with preset settings and change to the appropriate style before placing the text.

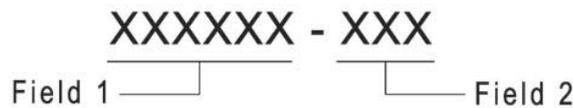
For example, if text at a plotted height of 2.5mm is required for some text elements but a plotted text height of 3.5mm is required for others, then two separate styles could be created with these preset settings.

The following guidelines shall be used for naming the text style(s) regardless of what method is used in creating the text.

Standard text style designations are used to define the appearance of text and are based on a combination of various text attributes or characteristics. Basic text style attributes for parent text styles include:

- Text font
- Height (product of design model scale factor X plotted height)
- Width factor (Microstation defaults to the same value as height)
- Justification (default to centre left justification)
- Italics

Standard text styles designations will conform to the following naming convention:  
Do not leave spaces before or after the hyphen.



**Field 1**      **XXXXXX – xxx**

Field one is a six character field and is assembled as AAAABB such that :

- AAAA      HCEW designation.
- BB      Plotted text height for full size drawing (i.e. 25 indicates a text height of 2.5mm on the hard copy)



**Field 2**                      xxxxxx – **XXX**

Scale factor (This is an optional modifier when, for example, layouts have been used and multiple scales are required or in a single scale environment, the drawing scale can be shown). The optional modifier would not be necessary if Annotation Scaling is utilized.

Examples of valid dimension style names:

- HCEW25**    Text height of 2.5mm.
- HCEW35S**                                         Text height of 3.5mm, sloped text.
- HCEW25-100**                                    Text height of 2.5mm, scale of 1:100.
- HCEW25S-50**                                  Text height of 2.5mm, scale of 1:50, sloped text.

**1.7.3 Text Heights and Text Style Designations**

Plotted Text Height (mm)*	Leroy® Lettering Guide No.	Font	Text Style Designation (vertical text)
1.5**	60	TT Arial	HCEW15-xx
2.0	80	TT Arial	HCEW 20- xx
2.5	100	TT Arial	HCEW 25- xx
3.0	120	TT Arial	HCEW 30- xx
3.5	140	TT Arial	HCEW 35- xx
4.5	175	TT Arial	HCEW 45- xx
5.0	200	TT Arial	HCEW 50- xx
6.0	240	TT Arial	HCEW 60- xx

\*plotted text height for full size (24x36) plots

\*\*1.5mm text height should only be used when absolutely necessary, as it may not be readable on half size reductions.

This font contains an italics style, which can be activated in Microstation by clicking the italics box under Element – Text Style – General tab.

**1.8 Blocks**

When blocks are placed, the properties (level, colour, linestyle and weight) of the data can be affected in various ways. How they are affected depends on the properties of the data when the block was created and the system settings when the block was placed.

For consistency, all blocks shall be created using the guidelines outlined in the PWGSC National CADD Standards section 3.3.



## 1.8.1 Block Library

A structural block library is included with this manual, containing blocks of commonly used elements. The blocks in this library are provided for consistency among all projects and must be used when required.

A drawing file has been created, called **Structural Blocks.dwg**, with all the blocks attached.

## 1.8.2 Sections and Elevations

Sections and elevations are used to provide more details of an element on a drawing. Section and elevation markers use the same symbol but are designated as one or the other by the label used for the detailed element; see examples below. The symbol and labels blocks are provided in the structural block library.

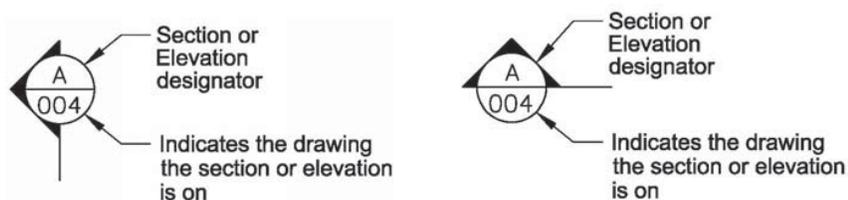
### 1.8.2.1 Symbol

Sections shall be preferably looking up and to the left or in a direction of increasing chainage. Elevations shall be looking in the direction of the intended elevation.

If the section or elevation is not taken in a continuous straight line from the end of the symbol, then a second symbol shall be placed at the other end of the intended section or elevation. A line shall then be drawn between the two symbols to delineate the path of the section or elevation (the line between the two marks may be cut to show only the area(s) where the section path deviates).

- The top half of the symbol shall be populated using uppercase alpha characters from 'A' to 'Z' (omit letters 'I' and 'O').
- The bottom half of the symbol shall be populated with the drawing number (field three only) of the drawing where the section or elevation is located.

Examples :



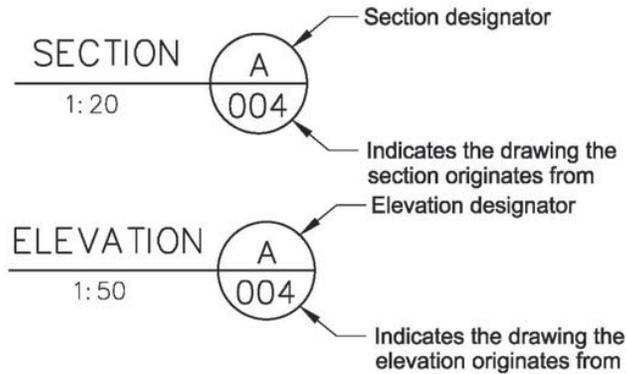
### 1.8.2.2 Label

Labels are placed below the section or elevation to cross-reference it with the symbol on the drawing from where the section or elevation was taken.

- The top half of the label shall be populated using uppercase alpha characters from 'A' to 'Z' (omit letters 'I' and 'O').
- The bottom half of the label shall be populated with the drawing number (field three only) of the drawing where the section or elevation is taken from.



Examples :



### 1.8.3 Details

Details are used to further define an element on the drawing but differ from sections and elevations in that they are shown in the same view as the master element, show more detail and are often shown at a smaller scale.

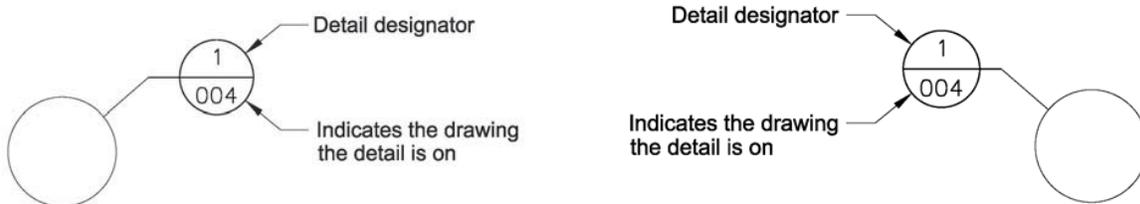
Details are shown using a symbol to delineate where the detail is taken from and a label to designate the actual detail. The symbol and labels are provided in the structural block library.

#### 1.8.3.1 Symbol

Details shall be delineated using a circle to define the area to be detailed and a detail symbol shall be placed close to the circle with a line to draw to connect the two.

- The top half of the detail symbol shall be populated using numeric characters from '1' to '99'.
- The bottom half of the detail symbol shall be populated with the drawing number (field three only) of the drawing where the detail is located.

Examples :



#### 1.8.3.2 Label

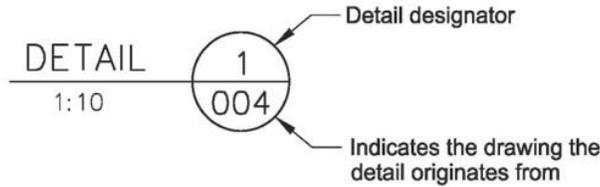
Labels are placed below the detail to cross-reference it with the symbol on the drawing from where the detail was taken.

- The top half of the label shall be populated using numeric characters from '1' to '99'.



- o The bottom half of the label shall be populated with the drawing number (field three only) where the detail is taken from.

Example :



## 1.9 Patterns or Hatching

Custom Autocad hatch patterns are not to be used as they could pose a problem with drawing translation or drawing portability.

## 1.10 Element Offset Distances

All elements of a drawing must be kept a minimum distance away from any other element in order for the plotted drawing to be legible. The following table has minimum distances for elements of various line weights and is included as a guideline only.

STANDARDS			SCALE OF DRAWING																
COLOUR	PEN SIZE	TYPE	1:1	1:5	1:10	1:20	1:25	1:30	1:50	1:75	1:100	1:125	1:150	1:200	1:250	1:300	1:400	1:500	1:750
GREY	.13	LINE - LINE	0.3	1.5	3	6	7.5	9	15	22.5	30	37.5	45	60	75	90	120	150	225
RED	.20	LINE - LINE	0.4	2	4	8	10	12	20	30	40	50	60	80	100	120	160	200	300
YELLOW	.35	LINE - LINE	0.5	2.5	5	10	12.5	15	25	37.5	50	62.5	75	100	125	150	200	250	375
GREEN	.50	LINE - LINE	0.6	3	6	12	15	18	30	45	60	75	90	120	150	180	240	300	450
CYAN	.70	LINE - LINE	0.8	4	8	16	20	24	40	60	80	100	120	160	200	240	320	400	600
		LINE - REINFORCING DOT	1.2	6	12	24	30	36	60	90	120	150	180	240	300	360	480	600	900
		REINFORCING DOT - DOT	1.8	9	18	36	45	54	90	135	180	225	270	360	450	540	720	900	1350
CYAN-GREEN	.70 - .50	LINE - LINE	0.7	3.5	7	14	17.5	21	35	52.5	70	87.5	105	140	175	210	280	350	525
CYAN-YELLOW	.70 - .35	LINE - LINE	0.65	3.25	6.5	13	16.25	19.5	32.5	48.75	65	81.25	97.5	130	162.5	195	260	325	487.5
GREEN-YELLOW	.50 - .35	LINE - LINE	0.55	2.75	5.5	11	13.75	16.5	27.5	41.25	55	68.75	82.5	110	137.5	165	220	275	412.5
YELLOW-RED	.35 - .20	LINE - LINE	0.45	2.25	4.5	9	11.25	13.5	22.5	33.75	45	56.25	67.5	90	112.5	135	180	225	337.5





**Examples:**

At a scale of 1:10, a red line must be 4 units from any other red line.  
At a scale of 1:25, a green line must be 17.5 units away from any other cyan line.  
At a scale of 1:50, a yellow line must be 22.5 units away from any other red line.  
At a scale of 1:100, a reinforcing dot must be 120 units away from any other cyan line and 180 units from any other reinforcing dot.

## **AS-BUILT DRAWINGS**

Based on definitions in Section 1.4, final drawing revision/submission shall be known as '**As-Built**s' and engineer's seal and signature is not required. By definition 'Record Drawings' require the assertion of accuracy and seal from the project Engineer, which is not the usual process for HCEW.

As-builts should be submitted within six months of completion of contract.

### **2.0 Definitions**

From CSA Draft Seed Document – Mapping of underground utility infrastructure, May 2007

#### **As-Built Drawing**

Documentation created by or based solely on information provided by a third party that reflects the installed, constructed, or commissioned conditions of a device, machine, equipment, apparatus, structure, system, or other outcome of an engineering project. Since the engineer has not verified that the information is complete or accurate, as-built drawings must not be sealed.

### **2.1 Procedure**

All construction work, particularly any changes from the proposed work shall be recorded on a print of the contract drawings, by the assigned site supervisor. These marked-up prints are to be submitted to the project manager immediately upon completion of the project.

Within six months of the completion of the project, the following changes shall be made to the CADD files:

- All field changes to be recorded.
- professional seals to be removed.
- As-built marked in the revision list.
- As-built to be stamped on cover sheet.

See Section 1.6 for submission requirements

### **2.2 Submission**

- Fill in revision for As-Built submission.
- Plot mylar hard copy of the full as-built contract set.
- Submit CD (consultant) or path (internal) with complete listing of digital drawings.
- Stamp the cover sheet with as-built in bottom right corner.





## **APPENDIX A**

### **ABBREVIATIONS, ACRONYMS AND TERMS**

The following abbreviations, acronyms and terms are used throughout these standards:

CADD	Computer Aided Design and Drafting
Consultant	Liaison / Representative of Company under contract to the PWGSC
CSA	Canadian Standards Association
.pdf	Adobe Acrobat file
Professional Seal	Stamp designating professional eligibility, applied manually to original printed drawings, with signature and date to be applied.
.xls	MicroSoft Excel file
.zip	PkZip compressed archive file



N° de l'invitation - Solicitation No.  
EQ754-161755/A  
N° de réf. du client - Client Ref. No.  
R.073593.001

N° de la modif - Amd. No.  
File No. - N° du dossier  
PWL-5-38143

Id de l'acheteur - Buyer ID  
pw1035  
N° CCC / CCC No. / N° VME - FMS

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**APPENDIX F - Selected Existing Photos, Drawings and Reports for Burlington  
and Hamlet bridge sites  
(See attachment)**