



**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

Title - Sujet TSW South Bundle Prime Consultant	
Solicitation No. - N° de l'invitation EQ754-171285/A	Date 2016-09-20
Client Reference No. - N° de référence du client R.076951.138	
GETS Reference No. - N° de référence de SEAG PW-\$PWL-041-2215	
File No. - N° de dossier PWL-6-39078 (041)	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2016-11-01	
Time Zone Fuseau horaire Eastern Daylight Saving Time EDT	
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input checked="" type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Chan, Ricky	Buyer Id - Id de l'acheteur pw1041
Telephone No. - N° de téléphone (416) 512-5276 ()	FAX No. - N° de FAX (416) 512-5862
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction: Various Locations Trenton, ON X1X 1X1	

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

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

REQUEST FOR PROPOSAL (RFP)

TABLE OF CONTENTS

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

Front Page

Table of Contents

Supplementary Instructions to Proponents (SI)

- S11 Introduction
- S12 Proposal Documents
- S13 Optional Site Visit
- S14 Questions or Request for Clarifications
- S15 Canada's Trade Agreements
- S16 Certifications
- S17 Changes to Clause R1410T (2016-04-04) General Instructions (GI) –
Architectural and/or Engineering Services – Request for Proposal
- S18 Web Sites

Terms, Conditions and Clauses

Agreement

Supplementary Conditions (SC)

SC1 Security Requirement

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

Agreement Particulars

Submission Requirements and Evaluation (SRE)

Annex A – Project Brief

Appendix A – Team Identification Format

Appendix B – Declaration/Certifications Form

Appendix C – Price Proposal Form

Appendix D – Doing Business with Public Works and Government Services Canada

Appendix E – Heritage Canals and Engineering Works (HCEW) CADD Standards

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 (2016-04-04), 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;

-
- (d) the document entitled "Doing Business with Public Works and Government Services Canada";
 - (e) the document entitled "Heritage Canals and Engineering Works CADD Standard";
 - (f) the document entitled "Team Identification Format";
 - (g) any amendment to the solicitation document issued prior to the date set for receipt of proposals; and
 - (h) 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 OPTIONAL SITE VISIT

Arrangements have been made for a tour of the work sites. The site visit will be held on Thursday, October 13, 2016 at 9:30 a.m. at:

Parks Canada
Lock 1 Maintenance Compound
155 County (Regional) Road 33
Trenton ON
K8V 5P6

Proponents should dress according to outdoor weather conditions and wear safety boots or hiking shoes as well as a reflective vest as a minimum personal safety apparel.

Proponents are requested to communicate with the Contracting Authority named on the RFP - Page 1 two (2) business days before the scheduled visit to confirm attendance and provide the name(s) of the person(s) who will attend. Proponents may be requested to sign an attendance form.

Proponents who do not attend or send a representative will not be given an alternative appointment. Proponents who do not attend will not be precluded from submitting a proposal. Any clarifications or changes to the solicitation resulting from the site visit will be included as an amendment to the solicitation.

SI4 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 ten (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.

SI5 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).

SI6 CERTIFICATIONS

1. Integrity Provisions – Declaration of Convicted Offences

In accordance with the Ineligibility and Suspension Policy (<http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html>), the Proponent must **provide with its bid, as applicable**, to be given further consideration in the procurement process, the required documentation as per R1410T (2016-04-04), General instructions 1 (G11), Integrity Provisions – Proposal, **section 3b**.

2. Federal Contractors Program for Employment Equity - Proposal Certification

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) 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.

SI7 CHANGES TO CLAUSE R1410T (2016-04-04) General Instructions (GI) – Architectural and/or Engineering Services – Request for Proposal

1. Section GI3 (2015-03-25) Overview of Selection Procedure, 3.2 Proposal Evaluation and Rating, Item 5. is deleted and replaced with the following:

GI3 3.2 Proposal Evaluation and Rating

5. The remaining prices proposals are rated as follows:

- a. The lowest price proposal receives a Price Rating/maximum Score of 20;
- b. Other price proposals will receive a Score based on the following formula:

$$\frac{\text{Lowest Price Proposal}}{\text{Proponent Price Proposal}} \times 20 \text{ points} = \text{Price Rating/Score}$$

SI8 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

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>

Ineligibility and Suspension Policy

<http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html>

Code of Conduct for Procurement

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

Lobbying Act

Solicitation No. - N° de l'invitation

EQ754-171285/A

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

R.076951.138

Amd. No. - N° de la modif.

File No. - N° du dossier

PWL-6-39078

Buyer ID - Id de l'acheteur

pwl041

CCC No./N° CCC - FMS No/ N° VME

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

Buy and Sell

<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>

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 (2016-04-04), General Condition (GC) 1 - General Provisions – Architectural and/or Engineering Services
 - R1215D (2016-01-28), General Condition (GC) 2 - Administration of the Contract – Architectural and/or Engineering Services
 - R1220D (2015-02-25), General Condition (GC) 3 - Consultant Services
 - R1225D (2015-04-01), General Condition (GC) 4 - Intellectual Property
 - R1230D (2016-01-28), General Condition (GC) 5 - Terms of Payment – Architectural and/or Engineering Services
 - 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 (2016-01-28), General Condition (GC) 8 - Dispute Resolution – Architectural and/or Engineering Services
 - R1250D (2015-07-03), General Condition (GC) 9 - Indemnification and Insurance

Section GC1.1 of R1210D, Definitions, incorporated by reference above, is amended as follows:

ADD:

“Architectural and Engineering Services”

means services to provide a range of investigation and recommendation reports, planning, design, preparation, or supervision of the construction, repair, renovation or restoration of a work and includes contract administration services, for real property projects.

“Construction Services”

means construction, repair, renovation or restoration of any work except a vessel and includes; the supply and erection of a prefabricated structure; dredging; demolition; environmental services related to a real property; or, the hire of equipment to be used in or incidentally to the execution of any construction services referred to above.

“Facility Maintenance Services”

means services related to activities normally associated with the maintenance of a facility and keeping spaces, structures and infrastructure in proper operating condition in a routine, scheduled, or anticipated fashion to prevent failure and degradation including inspection, testing, servicing, classification as to serviceability, repairs, rebuilding and reclamation, as well as cleaning, waste removal, snow removal, lawn care, replacement of flooring, lighting or plumbing fixtures, painting and other minor works.

Section GC1.12 of R1210D, Not applicable, incorporated by reference above, is deleted in its entirety and replaced with the following:

R1210D GC1.12 (2016-04-04) Performance evaluation - contract

1. Consultants shall take note that the performance of the Consultant during and upon completion of the services shall be evaluated by Canada. The evaluation includes all or some of the following criteria:
 - a. Design
 - b. Quality of Results
 - c. Management
 - d. Time
 - e. Cost
2. A weighting factor of 20 points will be assigned to each of the five criteria as follows:
 - a. Unacceptable: 0 to 5 points
 - b. Not satisfactory: 6 to 10 points
 - c. Satisfactory: 11 to 16 points
 - d. Superior: 17 to 20 points
3. The consequences resulting from the performance evaluation are as follows:
 - a. For an overall rating of 85% or higher, a congratulation letter is sent to the Consultant.
 - b. For an overall rating of between 51% and 84%, a standard, meets expectations, letter is sent to the Consultant.

- c. For an overall rating of between 30% and 50%, a warning letter is sent to the Consultant indicating that if, within the next two (2) years, they receive 50% or less on another evaluation, the firm may be suspended from any new PWGSC solicitations for construction services, architectural and engineering services or facility maintenance services, of real property projects, for a period of one year.
- d. For an overall rating of less than 30%, a suspension letter is sent to the Consultant indicating that the firm is suspended from any new PWGSC solicitations for construction services, architectural and engineering services or facility maintenance services, of real property projects, for a period of one year.
- e. For a rating of 5 points or less on any one criterion, a suspension letter is sent to the Consultant indicating that the firm is suspended from any new PWGSC solicitations for construction services, architectural and engineering services or facility maintenance services, of real property projects, for a period of one year.

The form PWGSC-TPSGC 2913-1, Select - Consultant Performance Evaluation Report (CPERF), is used to record the performance.

Supplementary Conditions
Agreement Particulars

- (c) Project Brief;
 - (d) the document entitled "Doing Business with Public Works and Government Services Canada";
 - (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;
 - (h) the document entitled "Doing Business with Public Works and Government Services Canada";
 - (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.

Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

EQ754-171285/A

pw1041

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

R.076951.138

PWL-6-39078

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

SUBMISSION REQUIREMENTS AND EVALUATION (SRE)

SUBMISSION REQUIREMENTS AND EVALUATION

SRE 1 GENERAL INFORMATION

1.1. Reference to the Selection Procedure

An "Overview of the Selection Procedure" can be found in R1410T General Instructions to Proponents (G13).

1.2. Calculation of Total Score

For this project the Total Score to be established as follows:

Technical Rating x 80%	=	Technical Score (Max. 80 Points)
Price Rating x 20%	=	<u>Price Score (Max. 20 Points)</u>
Total Score	=	Max. 100 Points

SRE 2 PROPOSAL REQUIREMENTS

2.1. Requirement for Proposal Format

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

- Submit one (1) bound signed original plus three (3) bound copies of the proposal
- Paper size should be - 216mm x 279mm (8.5" x 11")
- Minimum font size - 11 point Arial, or equivalent
- Minimum margins - 12 mm left, right, top, and bottom
- Double-sided submissions are preferred
- One (1) 'page' means one side of a 216mm x 279mm (8.5" x 11") sheet of paper formatted as described above
- 279mm x 432 mm (11" x 17") fold-out sheets for spreadsheets and organization charts will be counted as one page per side
- 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 **fifty (50) pages**.

2.2.2. The following are not part of the page limitation mentioned above:

- Covering letter
- Cover page
- Tab/Dividers, provided they are free of text and/or graphics
- Consultant Team Identification (Appendix A)
- Declaration/Certification Form (Appendix B)
- Integrity Provisions – Required Documentation
- Front page of the RFP
- Front page of revision(s) to the RFP
- Price Proposal Form (Appendix C)

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

SRE 3 SUBMISSION REQUIREMENTS AND EVALUATION

3.1. MANDATORY REQUIREMENT

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 must be a **Civil / Structural Dam 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) Proponents must identify their proposed team members with their proposal submission at RFP closing date and time. An example of an acceptable format (typical) for submission of the team identification information is provided in Appendix A.

-
- b) The required Geotechnical, Mechanical, Electrical / Controls and Environmental Engineers are to be identified as either in-house specialists of the Proponent, or employees of a Sub-Consultant.
- c) The Consultant Team to be identified for the purposes of the evaluation to include the following: (except that Geotechnical, Mechanical , Electrical / Controls and Environmental Engineers need only be listed once as either In-house or Sub-consultant category)
- i. Consultant (Proponent): Civil/Structural Dam Engineering Consultant
 - In-house Senior Team Leaders:
 - Project Manager
 - Civil/Structural Dam Engineer
 - Geotechnical Engineer (In-house)
 - Mechanical Engineer (In-house)
 - Electrical / Controls Engineer (In-house)
 - Environmental Engineer (In-house)
 - In-house Engineering Team Members:
 - List ten (10) Engineering Team members, two (2) team members for each of Civil/Structural Dam, Geotechnical , Mechanical, Electrical / Controls and Environmental disciplines.
 - ii. Geotechnical Sub-Consultant Firm (if required to substitute for in-house Senior Team Leaders and Engineering Team Members)
 - Senior Team Leader:
 - Geotechnical Engineer (Sub-Consultant)
 - Engineering Team Members:
 - Two (2) Geotechnical Engineers (Sub-Consultant)
 - iii. 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 (2) Mechanical Engineers (Sub-Consultant)
 - Two (2) Electrical / Controls Engineers (Sub-Consultant)
 - iv. Environmental Sub-Consultant Firm (if required to substitute for in-house Senior Team Leader and Engineering Team Members)
 - Senior Team Leader:
 - Environmental Engineer (Sub-Consultant)
 - Engineering Team Members:
 - Two (2) Environmental Engineers (Sub-Consultant)

d) **Information required:**

- i. Name of proponent, and name of Geotechnical, Mechanical, Electrical / Controls and/or Environmental sub-consultant, if used.
 - ii. Copy of proponent's Certificate of Authorization issued by Professional Engineers of Ontario. If the Certificate is not provided with the proposal, it must be provided within two (2) days of request from the Contracting Authority.
 - iii. Names and roles of key personnel to be assigned to the project per Section a) above.
 - iv. For the Senior Team Leaders and 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, G19 Limitation of Submissions).
- e) Additional information listed in paragraphs above to 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 – Required Documentation

In accordance with the Ineligibility and Suspension Policy (<http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html>), the Proponent must provide, **as applicable**, to be given further consideration in the procurement process, the required documentation as per R1410T (2016-04-04), General instructions 1 (G11), Integrity Provisions – Proposal, **section 3a**.

3.2. RATED REQUIREMENTS

* Similar projects means projects with similar construction cost, complexity, nature, scope.

3.2.1. Achievements of Proponent on Similar Projects*

-
- a) Describe the Proponent's experience and details of work performed as Consultant specifically related to dam projects and to earth embankment projects.
 - b) Select three (3) dam projects completed within the last ten (10) years, which was either a major rehabilitation project or a full replacement project. The construction of these projects should have been substantially completed within the stated timeframe.
 - c) **Information that should be supplied:**
 - i. Clearly indicate how each project is comparable and relevant to the projects described in this Request for Proposal (RFP).
 - 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. budget control and management - i.e. contract price & final construction cost - explain variation
 - vi. project schedule control and management - i.e. initial schedule and revised schedule - explain variation
 - vii. Indicate key personnel that was involved in the project delivery that is now proposed to be involved 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.

Higher consideration may be given for similar dam projects including key personnel involved in the project delivery that are now being proposed to be involved in the projects covered by this RFP. Higher consideration may be given if key personnel involved in the similar dam project(s) delivery are proposed for the same role on the current Consultant Team.

The Proponent (as defined in R1410T General Instructions to Proponents, G12 Definitions) must possess the knowledge on the above projects. Past project experience from entities other than the Proponent will not be considered in the evaluation unless these entities form part of a joint venture Proponent.

Please indicate those projects which were carried out in joint venture and the responsibilities of each of the involved entities in each project.

3.2.2. Achievements of Senior Team Leaders to be Assigned to this Project

- a) The Project Manager should have a minimum of ten (10) years of experience managing projects of similar* scope and depth on fast-track schedules.

-
- b) The Civil/Structural Dam Engineer, the Geotechnical Engineer, the Mechanical Engineer, the Electrical / Controls Engineer and the Environmental Engineer who as Senior Team Leaders will supervise and lead each discipline should be senior professional engineers with a minimum ten (10) years of experience in dam inspection, analysis, design, and construction projects.
- c) 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.
- d) This is the opportunity to emphasize their strengths and expertise directly related to dams, to recognize their past responsibilities and achievement(s).
- e) Provide information for each of the following Senior Team Leaders:
- i. Project Manager
 - ii. Civil/Structural Dam Engineer
 - iii. Geotechnical Engineer
 - iv. Mechanical Engineer
 - v. Electrical / Controls Engineer
 - vi. Environmental Engineer
 - vii. Only identify Senior Team Leaders that are carrying out the Engineering and/or management work on this project.
- f) **Information that should be supplied for each Senior Team Leader:**
- i. Relevant experience and expertise;
 - ii. Number of years of relevant experience;
 - iii. Role, responsibility and details of involvement of the individual in relevant past projects.

3.2.3. Achievements of Engineering Team Members to be Assigned to this Project

- a) List ten (10) Engineering Team members, two (2) for each of the Civil/Structural Dam, Geotechnical, Mechanical, Electrical / Controls and Environmental engineering disciplines. Each Engineering Team Member should be a professional engineer with a minimum of five (5) years of relevant dam experience.
- b) Describe the expertise and performance of engineering team members to be assigned to this project regardless of their past association with the current Proponent or Sub-Consultant firm.
- c) 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 dams, to recognize their past responsibilities and achievements.
- d) Provide information for ten (10) Engineering Team Members for evaluation, two (2) per discipline (i.e., Civil/Structural Dam Engineer,

Geotechnical, Mechanical, Electrical / Controls and Environmental Engineer). The actual Consultant Team for the project may include more staff, but only include ten (10) Engineering Team Members for evaluation in this proposal.

- e) Only identify Engineering Team Members carrying out the majority of the Engineering work on this project.
- f) Engineering Team Members shall not be same individuals proposed as Senior Team Leaders.
- g) **Information that should be supplied for each Engineering Team Member:**
 - i. Relevant experience and expertise;
 - ii. Number of years of relevant experience;
 - iii. Role, responsibility and details of involvement of the individual in relevant past projects.

3.2.4. Understanding the Project Milestones and Schedule

- a) The Proponent should demonstrate capability to perform the services and meet project challenges and milestones by providing a plan of work.
- b) **Information that should 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.

3.2.5. Understanding the Consultant Team Personnel Requirements

- a) The Proponent should demonstrate the capacity and capability to perform the services and meet the tight pre-tender period schedule constraints for ALL sites.
- b) Quantity of Proponent's personnel assigned for each individual month, per discipline and per seniority level 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.
- d) **Table format and information that should be supplied:**
 - i. Present table on a single side of one 11"x17" sheet;

- ii. Row titles should be used to describe the function/discipline/seniority of Team Members assigned to the project;
- iii. In each cell of the table, fill in quantity of person-days to be assigned to complete the work within the designated delivery dates.

3.2.6. Design Approach

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

3.3. EVALUATION AND RATING

In the first instance, price envelopes to remain sealed and only the technical components of the proposals that are responsive to 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	1.5	0 - 10	0 – 15
3.2.2 Achievements of Senior Team Leaders to be Assigned to this Project	2.0	0 - 10	0 – 20
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	1.5	0 - 10	0 - 15
3.2.6 Design Approach	1.5	0 - 10	0 – 15

Solicitation No. - N° de l'invitation

EQ754-171285/A

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

R.076951.138

Amd. No. - N° de la modif.

File No. - N° du dossier

PWL-6-39078

Buyer ID - Id de l'acheteur

pwl041

CCC No./N° CCC - FMS No/ N° VME

Technical Rating	10.0		0 - 100
-------------------------	-------------	--	----------------

GENERIC EVALUATION TABLE

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

NON RESPONSIVE	INADEQUATE	WEAK	ADEQUATE	FULLY SATISFACTORY	STRONG
0 point	2 points	4 points	6 points	8 points	10 points
Did not submit information that 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 to 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
	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

To be considered further, proponents **must** achieve a minimum Technical Rating of sixty (60) points out of the hundred (100) points available as specified above.

No further consideration will be given to proponents not achieving the pass mark of sixty (60) points.

SRE 4 PRICE OF SERVICES

- 4.1.1. All price proposal envelopes corresponding to responsive proposals that have achieved the pass mark of sixty (60) points to 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 will be set aside and receive no further consideration.
- 4.1.4. The remaining price proposals are rated as follows:
 1. The lowest price proposal receives a Price Rating/maximum Score of 20;
 2. Other price proposals will receive a Score based on the following formula:

$$\frac{\text{Lowest Price Proposal}}{\text{Proponent Price Proposal}} \times 20 \text{ points} = \text{Price Rating/Score}$$

SRE 5 TOTAL SCORE

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

Rating	Possible Range	% of Total Score	Score (Points)
Technical Rating	0 - 100	80	0 – 80
Price Rating	0 - 100	20	0 – 20
Total Score		100	0 – 100

- 5.1.2. The Proponent receiving the highest Total Score is the first entity that the Evaluation Board to recommend to 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 to be selected.

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, G116 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 Appendix B	– completed and signed - form provided in Appendix B
Integrity Provisions – Required Documentation	– as applicable in accordance with the Ineligibility and Suspension Policy (http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html) and as per R1410T (2016-04-04), General instructions 1 (G11), Integrity Provisions – Proposal, section 3a.
Integrity Provisions - Declaration of Convicted Offences	– with its bid, as applicable in accordance with the Ineligibility and Suspension Policy (http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html) and as per R1410T (2016-04-04), General instructions 1 (G11), Integrity Provisions – Proposal, section 3b.
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 the form provided in Appendix C – submitted in a separate sealed envelope clearly marked “Price Proposal”, and listing the Proponent firm’s name
---------------------	--

Solicitation No. - N° de l'invitation

EQ754-171285/A

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

R.076951.138

Amd. No. - N° de la modif.

File No. - N° du dossier

PWL-6-39078

Buyer ID - Id de l'acheteur

pw1041

CCC No./N° CCC - FMS No/ N° VME

ANNEX A – PROJECT BRIEF

Annex A – PROJECT BRIEF

Information contained in this Project Brief identifies the project requirements and the consulting services required for this project.

The Project Brief is divided into three sections:

- PROJECT REQUIREMENTS (PR)

- PROJECT ADMINISTRATION (PA)

- REQUIRED SERVICES (RS)

For standards relating to the service provisions herein please refer to the document 'Doing Business with PWGSC' provided as an Appendix. The standards in Doing Business must be adhered to in conjunction with Project Brief, as the two documents are complementary. The Project Brief describes project-specific requirements while Doing Business deals with information common to all projects. In case of a conflict between the two documents, the requirements of the Project Brief take precedent.

Table of Contents

1	PROJECT REQUIREMENTS (PR)	5
1.1	Project Information	5
1.1.1	General	5
1.1.2	Project Identification	5
1.1.3	Project Delivery Approach	5
1.1.4	Estimated Construction Costs	6
1.1.5	Project Schedule	7
1.2	Project Background	8
1.2.1	Overview	8
1.3	Description of Sites (Design by Others)	11
1.3.1	Site H: Campbellford Dam 11 and Lock 13 Rehabilitation	11
1.3.2	Site I: Crowe Bay Dam 12 and Lock 14 Rehabilitation	15
1.4	Description of Sites (Designed under this Project Brief)	18
1.4.1	Site A: Dam 1 at Lock 1 Reconstruction and Lock 1 Rehabilitation, Trenton	18
1.4.2	Site B: Glen Miller Dam 3 at Lock 3 Rehabilitation	24
1.4.3	Site C: Frankford Dam 6 at Lock 6 Rehabilitation	27
1.4.4	Site D: Meyers Dam 8 at Lock 9 Rehabilitation	31
1.4.5	Site E: Dam 9 at Lock 10 Hagues Reach Rehabilitation	34
1.4.6	Site F: Ranney Falls Locks 11 and 12 – Lock Gate and Valve Rehabilitation	37
1.4.7	Site G: Dam 10 at Lock 11 and 12 Ranney Falls Rehabilitation	38
1.4.8	Site J: Southern Sector Concrete Repairs	40
1.5	Stakeholders	46
1.6	Project Objectives	46
1.6.1	Design Principals	46
1.6.2	Project Objectives	46
1.6.3	Cultural Resource Management	46
1.6.4	Environmental Protection	49
1.7	Operations	49
1.7.1	Navigation	49
1.7.2	Flood Mitigation	50
1.7.3	Environmental Constraints	50
1.8	Project Delivery	50
1.8.1	Municipal Approvals and Access to Property	50
1.8.2	Health and Safety	50

1.8.3	Sustainable Development	51
1.8.4	Codes and Standards.....	52
1.8.5	Solid Waste Management	53
1.8.6	Constraints and Challenges	54
1.9	Technical Requirements	55
1.9.1	Design Philosophy.....	55
1.9.2	Structures	56
1.9.3	Earth Dam Rehabilitation	58
1.10	Summary of Services Required.....	59
1.11	Resource Requirements	59
1.12	Existing Documentation	60
2	PROJECT ADMINISTRATION (PA)	61
2.1	Roles and Responsibilities	61
2.1.1	PWGSC.....	61
2.1.2	Client Department	62
2.1.3	Design Consultants	62
2.1.4	Prime Consultant.....	62
2.1.5	Construction Manager	66
2.2	Communications.....	68
2.2.1	Document Submissions to PWGSC	68
2.2.2	Acceptance of Document Submissions.....	69
2.2.3	Correspondence.....	69
2.2.4	Lines of Communication.....	69
2.3	Media Relations.....	70
2.4	Public Relations.....	70
2.5	Response Time	71
2.5.1	Design Phases	71
2.5.2	Tender Phase.....	71
2.5.3	Construction Phase	71
2.5.4	Post-Construction Phase.....	72
2.6	Meetings	72
2.6.1	Project meetings.....	72
2.6.2	Design Meetings.....	73
2.6.3	Construction Meetings.....	73
3	REQUIRED SERVICES (RS)	75
3.1	General Requirements	75

3.2	Project Reports	75
3.2.1	Monthly Progress Reports	75
3.2.2	Milestone Reports	76
3.2.3	Exception Reports	76
3.3	Project Management	76
3.3.1	Cost Management	77
3.3.2	Time Management	77
3.3.3	Quality Management	77
3.3.4	Risk Management	78
3.3.5	Scope Management	78
3.4	Design Phases	78
3.4.1	Requirements Analysis	78
3.4.2	Site Studies and Technical Investigations	81
3.4.3	Design Concept	82
3.4.4	Design Development	84
3.4.5	Construction Documents	89
3.5	Post Design Phases	91
3.5.1	Construction Document Review and Acceptance	92
3.5.2	Tender Phase	92
3.5.3	Construction Phase	93
3.5.4	Post Construction	96
	Annex AA - Existing Documentation	98

1 PROJECT REQUIREMENTS (PR)

1.1 Project Information

1.1.1 General

Public Works and Government Services Canada (PWGSC) on behalf of Parks Canada Agency (PCA), intends to retain a suitably qualified engineering firm, with sub-consultants as necessary, in the capacity of Prime Consultant for the provision of a multidisciplinary team to fulfil the services required for this project as detailed herein.

1.1.2 Project Identification

PWGSC Project Title: Trent-Severn Waterway Infrastructure
South Bundle

Location of the Project: Trenton, Ontario

Sub Project Components:

- Dam 1 at Lock 1 Reconstruction and Lock 1 Rehabilitation, Trenton (R.076951.130)
- Glen Miller Dam 3 at Lock 3 Rehabilitation (R.076951.230)
- Frankford Dam 6 at Lock 6 Rehabilitation (R.076951.330)
- Meyers Dam 8 at Lock 9 Rehabilitation (R.076951.430)
- Dam 9 at Lock 10 Hagues Reach Rehabilitation (R.076951.530)
- Ranney Falls Locks 11 and 12 – Lock Gate and Valve Rehabilitation (R.076951.630)
- Dam 10 at Lock 11 and 12 Ranney Falls Rehabilitation (R.076951.730)
- Campbellford Dam 11 and Lock 13 Rehabilitation (R.076951.830)
- Crowe Bay Dam 12 and Lock 14 Rehabilitation (R.076951.930)
- Southern Sector Concrete Repairs (R.076951.010)

PWGSC Project Number: See above

Client Department / User: Parks Canada Agency (PCA)
Ottawa, Ontario, K1A 0H3

PWGSC Project Manager: To be Determined

1.1.3 Project Delivery Approach

PWGSC has partnered with PCA to deliver an infrastructure program on the Trent-Severn Waterway (TSW) over the next 4 years. The objective of the program is to improve infrastructure, operational effectiveness and public safety on the waterway, while protecting its heritage value and character-defining elements to the extent possible and promoting visitor experience.

Implementation of this project is to be carried out through a Construction Management arrangement with the Construction Manager providing Advisory Services during design and acting as General Contractor and Constructor during construction. PWGSC will retain the Construction Manager under a separate contract. The Construction Manager will also act as Commissioning Manager (CxM).

PWGSC intends to engage a Design Consultant through separate Request for Proposal and, in some cases, in-house staff to prepare the design and construction documents for one or more

sites of this project. PWGSC may engage additional speciality consultants to assist with various aspects of the work.

In order to achieve the project objectives PWGSC will also engage the services of a Prime Consultant to undertake the design and construction documents for eight (8) sites and provide technical support, contract administration and site engineering services during the construction and post construction phases for all sites identified herein and as defined in this Project Brief.

The Prime Consultant shall review, accept and implement as appropriate the construction documents prepared by the other Design Consultant(s) and work in collaboration with the Construction Manager, the project team and all stakeholders through the Departmental Representative.

The South Bundle which includes the sites listed below is one of the identified projects in the TSW overall program and the subject of this Project Brief.

1. Site A: Dam 1 at Lock 1 Reconstruction and Lock 1 Rehabilitation, Trenton;
2. Site B: Glen Miller Dam 3 at Lock 3 Rehabilitation;
3. Site C: Frankford Dam 6 at Lock 6 Rehabilitation;
4. Site D: Meyers Dam 8 at Lock 9 Rehabilitation;
5. Site E: Dam 9 at Lock 10 Hagues Reach Rehabilitation;
6. Site F: Ranney Falls Locks 11 and 12 – Lock Gate and Valve Rehabilitation;
7. Site G: Dam 10 at Lock 11 and 12 Ranney Falls Rehabilitation;
8. Site H: Campbellford Dam 11 and Lock 13 Rehabilitation;
9. Site I: Crow Bay Dam 12 and Lock 14 Rehabilitation; and
10. Site J: Southern Sector Concrete Repairs.

A Design Consultant will be retained to provide design services including the following Project Phases: Requirement Analysis; Design Concept; Design Development and Construction Documents for the sites H and I.

The Prime Consultant will be retained to provide design services including the following Project Phases: Requirement Analysis; Design Concept; Design Development and Construction Documents for Sites A, B, C, D, E, F, G and J. The Prime Consultant will also be required to provide tender, contract administration, construction and post construction phase services for all sites from A to J, including Sites H and I.

1.1.4 Estimated Construction Costs

The indicative budget allocated for construction of the included sites is estimated as follows:

Site A: Dam 1 at Lock 1 – Trenton	CAD	\$24.3 Million
Site B: Glen Miller Dam 3 at Lock 3	CAD	\$8.8 Million
Site C: Frankford Dam 6 at Lock 6	CAD	\$3.3 Million
Site D: Meyers Dam 8 at Lock 9	CAD	\$6.2 Million
Site E: Dam 9 at Lock 10 Hagues Reach	CAD	\$7.5 Million
Site F: Ranney Falls Locks 11 and 12 Lock Gate and Valve Rehabilitation	CAD	\$1.1 Million

Site G: Dam 10 at Lock 11 and 12 Ranney Falls	CAD \$5.5 Million
Site H: Campbellford Dam 11 and Lock 13	CAD \$16.2 Million
Site I: Crowe Bay Dam 12 and Lock 14	CAD \$14.1 Million
Site J: South Sector Concrete Repairs	CAD \$12.1 Million

PWGSC reserves the right to re-assign and re-balance the budget allocations noted to optimize and better manage design requirements, site conditions and actual construction costs.

1.1.5 Project Schedule

The Project is to be delivered generally in accordance with the project milestone listing identified below. However the Prime Consultant in coordination with the Construction Manager, Design Consultant for sites H & I and Departmental Representative will be expected to reduce the project duration to the extent possible with an eye to cost and time effectiveness. Each site may follow separate and / or parallel time paths. Considering a possibility of encountering unidentified site conditions during the work, flexibility is important in terms of accommodating unanticipated site requirements. The timelines indicated below include normal PWGSC turnaround time.

Phase	Milestone
Pre-Design – Analysis of Project Requirements Complete	Dec 2016
Design Concept Complete	Jan 2016
Supplementary Investigations Complete	Jan 2016
In-Water Work: Design Development Complete	Feb 2017
In Water Works: Construction Documents Complete	Apr 2017
In-Water Works: Tender and Award Complete	May 2017
*In-Water Works: Start Construction (subject to in water work restrictions)	Jul 2017
In-Water Works: Construction Complete (subject to in water work restrictions)	Sept 2017
Infrastructure: Design Development Complete	Mar 2017
Infrastructure: Construction Documents Complete	Jun 2017
Infrastructure: Tender and Award Complete	Aug 2017
Dams and Earthworks: Start Construction	Sep 2017
Dams and Earthworks: Construction Complete	Nov 2020

The schedule provided above allows for In-Water work restrictions based on the Ontario Ministry of Natural Resources (OMNR) guidelines and administered by PCA. The restricted

period for in-water work is from March 15 to July 15 inclusive. Environment Canada restrictions to tree removals is from April 1-August 27 each year.

Restriction periods may vary by site. Site specific in water work restrictions will be confirmed in the environmental impact assessment (EIA) after baseline studies are complete. The breeding bird timing restriction for no vegetation removal works is from March 31st to August 27th for Zone C2. Breeding birds including Barn Swallow (Species at Risk (SAR)) may inhabit the dam structures and will require exclusion netting prior to the nesting period or work on the dams will be restricted to the March 31st to August 27th period. There are also several SAR considerations and Critical Habitat restrictions for the proposed project areas (see Section 1.6.4), additional timeline constraints may be required. It is possible that Dam 1 may have further timing window restrictions for cool water species from Lake Ontario or due to SAR.

Note that the above time allocations are meant to provide a preliminary timeframe of major activities and milestones. The schedule supplied by the Prime Consultant is to include sufficient details to clearly demonstrate the sequence and interdependency of design activities and to provide a reasonable basis for progress monitoring and coordination. The duration of some tasks may vary depending on the overlapping design and construction phases through multiple tendering and construction packages.

The Prime Consultant in collaboration with the Construction Manager shall identify and take advantage of opportunities to advance the schedule. The design team shall produce and submit conceptual design summary as early as possible following the commencement of design work, and provide updates on an on-going basis, in order to guide and inform the EIA work of others, and to provide preliminary cost estimates of concepts being considered to decision-makers.

A major impact on construction start could be the approval of impact assessments that include such environmental, archaeological, cultural resource, First Nations and public consultation components.

* In-Water Works must be completed between July 15th and October 1st of any given year. There should be no work completed in the water between September 15th and July 15th. This would include coffer dams and dewatering to isolate a construction area. Once area is dry work can continue in the dry, similarly coffer dams can't be removed in the above window.

1.2 Project Background

1.2.1 Overview

Parks Canada is mandated to protect significant examples of Canada's cultural heritage so that they can be enjoyed by present and future generations. As of March 2015, there were 959 designated National Historic Sites of Canada. Parks Canada directly administers 167 of these, including nine (9) historic canals. The National Historic Sites Conservation Program reflects Parks Canada's mandate to ensure the commemorative integrity of national historic sites on Parks Canada lands. A National Historic Site possesses commemorative integrity when:

- the resources directly related to the reasons for designation as a National Historic Site are not impaired or under threat;
- the reasons for designation as a National Historic Site are effectively communicated to the public;
- the site's heritage values (including those not related to the reasons for designation as a National Historic Site) are respected in all decisions and actions affecting the site.

To support commemorative integrity, conservation of National Historic Sites operates at two levels: it applies to an entire national historic site as well as to the individual cultural resources associated with these places, including landscapes and landscape features, buildings and engineering works, archaeological sites, and archaeological and historical objects. Understanding and managing the condition of these cultural resources is critical to their protection.

Requirements for conservation of National Historic Sites are outlined in federal legislation and regulations, most importantly the Parks Canada Agency Act, Historic Sites and Monuments Act, and Canada National Parks Act. This legislation is complemented and reinforced by a number of policies that identify at a broad level how Parks Canada manages the cultural resources under its stewardship and by directives and guidelines developed by Parks Canada that provide guidance on implementation. The Parks Canada Agency Act requires that management plans be prepared for National Historic Sites and states that it is in the national interest to ensure the commemorative integrity of National Historic Sites. The Historic Canals Regulations under the Department of Transport Act provide the regulatory framework for the management, use and protection of the Rideau Canal and Trent-Severn Waterway in accordance with the Historic Canals Policy and the Management Plan. Parks Canada considers the Standards and Guidelines for the Conservation of Historic Places in Canada, version 2 (2010) as its primary source of heritage conservation guidance for all work on the Trent Severn Waterway National Historic Site, be it for maintenance, or interventions such as preservation and rehabilitation and including replacement work. Activities to ensure the conservation and maintenance of cultural resources are primarily guided by the Standards and Guidelines for the Conservation of Historic Places in Canada (S&G). These guidelines address four types of resources (i.e., cultural landscapes, archaeological sites, buildings, and engineering works) and materials. As of May 2016, an electronic version of the Standards and Guidelines for the Conservation of Historic Places in Canada, version 2 (2010) can be found at www.historicplaces.ca

The cultural resources identified above as the South Bundle are part of the Trent-Severn Waterway (TSW), which meanders nearly 400 kilometres across central Ontario to link Georgian Bay with the Bay of Quinte and hence to Lake Ontario. Through most of its length the navigation route of the Waterway consists of natural water courses connected through a series of engineering works including 36 conventional locks, 2 flight locks, 2 hydraulic lift locks and a marine railway. In addition there are numerous canal cuts, entrance piers and embankments along with 125 dams of various sizes and types. Constructed between 1833 and 1930, the TSW was declared a National Historic Site in 1929. It commemorates Canada's history of canal construction and the importance of the canal system throughout this country's history. This heritage corridor is enjoyed by more than 1.5 million land and water based visitors every year.

The numerous dams of the TSW are linked not only to the themes of in-land water transportation and the evolutionary development of the system like many other engineering structures but to water management as well. Forty-three of the 125 dams along the Waterway were designated as of "Other Heritage Value (OHV)" cultural resources based on their historic associations, the integrity of their surviving design and construction qualities and their environmental setting. An example of these dams includes Dam #13 at Healey Falls because of its impressive size and its unique curved-wall design. Healey Falls is also a designated cultural landscape (OHV) conveying an interesting mix of significant historic themes. Relatively secluded and little changed since the Waterway went through in the early 20th century, the landscape features a collection of some of the largest engineering structures on the system including the arched dam and the flight lock.

Many of the locks along the system were evaluated as OHV cultural resources which include all the locks in the Trent River section (Locks 1 through 18) because they reveal the evolutionary character of lock operation and construction. While the gate opening mechanisms on the lower gates have been automated, the upper gates retain their traditional manual method of operation. In addition, the locks in the Trent River section retain much of their original fabric and massing, and the environmental setting has experienced relatively little change since the construction period.

The heritage value of several lockstation landscapes in the South Sector is derived from their secluded locations and relationship to natural features. The Percy Reach, Meyers and Hagues Reach lockstations are characterized by the natural setting and where human presence is evident only through a pastoral landscape. The landscape adjacent to the Glen Ross station conveys a sense of historic isolation from the more modern southern Ontario landscape through the dominant influence of a natural setting. Related to the natural features is the significant aboriginal presence evident on the cultural landscape at Healey Falls as well as at the Percy Reach burial mounds site. Several important aboriginal archaeological sites have been identified along the Waterway along with additional sites whose extent and significance are yet to be determined. The former category includes Glen Ross, the burial mounds at Percy Reach and the quarry site at Healey Falls. Other aboriginal sites and “find spots” with potential importance on the Waterway include: the “bird amulet” at Glen Miller, the Sill Island site at Frankford and the Myers Island site at Percy Reach. In addition to these terrestrial sites there several known marine aboriginal sites or “find spots” whose importance has yet to be determined. Until further investigation is conducted these potential sites must be considered cultural resources.

After nearly 100 years, the original waterway mandate of navigation is now challenged to meet the widely varying needs and expectations of modern stakeholders. As a national historic site, the waterway must be managed for the protection and presentation of nationally significant cultural resources. Government agencies and environmental organizations expect the system to be managed to provide for the protection of cultural and natural resources including species at risk; while business organizations and individual business owners strive for contributions to the economic well-being of the area. Municipalities, cottagers and shoreline owners expect it to contribute to the quality of their lifestyles and recreational interests, while ensuring water supplies of adequate quality and quantity.

The Ontario Waterways Unit of PCA owns and operates, on behalf of Canada, the TSW that extends from the Bay of Quinte on Lake Ontario at the City of Quinte West (Trenton) to Port Severn in the north; located to the south of Georgian Bay (Lake Huron). The waterway traverses two major watersheds, the Trent River Watershed and the Severn River Watershed. The Trent River basin, which drains more than 12,600 km², encompasses some 218 lakes in the Haliburton Highlands region, 47 of which are directly controlled by the TSW. Water from these lakes flows south along either the Gull River, Burnt River, Nogies Creek, Mississauga River, Eels Creek or Jack Creek systems into the Kawartha Lakes. The Kawarthas drain down the Otonabee River into Rice Lake and on to Trenton on Lake Ontario via the Trent River. The Crowe River drains the eastern-most lakes in the Trent Watershed. Lake Scugog drains northward from the Oak Ridges Moraine to Sturgeon Lake. The neighboring Severn River basin drains an area just over 6,000 km². Included in this watershed are the Canal Lake - Talbot River system, the Holland River, the Lake Simcoe - Couchiching basin, the Black River and the channels of the Severn River below the hamlet of Washago.

The water levels and flows on the waterway are managed by 104 operable dams which are owned and operated by the Ontario Waterways Unit of PCA. Of the 104 dams, 83 are located

on the Trent River Watershed, including 47 dams and water retaining structures in the Haliburton sub-watershed to control various reservoir lakes and rivers feeding the waterway. The remaining 21 dams and water retaining structures associated with the waterway are located in the Severn River Watershed.

The new 2016-2021 work should be planned and designed bearing in mind that the whole Trent-Severn Waterway is a cultural landscape, and that all the new work is meant to tie together, protect and promote the Trent-Severn Waterway National Historic Site, so that to future generations the 2016-2021 work will be seen as an illustration of 21st Century excellence in cultural resource management.

In summary, Parks Canada recognizes:

- that the Trent-Severn Waterway is designated as a National Historic Site and that its commemorative integrity should be maintained;
- that the Trent-Severn Waterway has a long history that illustrates the depth and diversity of the peoples that have lived by, worked on, and traveled the waterway;
- that the Trent-Severn Waterway has a long history as a working waterway;
- that the Trent-Severn Waterway has evolved in response to changes in technology and community needs;
- that the Trent-Severn Waterway will continue to evolve; and
- that the current Trent-Severn Waterway program, while rooted in its history, is but a new layer of history that should celebrate this evolution - past, present and future.

Therefore, Parks Canada's 2016-2021 program of work on the Trent Severn Waterway NHS is intended to be seen as a new layer of history, representing design excellence and early 21st Century technology and community standards in a manner that protects and enhances the previous layers of the National Historic Site.

1.3 Description of Sites (Design by Others)

The following information is provided as reference only so that the Prime Consultant is provided the opportunity to fully understand the current conditions and the scope of the rehabilitation program at each site. The respective Design Consultant will develop the detailed requirements and prepare construction documents. The Prime Consultant will be required to review the design and provide tender, contract administration, construction and post construction services as detailed herein.

1.3.1 Site H: Campbellford Dam 11 and Lock 13 Rehabilitation

Dam 11 Campbellford

Dam 11 is a concrete gravity structure, built in 1913 and rehabilitated with two mechanized radial gates in 1976. Its purpose is to regulate water to maintain the navigation water level on the Trent-Severn Waterway. The dam also provides regulation for hydropower generation in the watershed. The current configuration of the dam consists of four wooden stoplogs spillway, an overflow spillway and two radial gates, in addition to two blocked sluices. The overall dam length is 142 m. The overall height of the dam is 11.2 m from bedrock to the top of the dam deck. By convention for the Trent-Severn Waterway, sluice numbering starts at the lock. Sluice 1 is the rightmost (west) sluice. The Campbellford Dam #11 is a cultural resource of "Other Heritage Value" (formerly known as Level II cultural resource, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). It exemplifies a form of water management technology used on the Trent-Severn Waterway. Its heritage value resides in its historic associations, the integrity of its surviving design and construction qualities and its environmental setting.

The wooden stoplog spillways consist of four, single gain, 7.62 m wide spillways, with 12 logs per sluice. The overflow spillway consists of a flat crest overflow spillway divided by four piers supporting the dam deck. The two radial gates are 15.24 m in width and are electrically operated. In addition to the above, there are two blocked sluices. One sluice, at the west end of the concrete dam is permanently closed by a concrete wall. The second closed sluice, between the overflow spillway and radial gates is closed with steel stoplogs and no permanent mechanism of removing these is available currently.

Three main embankment dams are also appurtenant to dam. These earth fill dams are located at the left and right approaches to the lock, between the Trent River and the powerhouse intake canal and to the west of the powerhouse intake canal. The length of these structures is as follows:

- a) Lock Upper Approach Canal Left Embankment 560 m
- b) Right Concrete Core Earth Embankment 120 m
- c) Left Earth Embankment Dam 310 m

Lock 13 Campbellford

The lock associated with Campbellford Dam, Lock 13, is also a concrete gravity structure equipped with manual upper gates and mechanized lower gates. The lock is a single chamber of 53.3 m long by 10 m wide. The depth of the lock, from coping to floor is 10.8 m. Lock 13 was rehabilitated in 2004, where new wagon valves and refurbished rails were installed and again in fall 2005, where the hydraulic system was installed on the downstream gates. The Campbellford Lock #13 is a cultural resource of "Other Heritage Value" (formerly known as Level II cultural resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). It exemplifies a form of water management technology used on the Trent-Severn Waterway and reveals the evolutionary character of lock operation and construction.

Background information is being made available in Annex AA, as reference material only.

1.3.1.1 Existing Structure, Conditions and Constraints

- a) Dam 11 is a concrete gravity structure, consisting of four wooden stoplogs spillway, an overflow spillway and two radial gates, in addition to two blocked sluices.
- b) The overall dam length is 142 m. The overall height of the dam is 11.2 m from bedrock to the top of the dam deck.
- c) The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. CRM advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.
- d) The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.
- e) The Dam Safety Review (DSR) for this site identified a significant deficiency with respect to standards based discharge capacity at Campbellford Dam 11. The DSR recognized that it would not be feasible to modify the dam to achieve the standard based Inflow Design Flood (IDF) and that increasing discharge capacity beyond that of the upstream Crowe Bay Dam 12 would not be reasonable. Considering the inadequacies of the

dam's discharge capacity, the DSR recommended to convert the stop log and blocked sluices to vertical mechanical gates in order to increase the capacity to at least that of the upstream Crowe Bay Dam.

- f) Concrete deterioration at the lock and approach walls is not widespread but repairs and rehabilitation are required to improve asset conditions and extend service life of these structures.

1.3.1.2 Scope of Work

A comprehensive rehabilitation of the dam, lock and associated structures at Campbellford Dam 11 and Lock 13 are required. The principal objectives is to rectify deficiencies identified in the DSR and the reduction of risks to a reasonable level by improving and increasing discharge capabilities to a level planned for the upstream Crowe Bay Dam 12 (approx. 650 year return).

A summary of the scope of work is as followed:

The goal at Campbellford Dam is to increase the discharge capacity to slightly exceed or equal the discharge from Crowe Bay Dam 12 by evaluating options and recommending solutions including:

- i) Reconstructing the four timber stop log spillways as mechanized gates;
- ii) Reconstructing the steel stop log sluice as a mechanized gate;
- iii) Reconstructing the concreted spillway as a mechanized gate if required to satisfy discharge requirements or allow for water diversion during construction.

Construction of a new retaining wall downstream of dam's East pier and extension of the concrete retaining wall downstream of dam's east pier to protect against shoreline erosion. The retaining wall to be designed to resist flow from overtopping of earth embankments above.

Rehabilitate overflow spillway:

- i) The overflow spillway is in poor condition and requires concrete repairs to improve its condition to good.

Concrete repairs and stabilization measures to the Dam:

- i) Carry out concrete repairs to dam to improve dam condition to good.
- ii) Execute stabilization measures to concrete dam to address stability deficiencies identified in the DSR.
- iii) Replacement of the pedestrian catwalk on dam with a vehicle deck;
- iv) The pedestrian catwalk that crosses the overflow spillway is to be replaced with a deck capable of allowing access to the radial gates from the east approach for maintenance activities by service vehicles and cranes.

Rehabilitation of Earth Embankments:

- i) There are three concrete core earth embankment dams at Campbellford that require rehabilitation to improve condition and resistance to overtopping.
- ii) Rehabilitate the left embankment earth dam to improve its condition to good with an increased crest elevation (of approximately 0.43m) to match that of the concrete deck (154.5m geodetic);
- iii) Rehabilitate the right earth embankment to improve its condition to good with an increased crest elevation (of approximately 0.43m) to match that of the concrete deck (154.5m geodetic);

- iv) Rehabilitation of the lock upper approach left canal earth embankment to improve its condition to good with an increased crest elevation (of approximately 0.43 m) to match that of the concrete deck (154.5 m geodetic) from the right earth embankment to the left upper concrete lock approach wall;
- v) All these earth dams are considered in fair to poor condition due to extensive vegetation growth and erosion and are in need of general rehabilitation and repair to improve their condition.
- vi) Vegetation: a vegetation plan for the earth dam rehabilitation to include restoration with appropriate native and naturalized vegetation requiring minimal maintenance that would promote an early successional native habitat.

Lock 13 Rehabilitation:

- i) Concrete repairs to improve overall asset condition of lock to good;
- ii) It is anticipated that that this work will include refacing or partial replacement of lock structures to achieve 50 year life;
- iii) Scope to include repair of sluice tunnels, shafts and mechanical systems as required.

Upstream and downstream lock approach wall repairs:

- i) Repair of upstream and downstream lock concrete approach walls to improve their condition to good and increase service life beyond 25 years;
- ii) The DSR identified isolated condition deficiencies to both the upstream and downstream approach walls. The objective is to repair or rehabilitate these walls to extend their service life beyond 25 years. It is not envisioned that these walls would be demolished and reconstructed.

Public Safety Measure Improvements:

- i) Public safety and operator enhancements are to be based on Canadian Dam Association (CDA) Guidelines and PCA practice and standards.
- ii) The dam deck is currently closed to the public. This general arrangement will be maintained for the rehabilitated structure and public safety measures must be designed for this accommodation. The measures will include but are not necessarily limited to:
 - o Installation of permanent (considering ice loads) safety boom upstream of the dam. Boom positioning will be constrained by existing private homes upstream of dam and will have to terminate at PCA property;
- iii) Upgrade of signs throughout the dam using PCA templates including signs to public to stay out of operation area of the dam;
- iv) Installation of post mounted audible alarm on the dam to warn the public in downstream hazard area of gate adjustments
- v) Enhancement of handrails and fencing to better prevent public access to the dam.

Back-up Generator and Uninterruptible Power Supply (UPS) Installation:

- i) Installation of a back-up power generator with uninterrupted power supply controls integrated into all dam control systems to provide automatic backup power for gate operations and gate heaters in the event of power outages;
- ii) Mechanical Radial Gate Repairs;
- iii) Carry out minor repairs to existing mechanical radial gates and associated machinery.

1.3.2 Site I: Crowe Bay Dam 12 and Lock 14 Rehabilitation

Dam 12 Crowe Bay

Dam 12 (Crowe Bay) was originally constructed in 1913. In 1985 there was a major rehabilitation of the dam with the installation of five mechanized gates. No work was undertaken on other components of the dam in 1985. The Crowe Bay Dam #12 is not a cultural resource (NCR, formerly known as “Other Cultural Resource”, Cultural Resource Inventory, 1994-95, rev. Nov. 2015).

Lock 14 Crowe Bay

Lock 14 was also constructed circa 1913. Numerous upgrades and repairs have been undertaken at this lock. In 1936 a concrete cutoff wall was constructed offset from the left or east side of the lock. In 1939 the east lock wall was substantially reconstructed. In 1967 the upper concrete sill was repaired. In 1973 the lower apron (downstream of lower gates) was repaired. In 2007 new wagon valves and refurbished rails were installed.

In 1981 the lower sill was repaired and in 1990 there was a rehabilitation of the lock including installation of a hydraulic system on the downstream gates. There are some problem areas with concrete and mechanical components. Concrete deterioration on walls is not widespread.

The Crowe Bay Lock #14 is a cultural resource of “Other Heritage Value” (formerly known as Level II cultural resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). It exemplifies a form of water management technology used on the Trent-Severn Waterway. Its heritage value resides in its historic associations, the integrity of its surviving design and construction qualities and its environmental setting. Also, the site has potential archaeological resources in the project area that are of “Other Heritage Value”.

Headrace Dam Bridge

The Headrace Bridge is a single lane, three-span reinforced concrete slab-on-grade structure constructed in 1908. The bridge provides a service road access to the lock. The structure also serves as a stop log dam to dewater the intake to the power dam. The Headrace Dam Bridge is not a cultural resource (NCR, formerly known as “Other Cultural Resource”, Cultural Resource Inventory, 1994-95, rev. Nov. 2015).

Background information is being made available in Annex AA, as reference material only.

1.3.2.1 Existing Structure, Conditions and Constraints

- a) Crowe Bay Dam 11 is a 160m long structure that includes five mechanical sluices, a concrete overflow component and associated retaining walls and abutments.
- b) The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. CRM advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.
- c) The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.
- d) The overflow component is in poor condition due to concrete deterioration.

- e) The DSR for this site identified a deficiency with respect to discharge capacity at this site. The DSR recognized that increasing capacity at the site by the installation of additional vertical gates would reduce risks with respect to discharge capacity.

1.3.2.2 Scope of the Work

Scope of work will include the comprehensive rehabilitation of the dam, lock and associated structures at Crowe Bay. Work will also include the conversion of the overflow spillway of the dam into mechanical gates in order to reduce the risks of overtopping to a level as low as possible given site characteristics and downstream dam capacities.

A summary of the scope is as follows:

Increase the discharge capacity of the dam by replacing the overflow spillway with mechanized gates. The design of the gates shall include measures to mitigate oxygen concentrations and changes to flow patterns compared to current flow patterns and O₂ levels in order to protect and enhance fish habitat in the downstream reaches. The design shall also account for potential accumulation of sediment at all upstream sides of dams and potential effects on the operation of the mechanized gates.

Construction of new Retaining Wall Downstream of the Dam will achieve the objective to protect against shoreline erosion by extending the concrete pier wall downstream to mitigate erosion concerns. Furthermore, to provide support to the embankment fill to reduce loss of supporting fill material in the rare event of embankment over toping due to severe flood.

Modification of Embankment to resist overtopping:

- i) Modification of lock embankment and walls between lock 14 and the river to resist Inflow Design Flood (IDF) overflow conditions to a reasonable level;
- ii) The anticipated measures could entail:
 - o Rehabilitation or modification of upstream west approach walls and lock walls to resist overtopping at IDF elevations;
 - o Construction of new retaining wall downstream of dam along lock embankment.
 - o Construction of a short cutoff wall from just downstream of the lower lock gate to tie into the new retaining wall downstream of the dam;
 - o Construction of a cut off wall from the left downstream lower lock gate to the power plant;
 - o Design of new slope protection to tolerate overtopping and contain backfill material during overtopping.

Lock 14 rehabilitation and repairs:

- i) Carry out concrete repairs or other works to improve overall asset conditions to good;
- ii) This scope component will entail additional assessment of concrete conditions through inspection, coring and testing and development of rehabilitation options. It is anticipated that this work will including concrete refacing and crack repairs;
- iii) Scope to include repair of sluice tunnels, shafts and mechanical systems as required.

Repair of upstream and downstream approach walls:

- i) The DSR identified isolated deficiencies to both the upstream and downstream approach walls. The objective is to repair or rehabilitate these walls to improve their condition to good and extend their service life beyond 25 years. It is not envisioned that these walls would be demolished and reconstructed.

Public Safety Measures:

- i) Public safety and operator enhancements are to be based on CDA Guidelines and PCA practice and standards;
- ii) The dam deck is currently open to the public with the exception of the operation equipment that is isolated by guardrails. This general arrangement will be maintained for the rehabilitated structure and public safety measures must be designed for this accommodation. The measures will include but are not necessarily limited to:
 - o Installation of permanent (considering ice loads) safety boom upstream of the dam. Boom positioning will be constrained by existing private homes upstream of dam and will have to terminate at PCA property;
 - o Upgrade of signs throughout dam using PCA templates including signs to public to stay out of operation area of the dam;
 - o Installation of post mounted audible alarm on dam to warn public of water discharge due to gate operation ;
 - o Conversion of downstream guardrail along deck and ends of dam to a public access standard;
 - o Installation of gate at operation deck entrance to restrict public access to gate mechanics and upstream side of dam;
 - o Modification of gate at dam deck to allow pedestrian access but prevent unauthorized vehicle access;
 - o Installation of new vehicle gates to prevent public vehicles entering access lane;
 - o Installation of handrails and fencing along new tailrace wall due to fall hazard.

Installation of a back-up power generator with uninterrupted power supply controls integrated into all dam control systems to provide automatic backup power for gate operations and gate heaters in the event of power outages.

Headrace Bridge Evaluation and Repairs:

- i) Perform a visual inspection of bridge deck, superstructure, and piers including under water components to confirm results of 2012 inspection;
- ii) Propose required repairs and upgrades to meet requirements as a site access bridge and improve condition rating from poor to good;
- iii) This single lane headrace bridge is used for pedestrian and service vehicle access to the lock. Public vehicle access not permitted;
- iv) This bridge will likely be used as part of the construction site access plan;
- v) The scope of work for this component to entail:
 - o Inspection of bridge deck, bridge piers (underwater) and bridge super structure;
 - o A structural analysis to determine the load classification for the structure;
 - o Propose repairs, if required, to allow use of bridge at full highway loading during construction and after project;
 - o Piers will require repair, however the aim is to undertake any required pier repairs without de-watering using tremie concrete.

Automation of dam gates:

- i) Automation of dam gates to reduce risk associated with sudden shutdown of power plant.
 - o The required infrastructure and logic control are existing onsite. A modification is required to make the connection between the vertical gate control and the station Programmable Logic Controller (PLC). This automation plan will require agreement and cooperation with the power plant operator;

- ii) Gate automation processes will need to incorporate warning sirens and incremental gradual gate opening so the public has adequate time to move from the hazard area;
- iii) A training wall along the most east sluice to protect the public from the new automated gate outflows should also be considered.

Minor repairs to existing mechanical gate pilasters and the deteriorated vertical gate pilasters above the deck are required.

1.4 Description of Sites (Designed under this Project Brief)

The Prime Consultant will be required to provide all services detailed under all Project Phases including: Requirement Analysis; Design Concept; Design Development; Construction Documents; Tender; Construction and Post Construction for the eight (8) sites (A, B, C, D, E, F, G and J) as defined herein.

1.4.1 Site A: Dam 1 at Lock 1 Reconstruction and Lock 1 Rehabilitation, Trenton

The site is located on the Trent River in the City of Quinte West (Trenton), Ontario, about 750m south of Highway 401. The downstream reach of the Trent River extends 2.8 km through the core of the City of Quinte West to its outlet in the Bay of Quinte. The dam can be accessed either via the lock lower east side approach walls or via the Trenton Water Treatment Plant, which accessible via Sydney St. and Chester Rd. (44° 07' 13" N and 77° 35' 23" W).

Lock 1 lock station can be accessed via Trent-Frankford Road (Hwy 33) on the west shore of the river. The Dam #1 and Lock # 1 (including canal cut) are cultural resources of "Other Heritage Value" (formerly known as Level II cultural resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). They exemplify a form of water management technology used on the Trent-Severn Waterway. Their heritage value resides in their historic associations, the integrity of their surviving design and construction qualities and their environmental setting.

Built in 1912 Dam 1 is a mass-concrete gravity structure founded on bedrock. The 222m structure spans across the Trent River with both ends of the dam abutting onto Parks Canada property. Although, PCA owns a large parcel of land along the east shore of the river, only a small segment of this parcel of land extends to the dam. The west end of the dam abuts onto a narrow island / embankment.

A DSR completed in 2015, concluded that the dam had a Hazard classification of Significant. As such, the dam must be capable of passing an inflow design flood (IDF) of one in 1,000-year flood, which for this site is a design flow of 1,750 cms and be capable of withstanding an earthquake (DBE) one in 1,000-year.

The DSR and an inspection of Lock no. 1 Lower Canal Entrance Walls and Downstream Breakwater revealed that the lock structure and its approach walls and lower canal walls are in various states of deterioration which need to be addressed.

PCA is presently considering an application by a private sector firm to install a hydroelectric generating plant at the East end of the Dam under a permit from Ontario's Independent Electricity System (OIES). Presently feasibility, concept designs and environmental reviews are being carried out by the private sector firm. The design of the new dam will include bypass gates to accommodate a low-head turbines generating plant. It is anticipated that the private power company will engage their own design consultant for the power plants and bypass gate design. There will be a requirement for the Prime Consultant of the main dam to coordinate with the design consultant hired by the private power company.

Background information is being made available in Annex AA, as reference material only.

1.4.1.1 Existing Structure, Conditions and Constraints

- a) The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. CRM advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.
- b) The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.
- c) Dam 1
 - i) The dam is a 222 meters long structure and is between 6.5 to 8.5 meters in height. 168m of the dam is the spillway structure, which is equipped with eighteen 7.62m wide stop log bays to control the upstream water of the Trent River. A 40.5m and 13.5m concrete retaining structures at either sides of the spillway structure extends the dam into the east and west river banks respectively.
 - ii) Out of the 18 bays, 10 bays accommodate nine (9) stoplogs and 8 bays accommodate twelve (12) stoplogs. All stoplogs are 0.3 m high by 0.35 m wide (12" x 14") timbers. Stop log adjustment/manipulation is achieved by means of a motorized hydraulic log lifter that moves from one bay to the other. Under normal operations only bay 4 through bay 14 operated.
 - iii) There is a 70m long training located on the west upstream side of the dam. The training wall is thought to be on bedrock and have an approximate height of 3.6m.
 - iv) Major concerns with prolonged use of the existing structure and associated mechanical equipment are:
 - Age of the concrete structure;
 - Aging equipment with questionable reliability;
 - Ongoing deterioration of the concrete structure with the presence of the alkali silicate reactivity;
 - Concerns with overall structural stability due to the condition of the structure;
 - Risk associated with access to and operation of the dam due to concerns with overtopping.
 - v) Known critical habitat for Channel Darter and Rainbow Mussel. All design options must maintain flow and habitat conditions during all phases of the project. The impact of design options on the channel darter spawning bed downstream of the current dam and of other aquatic habitat from dam to approx. 200m south (downstream) and 50m north (upstream) must be evaluated. Assessment to include current, velocity and depths during and post construction compared to current conditions. Fisheries habitat assessment to be provided by PCA.
- d) Lock 1 and, Upstream and Downstream Lock Approach Walls
 - i) Lock 1, built in 1911, is a 74.4 m long concrete structure, with a 53.5 m long by 10.1 m wide and 9.1 m deep lock chamber, equipped with timber mitre gates

spanning between concrete monoliths located at both upstream and downstream end of the chamber.

- ii) The upper gates are manually operated with a gear system while the lower gates have been retrofitted with hydraulic cylinders.
- iii) The filling and discharge of the lock chamber are controlled by a side port culverts-to-chamber manifold with control valves. The existing hydro-mechanical equipment consists of the original 1911 manual operating system.
- iv) The lock is operated during navigational season, from the May Victoria Day long weekend through the Thanksgiving weekend in October, and is closed during the winter period. When closed to operation, the lock chamber is filled with water.
- v) The upstream entrance to the lock is consist of:
 - 42m approach bullnose wall, with 77m total length of wall, on the east side;
 - 102m approach wall on the west side;
 - Both of the walls are gravity retaining wall founded on bedrock with an approx. height of 3 to 3.5m.
- vi) The downstream entrance to the lock consists of the section of wall between the lock lower lock structure and the canal walls which are located at the canal widening on the west side of the rail bridge abutments and consist of:
 - Approx. 130m walls on both side of the lock entrance;
 - Archive drawings suggest that the walls are approximately 1.5m thick, 4.5m in height and are cast directly ovetop and against the vertical face of the canal rock cut. Limited construction details are available.
- vii) Downstream east and west retaining, including the railway bridge abutments.
- viii) Inspection results identified many of the deficiencies associated with the lock structure which in general terms are:
 - Upstream approach walls have significant spalling and deteriorated/damaged concrete at the waterline;
 - Upper gate monoliths have minor spalling and deteriorated concrete;
 - Lock tunnels and valve pits have minor spalling and deteriorating concrete;
 - Lock chamber walls have spalling and deteriorated concrete of varying degree;
 - Downstream gate monoliths have large cracks, significant leaks and general deterioration;
 - Downstream approach walls have significant spalling and deteriorated/damaged concrete at the waterline. Sections of the walls that have experienced rotational and linear movements;
 - Downstream east retaining wall has significant spalling, cracking, delamination and deteriorated concrete wall, while the downstream west retaining wall has minor deteriorated concrete;

- Rail bridge abutments surfaces are showing signs of spalling and surface deterioration.
- e) Lower Lock Canal Walls
- i) The lower lock canal walls are the concrete shoreline walls starting where the canal widens on the west side of the rail bridge abutments and they consist of:
 - 530 m wall on the east of the canal;
 - 540 m wall on the west side of the canal;
 - Wall heights are between 3m to 4.5m from the top of the wall to the canal bottom.
 - The walls are approximately 1.2m thick and built directly against and anchored to the limestone bedrock. Limited information on the construction of these walls. Rehabilitation work done in the 1970's included some reinforced resurfacing of sections of walls together with anchorage of the walls into the limestone bedrock. Area behind both wall sloped embankment formed overburden from the construction of the canal.
 - ii) Based on Lock no. 1 Lower Canal Entrance Walls and Downstream Breakwater inspection report, concrete deterioration (erosion and undermining of varying significance) was observed along the waterline of the walls. There is rotational and linear movement of Canal Wall sections inwards towards the canal at the expansion joints. In addition, East Canal Wall sections and the West Canal Wall sections have experienced movement.

1.4.1.2 Scope of the Work

A DSR for Dam 1 and Lock 1, as well as a Trent Watershed Hydrotechnical Study have been conducted, and the reports dated March 2015 and September 2010 respectively, will be made available to the Prime Consultant.

The following are some high level design constraints:

- a) PCA does not own much land on the downstream on the east shore; as such the option of relocating the dam further downstream or upstream could be limited.
- b) The location of the water intake of the Trenton Water Treatment Plant may restrict the options for a location of the new structure. Furthermore, the water intake may impact the temporary dewatering works which could be required to allow for the construction to happen in the dry. Temporary relocations of these water intakes may need to be considered.
- c) Rehabilitation/new dam construction needs to account for the future hydro generating plant.
- d) The existing Bell cable which presently crosses the site must be maintained and protected at all times.
- e) Construction sequencing/phasing needs to take into consideration existing flow through the dam. Existing flows must be maintained, and allow for appropriate allowance for spring freshet. The lock structure cannot be used to pass river flows.
- f) Depending on the Environmental Impact Assessment (EIA) results, the project area could have the following Species at Risk considerations:

- Critical Habitat for Channel Darter (threatened) and Eastern Musk turtle (threatened)
 - Additional SAR: River Redhorse (Special Concern), Sturgeon (not SARA listed-Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Threatened). American Eel (Threatened), Eastern Pond mussel (Endangered) has been found south of the dam near the rail crossing. Potential for Butternut (Endangered).
- g) Navigation through the lock must be maintained during the navigation season.
- h) PCA access to the dam has to be maintained at all times.
- i) Water levels upstream of the dam must be maintained at all times for navigation and water treatment plant intake.
- j) Land access to the dam is limited to the east shore through the Trenton Water Treatment Plant property.
- k) Land access for construction work on the lock and associated works is limited to the west shore through PCA property.
- l) Due to limited land owned by PCA on either side of the river, arrangement to acquire/lease additional land for the construction staging/material storage/stockpiling will need to be made.
- m) It is anticipated that the northern section of the parcel of land that is owned by PCA along the east shoreline is contaminated and the use of this land could be restricted.

The design of Dam 1 is to account for the following site-specific items:

- A new hydro power generating station to be integrated into a new dam is being independently designed by the future private owner/operator. The station and associated structures will be abutting the East shoreline of Trent River, and will be located in line with Parks Canada portion of the new dam complex. Investigate providing a structural separation between the hydro power generating structure and the Parks Canada dam structure, such that either one can be repaired or replaced in the future without affecting the operation of the other. Ensure appropriate compatibility of the project with planned hydro power generation initiatives;
- Design the replacement dam with adequate number of mechanized radial gate sluices of standardized width to allow discharge of IDF flow without overtopping. The remainder of the dam's available length between the West embankment and the power generating station on the East side is to be designed as one or several separate sections of fixed or adjustable-level overflow spillways. Locations of these spillways will be dictated by the results of Environmental Impact Assessment study being conducted. The design of the gates shall include measures to mitigate oxygen concentrations and changes to flow patterns compared to current flow patterns and O₂ levels in order to protect and enhance fish habitat in the downstream reaches. The design shall also account for potential accumulation of sediment at all upstream sides of dams and potential effects on the operation of the mechanized gates;
- West upstream approach wall is to be replaced, or if possible fully rehabilitated through concrete refacing and extended to the new dam location. Standard guardrails are to be installed on full length of this wall. West downstream shoreline is to be stabilized and adequately protected against future erosion;

- East side approach and training walls will be designed and constructed by the private power generating company, as and if required;
- Provide 600VAC 3-phase power supply in addition to 240VAC & 120VAC. Locate backup power generator and Control House on land on the East side, and ensure no interference with the private power generating company's initiatives. Re-locate the Bell cable passing along the current dam's deck onto the replacement dam. Design an audible dam operation alarm system and informative alarm signage upstream and downstream of dam;
- Visitor access deck is to additionally incorporate two enlarged observation areas, and is to tie into the future pedestrian trails on the West side of the dam;
- Fencing around the site is to feature both a vehicle access gate and a pedestrian access gate. Fencing using conventional chain link material is inadequate for this site due to vandalism – investigate and design a more resilient solution, which is aesthetically acceptable and does not diminish the landscape heritage values of this site.
- Mitigation barriers for Asian carp may be required at Lower Lock Canal Walls as compensation/offsetting for DFO.

Rehabilitation of Lock 1 and other associated structures. Conduct adequate and appropriate investigations, studies, cost and options analyses to determine the most effective, efficient, heritage value preserving and environmentally responsible means of fully rehabilitating Lock 1, its components and all associated upper and lower approach walls, the lower entrance canal walls, and ensuring the resulting time-to-first-major-repair of 50 years. Design the selected restoration/repair/replacement and protection measures.

In close cooperation with the Construction Manager and PWGSC conduct all stages of design from Project Analysis to preparation of Construction Documents. Provide all necessary technical assistance during and post construction, including but not limited to: participation in meetings; technical clarifications and interpretations; review of shop drawings, of contractor's designs, and of all other submissions; periodic site visits to determine on adequate sampling basis whether construction is in conformity with construction documents and with the design intent; reviews of tests conducted by all parties; preparation of As-Built Record Drawings.

The design of dam replacement and lock rehabilitation shall additionally account for various improvements listed in the Expected Outcome and Deliverables section below:

- A new mechanized gravity dam and associated structures and equipment, which comply with PCA and Canadian Dam Association requirements, are able to pass the prescribed IDF flow without overtopping the dam or adjacent grade, and result in minimized asset maintenance requirements, safe and functional operation, with a service life of 80 – 100 years.
- A fully rehabilitated lock system and associated structures, which comply with PCA and Canadian Dam Association requirements, and result in minimized asset maintenance requirements, safe and functional operation, with a service life of 80 – 100 years, with time-to-first-major-repair of 50 years minimum following the completion of construction work.

Demolition and removal of existing dam and associated structures from site, and construction of new replacement dam with radial gate system and overflow spillways, associated structures, and necessary mechanical/electrical/controls equipment and systems, are to be all in

accordance with the construction documents. Demolition and removal of portions of existing lock, lock mechanisms and equipment, and of associated structures, and construction of corresponding repairs, concrete refacing and replacements.

New vehicular/maintenance/visitor dam deck suitable for access by the Client Department's maintenance vehicles with bed-mounted crane or by mobile cranes capable of lifting and transporting a radial gate off the dam for maintenance (or by a construction crane during construction). Channel, lock and dam embankments and approach/training walls deterioration issues fully resolved, including erosion repair, implementation of mitigation measures, concrete repairs/replacements and possible extension of some walls. Construction staging to deliver work on time with no interruption to navigation, and no interference with the construction of the new, privately owned generating station. Implementation of all mitigation measures to be undertaken pre and during construction, as specified in the final Environmental Impact Assessment (EIA) Report. Design and implementation of a complete water management plan during construction and erosion and sediment control plan, including flow diversion channel if required. Design, installation and removal of cofferdams and all other temporary works. Improvements to operator and public safety and security including: necessary utility power supply to the dam, automated and manual operation/control systems for gates, standardized signalization and signage, remote alarm system, steel service stoplogs, new safety boom system designed for ice loads upstream of dam, standardized guard rails on dam and lock/channel walls, and fencing around the dam site with gated vehicle and pedestrian access. Reinstatement of existing Bell cable on new dam. Complete site and landscaping restoration and improvements.

Salvage and preserve the existing log lifter at Dam 1 for the Client Department's use at other sites. Relocation will be undertaken by Parks Canada.

Provision of operator and maintenance training programme as part of commissioning, along with Operation and Maintenance (O&M) manuals.

1.4.2 Site B: Glen Miller Dam 3 at Lock 3 Rehabilitation

Glen Miller Dam 3 is a concrete gravity dam built in 1910 and partially rehabilitated in 1943. Dam 3 is operated to maintain prescribed water level ranges during the navigation period on the TSW. During the non-navigation season stoplogs are stripped from the structure. The Dam #3, Lock # 3 (including canal cut +C140) and the landscape are cultural resources of "Other Heritage Value" (formerly known as Level II cultural resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). They exemplify a form of water management technology used on the Trent-Severn Waterway. Their heritage value resides in their historic associations, the integrity of their surviving design and construction qualities and their environmental setting. Also, the site has potential archaeological resources in the project area that are of "Other Heritage Value" (Find spot +C24).

Dam 3 is considered to be in poor condition. There is major deterioration of the deck segments along with deterioration of the piers and abutments. The abutments were repaired in 1943 and are now deteriorating to the point where the above-water portion of the piers is again in need of major repair and possibly replacement.

There has been progressive erosion of the Lock 3 embankment shoreline downstream of an existing concrete toe wall. Erosion has resulted in loss of embankment fill and surficial slope instability. Toe protection exists for a portion of the reach that appears to have been put in to arrest slope failure in the area downstream from where the Sonoco Dam abuts the embankment. That portion of the embankment slope appears to have stabilized but the remaining portion of the reach continues to actively erode. A slope stability analysis for this

portion indicated that the present face is unstable and will likely experience localized failures that could remove the fill from the river side of the Lock. The original lock embankment material was a shattered limestone fill constructed from material excavated during lock construction – see historical photos.

A DSR report dated December 2015 with recommendations to address deficiencies as they relate to the Parks Canada Directive for Dam Safety will be made available to the Prime Consultant.

Background information is being made available in Annex AA, as reference material only.

1.4.2.1 Existing Structure, Conditions and Constraints

The concrete dam has a total length of approximately 158 m and consists of ten (10) stoplog weirs with nine (9) logs per weir, and four (4) stoplog weirs with twelve (12) logs per weir, operated with an Atlas Polar log lifter. The dam has a total height of approximately 7.5 m (from record drawings) and retains a reservoir height of approximately 6.28 m. Dam 3 has the hydraulic capacity to pass up to 98% of the 1000 year flood at 1707 cms prior to overtopping embankments which is within the parameters of a Significant Hazard Protection Classification and is considered acceptable from a risk perspective especially given the fact that the dam is stripped of all logs in the fall and not operated until the opening of the canal in May.

Work in and around water will rely on Contractor's water management especially during the spring freshet period to maintain required flows. Water levels and water flow is affected by seasonal rain, accumulation of snow and rate of snow melt. Water levels and water flow to be managed to prevent flooding and allow safe navigation.

Level of effort for winter construction will depend on variable weather conditions.

New dam could be replaced in two or three separate stages of construction, with part of the river channel possibly acting as a diversion channel. A temporary flow bypass channel is also a possibility.

Access to Dam is limited due to its location, limited Parks Canada land ownership at the site, and the adjacent canal Channel and Lock. The size of staging/storage areas will be limited.

Periods for in-water work are restricted to protect spawning beds and Species At Risk (SAR), and the type of work in and around water is regulated to protect the environment.

Navigation season and passage of vessels through the channel and lock cannot be interrupted by work on the Dam from Mid-May to Mid-October. If used, temporary bridges across the lock channel are to be removed each year for the duration of the navigation season.

The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. Cultural Resource Management (CRM) advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.

The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.

1.4.2.2 Scope of Work

Design Goals and Scope:

The reconstructed or rehabilitated dam shall have a new vehicular access deck designed for full highway loading prescribed in the CSA S6-14 Code for Ontario trucks. Rehabilitation option for the structure will also require upstream extension of existing dam piers and abutments to accommodate the new wider vehicular deck and to add upstream service gains to all sluices enabling future maintenance and repairs to be conducted in the dry. Replacement option is to be an in-kind replacement; with the new dam featuring current log lifter operated stoplog gate system, as well as upstream and downstream service gains.

Undertake adequate and appropriate geotechnical investigations of existing concrete elements of the dam and of the founding bedrock to ascertain the feasibility of rehabilitating the existing dam by cutting back and then re-facing all concrete piers, spillways, abutments and wing walls. Confirm downstream and upstream bedrock elevations and suitability for construction of a new dam (D/S) or extending existing piers (U/S). Verify stability of rehabilitated dam with a new vehicular deck and longer piers and abutments by investigating the stability of these elements acting without a monolithic connection to the adjacent spillway sections. Prepare detailed topographical and bathymetric surveys of Parks Canada property(ies).

During the Design Concept stage and if rehabilitation is a feasible option, conduct a comprehensive and detailed comparative Options Analysis of long-term durability, construction costs (assuming existing dam used as upstream coffer dam for new dam structure), construction time, and maintenance/repair costs for a 75-year post-construction period, all resulting from both Option 1 Rehabilitation of Dam, and Option 2 New Dam Construction. Client's decision on implementing either Option 1 or 2 will be made following the presentation of Options Analysis by Prime Consultant.

The design of dam replacement or rehabilitation shall additionally account for various improvements listed in the Expected Outcome and Deliverables section below.

Conduct adequate and appropriate investigations, studies, cost and options analyses to determine the most effective, efficient, heritage value preserving and environmentally responsible means of repairing, and ensuring future protection, of the currently eroding river-side Lock 3 embankment shoreline located between the existing Sunoco Dam's east abutment and the embankment's downstream end. Present the embankment options and cost analyses results to the Client for decision making. Design the selected restoration/repair and protection measures.

In close cooperation with the Construction Manager and PWGSC conduct all stages of design from Project Analysis to preparation of Construction Documents. Provide all necessary technical assistance during and post construction, including but not limited to: participation in meetings; technical clarifications and interpretations; review of shop drawings, of contractor's designs, and of all other submissions; periodic site visits to determine on adequate sampling basis whether construction is in conformity with construction documents and with the design intent; reviews of tests conducted by all parties; preparation of As-Built Record Drawings.

Expected Outcome and Construction Deliverables:

A new or fully rehabilitated, non-mechanized gravity dam and associated structures, as well as west embankment of the navigation channel and lock downstream of Sunoco Dam, which comply with PCA and Canadian Dam Association requirements, or as much as possible able to pass the prescribed IDF flow, and result in minimized asset maintenance requirements, safe

and functional operation, and 100-year minimum Service Life with time-to-first-major-repair with a service life of 80 – 100 years.

Scope of work:

a) Specific to dam rehabilitation option:

Demolition, removal and replacement of existing dam deck over rehabilitated and extended dam piers comprising new upstream service gains. Rehabilitation of all concrete components of the existing dam by cutting back and refacing existing concrete surfaces. All in accordance with the construction documents.

b) Specific to dam replacement option:

Demolition and removal of existing dam and associated structures from site, and construction of new replacement dam, structures, necessary electrical/controls equipment and systems, all in accordance with the construction documents.

c) Common to both options:

New vehicular/maintenance/visitor dam deck suitable for access by Client's maintenance vehicle with bed-mounted crane (or by a construction crane during construction). Channel and lock embankment and approach/training walls deterioration issues resolved, including erosion repair, implementation of mitigation measures and possible extension of walls. Construction staging to deliver work on time with no interruption to navigation. Implementation of all mitigation measures to be undertaken pre and during construction, as specified in the final Environmental Impact Assessment Report. Design and implementation of a complete water management plan during construction, including flow diversion channel if required. Design, installation and removal of cofferdams and all other temporary works. Improvements to operator and public safety and security including: necessary utility power supply to the dam, standardized signalization and signage, new rail system for existing log lifter, new lightweight gain covers, new safety boom system designed for ice loads upstream of dam, standardized guard rails on dam and both abutments, new vehicle and pedestrian approaches to dam, and fencing around the dam site with gated vehicle access. Complete site and landscaping restoration and improvements.

1.4.3 Site C: Frankford Dam 6 at Lock 6 Rehabilitation

The principal objective of this work-package is to reduce risk of dam failure to a level as low as reasonably possible with respect to discharge capacity deficiencies identified in the DSR for Frankford Dam 06.

Secondary objectives include operator and public safety upgrades.

The Frankford Dam and Lock 6 are located on Trent River in the Town of Frankford, Ontario and are part of the Trent-Severn Waterway. The dam and lock serve to provide navigation along the Waterway, and are owned and operated by the Trent-Severn Waterway (TSW) of PCA. The dam also controls water levels for the generating station.

Frankford Dam is a concrete gravity dam built in 1912 and has ten 7.62 m wide sluices with vertical steel roller gates, installed in 1994, and a 25 m wide concrete spillway. Lock 6 is a concrete gravity structure and was built in 1912 and is located approximately 1.2 km downstream of the Frankford Dam. The entrance to the channel upstream of Lock 6 is equipped

with a guard gate which is currently not operational. The Lock #6 (including canal cut and emergency dam) is a cultural resource of “Other Heritage Value” (formerly known as Level II cultural resource, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). It exemplifies a form of water management technology used on the Trent-Severn Waterway. Its heritage value resides in its historic associations, the integrity of its surviving design and construction qualities and its environmental setting. Also, the site has potential archaeological resources in the project area that are of “Other Heritage Value”. The Dam #6 is not a cultural resource (NCR, formerly known as Other cultural resource, Cultural Resource Inventory, 1994-95, rev. Nov. 2015).

The DSR for Dam 06 classified this dam as a High B consequence structure with an Inflow Design Flood (IDF) 51% of the way between the 1000-year flood and the Probable Maximum Flood (PMF) corresponding to 3,480 m³/s.

Based on the traditional standards based approach there is a significant discharge deficiency at Frankford Dam. Given the site characteristic, capacity of upstream dams, and channel characteristics this dramatic increase in Frankford Dam hydraulic capacity would be challenging and likely not reasonable. Before making decisions on increasing discharge capacity, a risk based study should be implemented in order to develop a strategy with respect to discharge capacity at this site. The risk based approach generally could use the principle of mitigating risk as low as reasonably possible (ALARP) which is an accepted approach for dam safety management.

Background information is being made available in Annex AA, as reference material only.

1.4.3.1 Existing Structures, Conditions and Constraints

The Frankford Dam comprises from west to east:

- West Embankment / Abutment - Consists of a 250 m long earth embankment with a concrete core wall, from Sill's Island GS to the West Abutment of the dam;
- eight (8) 7.62 m wide concrete sluiceways (west end);
- a 25 m wide concrete spillway;
- a concrete Pivot section;
- two (2) 7.62 wide concrete sluiceways (east end); and
- a left (east) abutment that includes a 13 m long concrete retaining wall with an earth embankment on the downstream side.

The West (Right) Embankment was constructed as an earthfill section with a concrete core wall. The concrete core wall is approximately 5.6 m high and has a base width of 1.5 m and a top width of 0.6 m. The wall appears to be founded on bedrock based on the background information. The top of the concrete core wall is at El. 110.44 m. The crest elevation of the embankment was surveyed and ranged between El. 110.85 and El.110.94 m and has a crest width of approximately 2.8 m. The embankment is approximately 180 m long and up to 5.1 m high on the downstream side.

In May 2015 a DSR was completed. In accordance with the PCA Directive, the dam was determined to have a HIGH B Hazard Classification both for the Sunny Day and Flood breach conditions. The Inflow Design Flood (IDF) was determined to be a flood 51% of the way between the 1,000-Year Flood and the PMF corresponding to 3,480 m³/s.

The mechanical equipment at the Frankford Dam consists of ten vertical steel roller gates equipped with electric hoists. Each gate has stoplog gains located upstream for de-watering and maintenance. The steel roller gates were installed in 1994. Gates 1, 2, and 7 to 10 are 2750 mm high, while gates 3 to 6 are 3970 mm high. All 10 hoists are identical. Gates are internally heated and have downstream enclosures and internal circulation fans. There are three gain heaters on each side of the gate, one upstream and two downstream of the gate. The backup drive for the gates are manual cranks or a portable gasoline-powered motor with hydraulic actuator. A backup generator was recently installed at the site. Rails are provided on the deck to provide for movement of a pair of log winches for installing and removing logs when the sluice gates require service.

The electrical system with the Frankford dam consists of a power distribution system that includes a motor control centre (MCC) line up, pad mounted transformer, and power distribution panel. A gate hoist panel for each unit which contains the hoist motor and its associated accessories. This hoist panel is located adjacent to each gate. There is a Hoist Motor Control station for each gate. Power and Control cables supply electrical power to the electrical equipment. There is Level control instrumentation for level monitoring. The AC power for the sluice gate operation is supplied by an AC 600V distribution system consisting of a Motor Control Centre (MCC), and a power distribution panel and a pad mounted transformer. The incoming power for the MCC is taken from the Hydro One overhead distribution system and feeds to the Motor Control Centre through a 75kVA 4.8 kV/600V-347V pad mounted transformer located near the control building. The complete MCC line up consists of modules which supply power to the hoist, gate heaters and gain heaters of each gate. Each gate has a hoist motor panel adjacent to each gate which consists of a 2HP, 1725 RPM, 60 Hz, 575V three phase induction motor. The control voltage for the brake system operation is from 120V AC power and the brakes can be engaged and disengaged manually.

The Retaining Wall and East Abutment of the dam is in good condition with some fine cracking and associated calcite deposits evident.

The deck of the East end gate sluices was in good condition apart from failed sealant in the deck joints. In 1994, the piers of these gate sluices were refaced with 150 mm layer of concrete. There is some cracking and associated calcite deposits on the lower downstream side faces of the piers but they are generally in good condition.

The Pivot Section was in good condition apart from failure of joint sealant. The wall appears to have been refaced on the upstream exposure. Downstream of the pivot bulkhead there are two walls with rock infill that are both in good condition.

The Spillway deck and support pilasters are in good condition apart from failure of the joint sealant. The downstream rollway is generally in good condition although there is a section where a Polyvinylchloride (PVC) waterstop has failed and is exposed with vegetation present in the joint.

The deck of the West Gate Sluices (numbers 3 to 10) are in good condition. In 1994, the piers of these gate sluices were refaced with 150 mm layer of concrete. The piers and rollway are in good condition.

West Abutment: On the west abutment, there are areas where the concrete appears to have had parging repairs applied but the wall is generally in good condition. The concrete wall upstream of the abutment is in good condition with some minor areas of deterioration.

The West (Right) Embankment was constructed as an earthfill section with a concrete core wall. The concrete core wall is approximately 5.6 m high and has a base width of 1.5 m and a top

width of 0.6 m. The wall appears to be founded on bedrock based on the background information. The top of the concrete core wall is at El. 110.44 m. The crest elevation of the embankment was surveyed and ranged between El. 110.85 and El. 110.94 m and has a crest width of approximately 2.8 m. The embankment is approximately 180 m long and up to 5.1 m high on the downstream side. This embankment was found to be generally in fair condition geotechnically. However, the concrete core wall of the upstream slope of the embankment was locally exposed for a length of approximately 4 m. At this location there was some localized erosion and shallow sloughing of the upper portion of the slope.

The guard gate section, the rotating bridge structure and the gate handling machine were visually inspected and found to be in very poor condition. The system has apparently not been used or maintained for many years, with the possible exception of the gate sections, which are stored within a compartment in the bridge structure.

The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. CRM advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.

The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.

1.4.3.2 Scope of the Work

The full scope and requirements will be developed during the investigation and design process, however, the general scope and secondary objective will entail:

- a) Conduct a study to establish the most optimal solution to address the lack of discharge capacity at the Frankford Dam, which is less than what is required to pass the inflow design flood (IDF). The risk based approach generally could use the principle of mitigating risk as low as reasonably possible (ALARP) which is an accepted approach for dam safety management. The report is to outline recommended measures to reduce risk of dam failure related to discharge deficiencies to a level as low as reasonable possible. Measures to be investigated include:
 - Review of DSR report and additional interpretation to confirm the consequence and IDF of the dam. This may give a lower IDF and reduce discharge deficiencies approximated in the DSR;
 - Conversion of the existing concrete overflow spillway to vertical mechanical gates to increase discharge capacity
 - Modification of the concrete core west embankment, or section of the embankment, to function as an overflow emergency spillway
 - Installation of a new guard gate to replace the non-operating guard gate system and modification of east dam abutment and embankments to isolate the canal embankments from extreme floods and reduce risk.
- b) Option study to identify measures to reduce risk as low as reasonably possible to address discharge capacity deficiencies with recommendation of preferred option or combination of options based on cost, ease of design and construction, and other factors such as property ownership and environment. This will be a critical milestone decision point prior to commencing design;
- c) Implementation of design and construction of selected option to reduce risk;

- d) Modification of backup power generator to power new gates and heaters in event of power disruption;
- e) Installation of public style guards on upstream and downstream side of dam deck as the dam will remain open to the public;
- f) Install dam safety boom upstream of dam in place of existing suspended cable. Design for full year use including ice loads; and
- g) Improve public safety measures at the dam including Installation of new Parks Canada dam safety signs at the site and other measures identified by the PCA public safety officer.

1.4.4 Site D: Meyers Dam 8 at Lock 9 Rehabilitation

The Meyers Dam 8 was built in 1913 as a concrete dam and originally had fourteen stop log sluices. The original three sluices at the east (left, referenced looking downstream) end of the dam are now used as the intakes to the Ontario Power Generation (OPG) generating station and are under the control of OPG. Currently in operation, there are four stoplog sluices and seven sluices with vertical steel roller gates that were installed in 1990. The Lock # 9 and the landscape are cultural resources of "Other Heritage Value" (formerly known as Level II cultural resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). They exemplify a form of water management technology used on the Trent-Severn Waterway. Their heritage value resides in their historic associations, the integrity of their surviving design and construction qualities and their environmental setting. The Dam #8 is not a cultural resource (NCR, formerly known as Other Cultural Resource, Cultural Resource Inventory, 1994-95, rev. Nov. 2015).

In March 2016 a DSR was completed. In accordance with the PCA Directive, the dam was determined to have a HIGH A Hazard Classification. The Inflow Design Flood (IDF) was determined to be a flood 44% of the way between the 1,000-Year Flood and the PMF corresponding to 1,610m³/s. This value is based on a rough estimate of the split of the flows downstream of the Hagues Reach Dam and could be refined with more detailed analyses and modelling. Such refinement could be warranted within the context of addressing spill deficiency at the Meyers Dam.

The estimated forebay level during passage of the IDF, assuming all sluiceways are open and no dam break, is at the crest of the concrete dam, 0.4 m above the crest of the west embankment and 0.5 m above the crest of the east embankment. Both these embankments have a concrete wall face; however, the 950 m long west embankment wall would be less susceptible to overtopping damage due to the topography along this wall and embankment.

The DSR recommended addressing the discharge capacity deficiency using a risk based approach. Examining the discharge capacity chart, it is evident that mechanizing the stop log sluices and considering the west wall/embankment as an emergency spillway, while protecting the east embankment, would be prudent and an effective measure to improve dam safety at the site.

1.4.4.1 Existing Structures, Conditions and Constraints

Meyers Dam consists of a concrete sluiceway with eleven sluices, four of which are manually operated stoplogs sluices. Three of the stoplog sluices are at the west end of the dam and the fourth stoplog sluice is at the east end, adjacent to the powerhouse. The dam is tied into the west river bank by man-made earth and rock embankments and forms a contiguous concrete retaining structure with the adjacent lock. The two main earthfill structures associated with water retaining components of Meyers Dam include the West (Right) and East (Left) Earthfill Embankments located upstream of the dam. The mechanical equipment at the Meyers Dam

consists of seven vertical steel roller gates equipped with electric hoists. All seven hoists are identical. The steel roller gates were installed in 1990 and fit into the 6,096 mm wide sluices. The gates in sluices 5, 6, and 7 are 3070 mm high, while gates in sluices 8 to 11 are 3980 mm high. The gates are internally heated and have downstream enclosures and internal circulation fans. There are three gain heaters on each gate, one on the upstream side and two on the downstream side. A portable backup drive is stored on site for the sluice gates and uses a gasoline-powered motor with a hydraulic actuator. A backup generator was recently installed at the dam. The dam abuts the east retaining wall that extends 100 m from the generating station to the west upper lock approach wall and consists of a concrete retaining wall with an earthfill embankment. Each gate has stoplog gains located upstream for de-watering and maintenance.

The electrical system with the Meyers dam consists of a power distribution system that includes a motor control centre (MCC), 347/600V, 3 phase 4 wire service system powered from a transformer at a hydro one pole. A gate hoist panel for each unit contains the hoist motor and its associated accessories. The hoist panel is located adjacent to each gate. There are Hoist Motor Control stations for each gate and power and control cables supply electrical power to the electrical equipment and level control instrumentation for level monitoring. The AC power for the sluice gate operation is supplied by an AC 600V distribution system consisting of a MCC and power distribution panels. The incoming power for the MCC is taken from the Hydro One overhead distribution system and feeds to the MCC through a pole mounted transformer, which is located near the control building. The complete MCC line up consists of modules which supply power to the hoist of each gate, gate heaters and gain heaters. Each gate has a hoist motor panel adjacent to each gate which consists of a 2HP, 1725 RPM, 60 Hz, 575V three phase induction motor. The brake control voltage is provided from 120V AC power and the brakes can be engaged and disengaged manually.

Condition assessment proves that the dam deck and piers are in generally good condition, and were refaced during the 1990 rehabilitation project. The rollway was not clearly visible as it was under water but where visible it appears to be in good condition. The concrete and steel decks are in good condition as are the upstream and downstream handrails along the deck. The apron is in good condition except for one section downstream where there are exposed reinforcing bars. There is cracking evident on the surface of the concrete and white deposits along the cracks; probably calcite but this is not of current concern. The apron was generally not visible but in those areas that were visible, there was an area of cracked concrete and some spalling was noted immediately downstream of one of the piers.

The West Earthfill Embankment was constructed of an earthfill section with a concrete retaining wall on the upstream side. The concrete gravity retaining wall is approximately 4.6 m high and has a base width of 2.5 m and a top width of 0.9 m. The wall appears to be founded on bedrock based on the background information. The top of the concrete retaining wall is at El. 125.10± m based on the 2013 topographical survey completed by PWGSC. The concrete retaining wall is tied into the Right Abutment of Meyers Dam structure at the south end and the north end wall blended well into the existing ground surface. The crest elevation of the embankment adjacent to the concrete retaining wall was surveyed and ranged between El. 124.70 m and El. 125.00 m and has a crest width of approximately 5.0 m. The embankment is approximately 950 m long and up to 4.1 m high on the downstream (dry) side. The downstream slope of the embankment is at approximately 2H:1V, based on the topographic survey. The west upstream retaining wall is in generally good condition with some freeze/thaw spalling observed. All associated handrails and fencing are in good condition.

The East Earthfill Embankment consists of an earthfill section with a concrete retaining wall on upstream side. The embankment is approximately 100 m long and up to 7.2 m high on the

downstream slope. The upper and lower slopes of the downstream embankment are at approximately 1.8H:1V and 1.6H:1V, respectively. The concrete retaining wall is tied into the Left Abutment of Meyers Dam structure and into Lock 9 wall at the east end. The crest of the East Earthfill Embankment provides access to the Powerhouse and Lock 9. The downstream slope of the embankment contains a relatively flat bench at the mid slope area and provides for a granular surface access road to the switchyard of the Powerhouse. The section of the earthfill embankment that was surveyed is approximately 40 m east from the Left Abutment of the spillway structure. The concrete retaining wall is up to 11 m high and has a base width of 5.8 m and a top width of 0.9 m. The wall is founded on bedrock based on the background information and 2014 geotechnical investigation. The top of the concrete retaining wall and crest of the embankment was surveyed to be at El.125.02 m±, with a crest width of 4 m±. At the surveyed section, the crest elevation of the flat bench at the mid slope area ranged between El.122.82 m± to El.123.04 m± and has a crest width of 5 m±. An approximately 500 mm high Rubble Random Masonry Wall is located below the mid-slope bench. Condition assessment proves that the retaining wall to the east of the OPG powerhouse is generally in good condition at its east end where it abuts the canal upstream (west) wall but towards its western end the top and edges of the wall are suffering from freeze/thaw cycle. The concrete is spalled along the joints and there is vegetation growth in the joints.

The lock itself is a concrete structure. Upstream and downstream of the lock there are concrete walls lining the lock embankments. At the downstream end of the lock there are concrete bulkheads and staircases to the lower level downstream of the lock. There are two earthfill structures associated with the Lock 9 structure, including the Right and Left Lock Wall Earthfill Embankments. These embankments are located on both sides of the concrete lock walls and extend downstream to the channel. The lock chamber walls are in very good condition. There are some minor horizontal fine cracks that appear to be tight. Approximately 150 mm above the low water level on both walls there is an open horizontal joint (or fracture) but there is no concrete deterioration along this joint. The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. CRM advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.

The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.

1.4.4.2 Scope of the Work

The main objective will be to convert four non-operable stop log sluices into mechanized vertical gates in order to improve operational effectiveness at Dam 08 with respect to water management. Modifications will also be undertaken at the site to direct extreme flood flows over the 950 m long west concrete wall that will serve as an emergency spillway in order protect more vulnerable components of the dam. This modification includes increasing the crest elevation of the 100 m long east concrete wall to match the dam deck elevation of 125.50 m an approximate 0.48 m increase.

The elevation of the right upstream approach wall will also be increased to 125.50 m for portion of its run coupled with landscape modification to prevent flow over this embankment.

Secondary objectives include the modification of backup power generator to power gate hoist systems and heaters in the event of power disruption, and other operator and public safety upgrades.

In summary the scope of work will include the following:

- a) Meyers Dam
 - i) Mechanization of four stop log sluices using vertical steel roller gates;
 - ii) New mechanized sluices to incorporate upstream services gains;
 - iii) Repair and modify sills and piers as required in sluices where new mechanized gates are to be installed;
 - iv) Modify or replace portion of deck where new steel gates will be installed;
 - v) Install galvanized gain covers in place of existing suspended stop logs at service gains;
 - vi) Modify backup power generator to power gates and heaters in event of power supply interruption; Include separate building to house the generator;
 - vii) Incorporate new electrical work into existing operating system. Modify existing control building as needed to incorporate the new electrical system;
 - viii) Replace cable trays as needed to feed power to all new mechanized sluices;
 - ix) Install public style guards along upstream and downstream side of dam deck;
 - x) Install upgraded Parks Canada dam safety signs throughout site.
- b) West (Right) Earthfill Embankment of Meyers Dam
 - i) Provide modification as needed so that the Embankment can safely act as an emergency spillway under extreme flood conditions.
- c) East (Left) Earthfill Embankment of Meyers Dam and Right Approach Wall
 - i) Repair and increase elevation of east wall and portion of right approach walls by 0.4 m (Elevation 125.5 m);
 - ii) Additional landscaping and modification as required to achieve this objective of directing extreme floods over west Embankment.
- d) Anticipated Studies: The following investigations and reports are required in order to quantify the project scope and design requirements prior to the design phase:
 - i) Assessment of flow characteristic changes to support environmental impact assessment due to the installation of four new sluice gates.

1.4.5 Site E: Dam 9 at Lock 10 Hagues Reach Rehabilitation

Hagues Reach Dam 9 is located on the Trent River and is part of the Trent Severn Waterway. The dam is approximately 3 km south of the town of Campbellford, Ontario. The dam and lock serve to provide navigation along the Waterway and the dam also controls water levels for the OPG power generation station located 320 m south of the dam. The Lock #10, Dam #9 (70% original form and fabric) and the landscape are cultural resources of "Other Heritage Value" (formerly known as Level II cultural resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). They exemplify a form of water management technology used on the Trent-Severn

Waterway. Their heritage value resides in their historic associations, the integrity of their surviving design and construction qualities and their environmental setting.

OPG owns and operates Hagues Reach Generating Station just south of the dam, with access from the main road via a bridge over Lock 10, just downstream of the gates.

1.4.5.1 Existing Structures, Conditions and Constraints

Hagues Reach Dam was originally built in 1915 with fifteen 6096 mm wide stoplog sluices. The concrete dam has a total length of 117 m and the outflow has been divided between two channels by a 'river' wall immediately downstream of the dam.

The west (right) channel bypasses Meyers Dam and joins the Trent River downstream of Meyers Dam. The east (left) channel outflow, the Hagues Reach GS dam outflow, and the lock all discharge into the main channel, upstream of Meyers Dam. The west and east outflows originally consisted of eight and seven stoplog sluices, respectively. The six west most sluices were demolished in 1973 and replaced with two 15.24 m wide radial-arm gates. OPG owns and operates Hagues Reach GS just south of the dam, with access from the main road via a bridge over Lock 10, just downstream of the gates. There were no drawings / records available that indicated any repair work has been done to the dam since 1973. The aerial view of the general layout of the dam and surrounding area is attached in the annex.

The outflow of Hagues Reach Dam has been divided into two channels. The west channel comprises of two 15 m wide gate controlled sluices and two 6.096 m wide stoplog sluices. The east channel comprises seven 6.096 m wide stoplog sluices. The East Retaining Wall / Earthfill Embankment runs between the east abutment of the dam and the nearby OPG Hagues Reach GS. The south end of the east retaining wall transitions to a gravity section. There are three main earthfill structures associated with the dam and canal. These include the west (right) abutment and embankment adjacent to the Hagues Reach Dam, earthfill embankment located between Hagues Reach Dam and Hagues Reach GS, and the west (right) canal earthfill embankment located on the west side of the canal between the generating station and Lock 10.

In December 2015 a DSR was completed. In accordance with the PCA Directive, the dam was determined to have a HIGH A Hazard Classification for sunny day failure and High B for flood conditions. The Inflow Design Flood (IDF) was determined to be a flood 69% of the way between the 1,000-Year Flood and the PMF corresponding to 3,690 cms.

The West Earthfill Embankment was constructed of an earthfill section with a concrete retaining wall on the upstream side. The concrete retaining wall is up to 4.1 m high and has a base width of 1.2 m and a top width of 0.9 m. The wall is founded on bedrock based on the background information. The elevation at the top of the concrete retaining wall is at El. 132.4. The crest elevation of the embankment adjacent to the concrete retaining wall is at El. 132.40±, with a crest width ranging from approximately 6.0 to 9.0 m. The embankment is approximately 32 m long and up to 4.1 m high on the downstream side, with a downstream slope of approximately 2H:1V. Based on the visual inspection the West Earthfill Embankment was generally in good condition with the exception of the dense vegetation cover. There were no visible slope movements, erosion or seepage that would suggest significant concerns related to the slope stability and performance of the structures.

The East Earthfill Embankment extends from the east side of Hagues Reach Dam downstream to the Hagues Reach Generating Station. The East Earthfill Embankment consists of an earthfill section with a concrete retaining wall on the upstream side. The upstream concrete retaining wall is up to 4.8 m high and has a base width of 2.4 m and a top width of 0.8 m. The wall is founded on bedrock based on the background information. The elevation at the top of the

concrete retaining wall ranged between El.132.33 and El. 132.55 m. The crest elevation of the embankment adjacent to the concrete retaining wall is approximately El.132.22. An approximately 50 m long concrete retaining wall is located at the toe of the downstream slope extending from the Hagues Reach Dam downstream. The embankment is approximately 300 m long and up to 6 m high on the downstream slope.

The conditional assessment shows that the tree and vegetation cover was dense at a number of locations, particularly on the crest, the downstream (dry side) slope, and at the toe of the slope, which impeded the visual inspection. Based on the visual inspection, the East Earthfill Embankment was generally in fair to good condition with the exception of significant seepage that was observed at some areas at the downstream toe and the dense vegetation cover. There were no observed visual slope movements or erosion that would suggest significant concerns related to the slope stability and performance of the structures.

Hagues Reach Dam is a concrete gravity dam originally built in 1915 with fifteen 6096 mm wide stoplog sluices. The concrete dam has a total length of 117 m and the outflow has been divided between two channels by a 'river' wall immediately downstream of the dam. The west (right) channel bypasses Meyers Dam and joins the Trent River downstream of Meyers Dam. The east (left) channel outflow, the Hagues Reach GS dam outflow, and the lock all discharge into the main channel, upstream of Meyers Dam. The west and east outflows originally consisted of eight and seven stoplog sluices, respectively. The six west most sluices were demolished in 1973 and replaced with two 15.24 m wide radial-arm gates. The mechanical equipment at the Hagues Reach Dam consists of two radial arm gates equipped with electric hoists, eight stoplog sluices operated with an Atlas Polar log lifter, and one sluice operated with manual winches. The AC power for the sluice gate operation is supplied by a 600V AC distribution system, which includes the power and control circuits for the operation of the gates. The incoming power for this power distribution is obtained from the adjacent OPG Hagues Reach GS. The incoming power cable is routed through conduit up to Pier 2 to supply the power distribution panels. The circular gains on each side of each gate have two heaters each. OPG owns a back-up generator that is used to operate the gates in the event of a power failure. In general, the concrete elements of the dam are in good condition. The concrete piers appear to generally be in good condition although there is surface crazing with associated white calcite deposits. Where the water visibility permitted, the conditions of the concrete observed with an underwater camera below the water line appeared to be consistent with that observed above the water. The "river" wall downstream of the dam is in poor condition.

The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. CRM advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.

The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.

1.4.5.2 Scope of the Work

The scope of work involves converting nine stop log sluices into mechanized vertical gates in order to improve operational effectiveness at Dam 09 with respect to water management. Sill elevations will be modified to increase the discharge capacity at the site so that it nominally exceed s1,400 cms prior to overtopping embankments.

Modifications will also be undertaken at the site so the east retaining wall and west retaining wall can tolerate overtopping during extreme flood emergencies. Scope will also include construction of an access bridge upstream of the radial gates to permit maintenance vehicle access to the new mechanical gates and deck.

In summary the scope of work will include the following:

- a) Converting nine stop log sluices (sluices no. 7 to no.15) into mechanized vertical gates at Dam 09;
- b) As part of the conversion sill elevations will be modified to increase the discharge capacity at the site so that it nominally exceed 1,400 cubic meters per second (cms) prior to overtopping embankments;
- c) Re-profile and lower sills and modify piers as required in new sluices to facilitate gate installation and achieve enhanced discharge capacity;
- d) New mechanized sluices to incorporate services gains;
- e) Construct new deck at vertical gate sluices to permit service vehicle access and a pedestrian corridor;
- f) Construction of an access bridge upstream of the radial gates to permit maintenance vehicle access to the new mechanical gates and deck;
- g) Modifications to the east retaining wall and west retaining wall so that they can withstand overtopping during extreme flood situations;
- h) Reconstruct river wall that is in poor condition;
- i) Install backup power generator to power nine new vertical gates and heaters in event of power disruption. Note that radial gates currently have a back-up electrical system;
- j) Installation of public style guards on upstream and downstream side of dam deck as the dam will remain open to the public (excluding radial gate section);
- k) Install dam safety boom upstream of dam. Design for full year use including ice loads; and Improve public safety measures at the dam including installation of new Parks Canada dam safety signs at the site, gain covers, and other measures to improve public safety at site in accordance with CDA Guidelines and PCA Public safety designs templates;
- l) Engineering Study: Assessment of flow characteristic changes to support environmental impact assessment due to converting nine stop log operated sluices to mechanized vertical lift gates.

1.4.6 Site F: Ranney Falls Locks 11 and 12 – Lock Gate and Valve Rehabilitation

The Ranney Falls Locks 11 and 12 are the first of two flight locks on the Trent-Severn Waterway. Locks 11 and 12 are located in the south end of the community of Campbellford in the Municipality of Trent Hills, Northumberland County. The Lock #11 (including canal cut) and #12 are cultural resources of “Other Heritage Value” (formerly known as Level II cultural resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). They exemplify a form of water management technology used on the Trent-Severn Waterway. Their heritage value resides in their historic associations, the integrity of their surviving design and construction qualities and their environmental setting. Also, the site has archaeological resources in the project area that are of “Other Heritage Value”.

The Locks were built in 1912 and the chamber walls and gate monolith structures are concrete gravity retaining walls founded on bedrock. The lock chamber valves of Locks 11 and 12 are the original design from 1912 and have been repaired over the years.

Background information is being made available in Annex AA, as reference material only.

1.4.6.1 Existing Structures, Conditions and Constraints

The Locks and gate monolith structures are concrete gravity retaining walls. The lock chamber valves of Locks 11 and 12 require major rehabilitation or replacement. Failures of these valves, at this location, have occurred which impacted navigation and visitor experience. Both the lower gates at lock 11 and 12 are steel. The lock gate gudgeon anchors (gate hinges) of the lower gates on Lock 11 and 12, are in need of replacement as a result of failures of similar anchors at the Sault Ste. Marie lock and two failures at this location. The gate anchors have proven to be defective and the anchors for the much larger Sault Ste. Marie gates have been redesigned and replaced. One hinge failed in 2007, and again the same hinge failed at a different point (most likely due to stresses caused by the first failure and time). The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. CRM advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.

The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.

1.4.6.2 Scope of the Work

The main objective to rehabilitate/replace the existing valves of Lock 11 and 12, as well as replace the gate hinges on the lower gates at Lock 11 and 12 to satisfy the requirements of Parks Canada and improve the condition of the assets from poor to good with an extended service life of 80-100 years.

The scope will include the replacement of the six existing valves for Lock 11 and 12 with new valves and the associated works related to the installation. At Ranney Falls there are 6 centrifugal valves that need to be replaced with either the same design, or a new valve design system. Scope will also include removal of existing gate hinges from the lower steel gates of Lock 11 and 12 and replacement with new as well as localized concrete repair and/or concrete design changes to anchor the new hinges into place. The lock gate gudgeon anchors (gate hinges) of the lower gates on Lock 11 and 12 will also be replaced.

1.4.7 Site G: Dam 10 at Lock 11 and 12 Ranney Falls Rehabilitation

Ranney Falls Dam is a concrete gravity dam built in 1925 and completely reconstructed in 1980. The concrete dam has a total length of 70 m and consists of six, 10 m wide, gate controlled sluices. The gates are vertical steel roller gates (installed in 1980) and each gate is operated by an electric motor with a backup hand crank, which drives two drum hoists. Gate heaters are also installed at each sluice. The Ranney Falls Dam #10 is not a cultural resource (NCR, formerly known as Other Heritage Value, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). However, the site has potential archaeological resources (timber slide, Dam ruins) in the project area that are of "Other Heritage Value".

A portable gasoline driven hydraulic motor, that drives the hydraulic system, is available as a backup in the event of a power failure. A backup generator was recently installed at the site. A maintenance gain is located directly upstream of each gate. A crane lifting from the road bridge is required to place the stop logs in the maintenance gains. The bridge is not owned by Parks Canada. The dam has a total height of approximately 10.82 m (top of downstream apron to top of deck) and retains a reservoir height of approximately 9.15m. The original dam constructed in 1925 more sluices than the 1980 construction.

1.4.7.1 Existing Structures, Conditions and Constraints

Ranney Falls Dam is a concrete gravity and has a total length of 70 m with six (6) 10 m wide, gate controlled sluices. The gates are vertical steel roller gates and are operated by an electric motor with a backup hand crank.

In March 2016 a DSR was completed. In accordance with the PCA Directive, the dam was determined to have a HIGH A Hazard Classification both for the Sunny Day and Flood breach conditions. The Inflow Design Flood (IDF) for Ranney Falls Dam was determined to be a flood 33% of the way between the 1,000-Year Flood and the PMF corresponding to 2,600 m³/s.

Based on the standards based approach there is a discharge deficiency at Ranney Falls Dam. An option study was conducted at Crowe Bay dam to determine a reasonable discharge capacity given site characteristics. Based on this study the reasonable discharge capacity increase at Ranney Falls Dam 10 was established.

The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. CRM advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.

The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.

1.4.7.2 Scope of the Work

The principal objective of this project is to increase discharge capacity at Ranney Falls Dam 10 in order to reduce risk associated with hydraulic capacity to reasonable level taking into account system capacities, site constraints, and proposed by-pass developments at an adjacent dam. Secondary objectives include public safety and operational enhancements, and other repairs.

Hydraulic Capacity Objectives: This High A consequence dam can currently pass 1,000 cms before embankments start to overtop. This 1,000 cms capacity has a return period of less than 500 years. Using the standards based approach this High A dam would have a discharge capacity requirement of 2,600 cms. Based on the standards based approach there is a discharge deficiency at Ranney Falls Dam. To satisfy the standards based IDF, the discharge capacity at Ranney Falls Dam would have to be increased substantially and is not considered feasible at the site nor reasonable considering system effects such Crowe Bay Dam. An option study was conducted at Crowe Bay dam to determine a reasonable discharge capacity given site characteristics. Based on this study the reasonable discharge capacity increase at Ranney Falls Dam 10 was established.

Crowe Bay Dam 12 is a governing upstream discharge structure. This dam will be enhanced under a separate project to increase its discharge capacity to an approximate 650 year return

period. Therefore Ranney Falls Dam 10 will require a discharge capacity of approximately 1400 cms which will nominally exceed Crowe Bays Dam's enhanced capacity.

An OPG initiative to construct a by-pass system as part of a hydro power project will increase capacity at the site by 172cms. Therefore this project will need to increase capacity by approximately 228 cms.

To increase the hydraulic capacity various options need to be explored to achieve the desired increase in capacity either separately or cumulatively. These options in preference are:

- 1) Modification of dam deck elevation and/or underside elevation of fully open gates that would eliminate these constrictions and allow greater discharge.
- 2) Lowering of sills and modification of gates to increase capacity. The new sills would have to be at an elevation above surrounding channel to prevent debris movement onto the sill.
- 3) Construction of a new auxiliary or emergency by-pass spillway with gate around the east abutment of the dam with a bridge for vehicle passage.
- 4) Construction of auxiliary or emergency spillway with gate at other area on the river reach from dam downstream to the locks. This option would only be considered if the other options prove to be infeasible.

The full construction scope and requirements will be developed during the design process, however, the general scope and secondary objective will entail:

- a) Option study to evaluate the preferred options with recommendation or preferred option or combination of options based on cost, ease of design and construction, and other factors such as property ownership and environment. This will be a critical milestone decision point prior to commencing design;
- b) Implementation of design and construction of selected option to increase capacity;
- c) Modification of backup power generator to power modified gates and heaters in event of power disruption;
- d) Reassess stability of rollway sluice component and if required develop stabilization measures such as adding concrete mass (preferred) or anchors (secondary preference) to address stability deficiencies identified in DSR;
- e) Extend erosion protection downstream of east wall to protect roadway embankment;
- f) Install dam safety boom upstream of dam in place of existing suspended cable. Design for full year use including ice loads; and
- g) Improve public safety measures at the dam including installation of new Parks Canada dam safety signs at the site. These public safety measures may also include additional signs in the tail race area subject to sudden changes in flow and installation of post mounted sirens for warning downstream visitors of flow adjustments.

1.4.8 Site J: Southern Sector Concrete Repairs

1.4.8.1 Healey Falls Locks 15, 16, 17

The Healey Falls Locks 15, 16 and 17 are located 11 km north of the City of Campbellford, Ontario on the Trent River, approximately 1.3 km east of County Road 50, adjacent to Canal

Road within Northumberland County. The Locks were built in 1916 and the chamber walls and gate monolith structures are concrete gravity retaining walls founded on bedrock.

The canal walls of Lock 16 and 17 are currently in poor condition & require significant repairs to ensure that the lock can remain in service to provide through navigation without creating undo risk to boaters. The general condition of the walls and floor are showing extensive signs of deterioration, with cracks showing efflorescence staining throughout.

The lock chamber valves of Locks 16 and 17 are the original design from 1916 and while they have been repaired over the years, major rehabilitation or replacement is required. Failures of these types of valves, at Ranney Falls, have occurred which impacted navigation and visitor experience. The Healey Falls Locks 15 (including walls and turning basin), 16 and 17, and the landscape are cultural resources of “Other Heritage Value” (formerly known as Level II cultural resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). They exemplify a form of water management technology used on the Trent-Severn Waterway. Their heritage value resides in their historic associations, the integrity of their surviving design and construction qualities and their environmental setting. Also, the site has potential archaeological resources (potentially of national significance) in the area that are of “Other Heritage Value”.

1.4.8.1.1 Existing Structures, Conditions and Constraints

The lock gate gudgeon anchors (gate hinges) are in need of replacement as a result of failures of similar anchors at the Sault Ste. Marie lock and two failures on the Trent- Severn, which utilized the same design. The design of the gate anchors has proven to be defective and the anchors for the much larger Sault Ste. Marie gates have been redesigned and replaced. Similar design changes to lock 16 and 17 gates are recommended.

The existing downstream gate of Lock 16 is constructed of wood, and based on DSR recommendations on similar size gates, the timbers of the gates are not able to withstand the pressures imposed on them & should be replaced with larger timbers or a new steel design.

The intake chamber and tunnel walls of Lock 15 are also in need of rehabilitation as found during the 2014-15 rehabilitation of the canal walls. Due to schedule and contractor constraints, they could not be added into the scope of that project and the work was delayed until the Lock 16/17 project was tendered. The deterioration is such that the gaps between the trash racks and the walls around them are large enough to allow the debris to pass into the chambers.

The existing Lock control building at Lock 17 is aging and does not satisfy the accessibility requirements which Parks Canada is implementing. Due to this, as well as building deterioration, PCA is considering replacement of the building as part of a future project.

The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. CRM advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.

The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.

1.4.8.1.2 Scope of the Work

The primary objective of this project is to recapitalize the lock structure of Lock 16, 17 and the remaining portion of Lock 15, by repairing the concrete walls, tunnels, chambers, coping and assessing the condition of the supporting concrete.

Secondary objective is to rehabilitate/replace the existing valves of Lock 16 and 17; replace the gate hinges on the lower gates at Lock 17; replace the downstream gates of Lock 16 with new steel gates, complete with the new hinge detail; and repairs to intake chamber walls and concrete of Lock 15 not completed in the previous project.

A third related objective being considered by Parks Canada is the future replacement of the existing Lock 16/17 Control building, with a new building that will meet the needs of the Operational and Maintenance Requirements as well as address any accessibility issues for the public. The building scope has not yet been developed or funded and is for consideration in facilitating design of the lock rehabilitation for compatibility with this future potential project.

The general construction scope of work is as follows:

- a) Recapitalize the lock walls of Lock 16 and 17 including the chambers, coping and floor as necessary;
- b) Completely replace the existing valves for Lock 16 and 17 with new valves and the associated work related to the installation. This work may include an investigation or comparison of implementing new valve systems at this location;
- c) Remove existing lower lock 17 gate hinges, and replace with new design previously approved for implementation;
- d) Removal of the downstream wood gates of Lock 16 and install the newly designed steel gates, complete with the new hinge design, and commission;
- e) Removal & replacement of concrete, etc. of the intake chamber and tunnel walls of Lock 15 and reinstating or replacing the trash racks.

It should be noted that the Valve and Hinge design work is to be coordinated with the Ranney Falls Lock Hinge and Valve project. Similar system and design for all these locks are a requirement.

1.4.8.2 Hagues Reach Lock 10 and Canal Walls Concrete Rehabilitation

The Hagues Reach Lock 10 is located on the Trent River and are part of the Trent-Severn Waterway. The lock serves to provide navigation along the Waterway. The lock is approximately 4 km south of the town of Campbellford, Ontario. The Lock #10 and the landscape are cultural resources of "Other Heritage Value" (formerly known as Level II cultural resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). They exemplify a form of water management technology used on the Trent-Severn Waterway. Their heritage value resides in their historic associations, the integrity of their surviving design and construction qualities and their environmental setting.

Lock 10, built in 1913, is a concrete gravity structure with two stacked-timber mitre-type gates. The lock gates 1 & 2 and gates 3 & 4 were modified to be operated hydraulically in the 1970's and 2005, respectively, and the hydraulically operated filling and discharge valves 1 & 3 were automated in 2005.

1.4.8.2.1 Existing Structures, Conditions and Constraints

The lock walls are generally in good condition. Minor map cracking and associated white deposits (likely to be calcite but possibly alkali-aggregate reaction gel) were noted. A minor spall was present on the west wall. Repairs to these minor deficiencies would be needed in order to extend the service life of the lock. The condition of concrete in tunnels and valve pits is not known. Required repairs to these components of the lock will be identified during the project investigations.

The downstream monoliths are in fair condition. There is extensive cracking of the concrete with associated calcite deposits. Some cracks are hairline but there are some that are wider. It needs to be investigated that rehabilitation of the downstream monolith will be a standard cut back and recast rehabilitation. The concrete walls downstream of the lock have suffered extensive spalling and erosion, particularly in the area downstream of the lock bulkheads. There is water line erosion in a number of areas. Comprehensive rehabilitation of these walls will be required. The linear limit of repairs will need to be qualified during the investigation process.

A structural assessment of the downstream stacked timber gates was undertaken as part of a DSR in 2015. The bottom timbers have deficiencies related to their structural capacities based on the current wood design code and the assumed grade of timber. The DSR provided the following recommendations to address the deficiency: accept the non-compliance and monitor only; modify the gate design with respect to timber size after a more detailed analysis; or replace the timber gate with a steel gate. The preferred solution may be to replace the lower timber gates with steel gates.

The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. CRM advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.

The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.

1.4.8.2.2 Scope of the Work

The primary objective of this project is to recapitalize the lock structure of Lock 10 by a comprehensive concrete rehabilitation of downstream monoliths and lower approach walls. It is anticipated that that this could be a standard cut back and recast rehabilitation typical for Locks on the TSW. The project also entails the replacement of the lower timber lock gates with new steel gates.

Secondary objective is isolated concrete repairs to chamber walls and tunnels, inspection, coring and testing as required to quantify scope and develop rehabilitation and repair options.

Scope definition will require dewatering of lock chamber by contractor to facilitate inspection, testing and scope definition

1.4.8.3 Percy Reach Lock 8 Concrete Repairs

The Percy Reach Lock 8 is located on the Trent River and is part of the Trent-Severn Waterway. The lock serves to provide navigation along the Waterway. The lock is located about 20km south of the town of Campbellford, Ontario. Lock 08, built in 1913, is a concrete gravity structure with two stacked-timber mitre-type gates. In 1971 a major shotcrete rehabilitation of

the lock and approach walls was undertaken. The Lock #8 and the landscape are cultural resources of “Other Heritage Value” (formerly known as Level II cultural resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). They exemplify a form of water management technology used on the Trent-Severn Waterway. Their heritage value resides in their historic associations, the integrity of their surviving design and construction qualities and their environmental setting. Also, the site has potential archaeological resources (potentially of national significance) in the area that are of “Other Heritage Value”.

1.4.8.3.1 Existing Structures, Conditions and Constraints

The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. CRM advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.

The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.

Note: There have not been recent inspections of this lock. The following scope may need to be defined during the inspection process.

1.4.8.3.2 Scope of the Work

The primary objective of this project is to recapitalize the lock structure of Lock 08 by a comprehensive concrete rehabilitation of downstream monoliths. It is anticipated that that this will be a standard cut back and recast rehabilitation typical for Locks on the TSW. The project also entails the replacement of the lower timber lock gates with new steel gates. Secondary objective is concrete repairs within the valve pits as required. Scope definition will require dewatering of lock chamber by contractor to facilitate inspection, testing and scope definition.

1.4.8.4 Meyers Lock 9 Concrete Repairs

The Meyers Reach Lock 9 is located on the Trent River and is part of the Trent-Severn Waterway. The lock serves to provide navigation along the Waterway. The lock is located south of the town of Campbellford, Ontario.

Lock 9, built in 1913, is a concrete gravity structure with two stacked-timber mitre-type gates. A concrete rehabilitation project was undertaken on the lock chamber walls in 1967. The Lock #9 and the landscape are cultural resources of “Other Heritage Value” (formerly known as Level II cultural resources, Cultural Resource Inventory, 1994-95, rev. Nov. 2015). They exemplify a form of water management technology used on the Trent-Severn Waterway. Their heritage value resides in their historic associations, the integrity of their surviving design and construction qualities and their environmental setting.

Lock 9 has two sets of filling and discharge valves set in shafts in the concrete walls of the lock. The set of valves on the east side of the lock are hydraulically operated, while the valves on the west side of the lock are manually operated and rarely used. Each gate leaf is actuated by a horizontal pinion/gear train mounted on a steel frame. Each gear train is driven by a manual crank mechanism with two selectable gear ratios. Lock valves #2, #3, and #4 are of the vertical wagon type and are original to the lock, with #3 having been converted to hydraulic power. Lock valve #1 was replaced in the fall of 2010 with a new style guillotine valve and is hydraulically powered.

1.4.8.4.1 Existing Structures, Conditions and Constraints

The canal walls upstream of the lock are in to good condition and are not included in the project scope. The east (left) upstream wall is in good condition along approximately 60% of its length. Towards the upstream end of the wall (the painted section) there is freeze/thaw deterioration and spalling of the concrete. Some fine vertical cracks with calcite deposits are present. Repairs will be limited to the deteriorated section with the goal of extending its service life.

The lock walls are generally in good condition. Concrete rehabilitation was undertaken on these walls in 1967. The lock walls are not included in the project scope. There are areas of poor concrete condition in the valve pits. The scope includes repair of these components to extend service life. Extent of repairs to be based on inspection.

The downstream monoliths are in fair to poor condition. There is extensive map cracking of the concrete on the east bulkhead. On the west bulkhead there is also extensive map cracking of the concrete. On the west abutment there is some concrete spalling at the construction joint below the concrete cap and at the base of the monolith. A potential spall was observed at the interface with the staircase. The rehabilitation of the downstream monolith could be a standard cut back and recast rehabilitation.

The east (left) downstream wall has suffered extensive freeze/thaw deterioration in a number of areas. The upstream and downstream ends of the wall remain in good condition. There is deterioration at joints and vegetation growth was observed in these joints. Rehabilitation of these walls is included in the scope.

The west (right) downstream wall is deteriorated due to freeze/thaw cycle effects from approximately the mid-point of the wall to the downstream end of the wall. Upstream of this, the concrete is in fair condition. Rehabilitation of this wall is included in the scope. The extent of linear repairs will be identified in the inspection process.

A structural assessment of the downstream stacked timber gates was undertaken as part of a DSR in 2015. The bottom timbers have deficiencies related to their structural capacities based on the current wood design code and the assumed grade of timber. It was recommended to address the deficiency: accept the non-compliance and monitor only; modify the gate design with respect to timber size after a more detailed analysis; or replace the timber gate with a steel gate. The preference would be to replace the lower timber gates with steel gates.

The cultural resource management constraints for the site will be addressed in the Cultural Resource Impact Analysis (CRIA) to evaluate the impacts of the proposed projects on the heritage value and character-defining elements of the cultural resources. CRM advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.

The archeological constraints for the entire site, including access routes, will be addressed in the Archeological Impact Assessment Report (AIA), which may require archeological fieldwork prior to and during construction.

1.4.8.4.2 Scope of the Work

The primary objective of this project is to recapitalize the lock structure of Lock 09 by a comprehensive concrete rehabilitation of downstream monoliths. It is anticipated that this will be a standard cut back and recast rehabilitation typical for Locks on the TSW. The project also entails the replacement of the lower timber lock gates with new steel gates.

Secondary objective is isolated concrete repairs to deteriorated sections of the upstream and downstream approach walls and concrete repairs within the valve pits.

Scope definition will require dewatering of lock chamber by contractor to facilitate inspection, testing and scope definition.

1.5 Stakeholders

The Prime Project Stakeholders include representatives from the following organizations:

- Parks Canada Agency (PCA) - Client Department / User – Project Leader
- PWGSC - Real Property Branch - Project Manager

Other Stakeholders may include as a minimum:

- Ontario Ministry of Natural Resources and Forestry (OMNRF);
- Ontario Power Generation (OPG);
- Peterborough Utilities Inc. (PUI)
- Other power generators;
- Local municipalities;
- Fisheries and Oceans Canada (DFO);
- First Nations;
- Conservation Authorities;
- Public; and
- Impacted commercial enterprises.

PCA is to be the lead when contacting other authorities having jurisdiction.

1.6 Project Objectives

1.6.1 Design Principals

The Project is to be designed and constructed to maintain a high standard of work based on state-of-the-art principles and practices compliant with PWGSC and PCA standards while respecting the heritage values and character-defining elements of each site. All design activities are to be fully coordinated resulting in cost and time effective services and successful completion of the project.

Project cost effectiveness is to be based on total life cycle analysis including construction, operation and maintenance costs for a minimum 80 to 100 years operational period.

The project is to be implemented in an environmentally responsible manner using recognized strategies to minimize the environmental impact of the Work. See 1.6.4.

1.6.2 Project Objectives

The objective of this project is to rehabilitate the specified infrastructure within the Cultural Resource Management process to meet the requirements of the Parks Canada Directive for Dam Safety; with a service life of 80 – 100 years for the new or rehabilitated structures as effectively as possible, with minimal impact on waterway operations, wildlife, the public including waterway users and neighbouring properties, and continued support of affected communities and municipalities.

1.6.3 Cultural Resource Management

For the rehabilitation of the cultural resources located in the southern sector of the Trent-Severn Waterway National Historic Site, a Cultural Resource Impact Analysis (CRIA) will be required.

The CRIA is now a component of the Agency's Project Management Standard and must be considered as part of each project. A CRIA is a process to study and determine the impact of the proposed projects on the heritage value and character-defining elements of a resource and to recommend an overall approach to the conservation of the heritage resources. Cultural resource management (CRM) advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.

The proposed projects involve dams, locks, landscapes and archeological sites that are cultural resources of "Other Heritage Value". These assets are cultural resources of other heritage value because they exemplify a form of transportation and water management technology used on the Trent-Severn Waterway National Historic Site. More specifically they contribute to the working assemblage and functional arrangement of engineering structures that make the TSW an operational system of through-navigation. The sites are part of the functional arrangements, landscapes and engineering works of various form and material that are cultural resources on the Trent-Severn Waterway, which together demonstrate the evolution of engineering construction and standard materials on the Waterway.

The engineering structures and landscapes on the Trent-Severn Waterway that are cultural resources of other heritage value are valued for:

- their historic association with Canada's national canal system, the evolutionary construction and operation of the Waterway and, aspects of local/community development;
- their design and/or functional qualities including the integrity of their original form, fabric and function; and
- their environmental qualities which include landmark status and the integrity of the historic character of the landscape.

The character-defining elements contributing to the heritage value of the dams, locks and landscapes located in the southern part of the TSW include their:

1. in situ location on the Trent-Severn Waterway;
2. morphology and typology;
3. aesthetic and visual quality (functional arrangement: assemblage of the canal, dam, lock and lock building);
4. dimensions, design and functional qualities;
5. concrete construction;
6. general massing and low profile silhouette;
7. number and form of sluices, piers, and spans;
8. log-lifting mechanism, including its associated mobile log hoist, and steel track system with wooden planks between; and
9. wooden stop-logs to control water flow, etc.

CRM Policy (PCA Cultural Resource Management Policy, 2013) outlines the requirements for managing the wide range of cultural resources administered by Parks Canada. Its objective is to ensure that cultural resources administered by Parks Canada are conserved and their heritage value is shared and protected. Under the Parks CRM Policy, conservation of heritage value must be a primary consideration in any intervention directed at a cultural resource. Therefore, the primary recommended conservation approach based on the Standards and Guidelines for the Conservation of Historic Places in Canada is rehabilitation with an emphasis on minimal intervention. Minimal intervention in the context of heritage conservation means doing what is required to arrest and correct deterioration or meet necessary codes while protecting heritage value as much as possible.

For any addition, modification and extension, the guidelines recommend:

- Balancing the need to alter constructed elements to meet current safety codes and standards with the need to preserve the heritage value of the work's functionality and operation;
- Designing and installing new mechanical or electrical systems or equipment when required for the continued use, in a manner that minimizes adverse effects on the cultural resource;
- Adding new features to meet health, safety or security requirements, in a manner that conserves the constructed elements and minimizes impact on the heritage value of the engineering work;
- Designing addition, modification and extension to a constructed element in a manner compatible with the engineering work and respects its heritage value.

Parks Canada recognizes however that the Cultural Resource Management Policy and the Standards and Guidelines do not provide site-specific recommendations. To ensure that the project managers and design consultants planning interventions on the Trent Severn Waterway have more specific guidance, Parks Canada has elected to produce the TSW Conservation Guidance (document to be provided to the successful Construction Manager).

The TSW Conservation Guidance is meant to provide an understanding of Parks Canada's expectations to those undertaking planning and design work for the Trent Severn Waterway NHS, so that:

- there is a common understanding of what is to be achieved and effective use of resources
- to ensure that the new work promotes the protection and conservation of the historic place, and that the TSW Vision and that the Commemorative Integrity of the TSW National Historic Site is upheld / is not compromised.

The TSW Conservation Guidance is meant to provide overall direction for new work, leaving sufficient flexibility to the designers so they are clear to pursue excellence on their design mandates.

The TSW Conservation Guidance is not meant to interfere with, alleviate, or distract any consultant obligations to meet Codes, Standards and/or Best Practices relevant to the work.

Where on a site-specific basis two or more Conservation Guidance statements conflict, project managers and design consultants are encouraged to seek advice from Parks Canada.

To ensure that conservation is based on a thorough understanding of an historic place and its character-defining elements, the Guidelines always recommend documenting and assessing the form, materials and condition of an historic place and its character-defining elements before any intervention decision and subsequent work. Further investigation and clarification of heritage value and character-defining elements (SoHV, Statement of Heritage Value) will be required for each cultural resource in order to properly assess impacts and propose mitigation measures. Specific recommendations and required mitigations – based on heritage value and character-defining elements - should be incorporated throughout the phases of the projects.

Also, cultural resource management requires knowledge and understanding of cultural resources, of their history (including interventions), current condition, and past and current importance to Canadians. Records and documentation preserve the information necessary for effective decision-making and for sharing the value of the resources with Canadians. Under the CRM Policy, cultural resources must be recorded and documented to preserve a public record,

particularly in cases of potential loss due to human or natural forces and when long-term stabilization or in-situ preservation are not possible. These records must be maintained, accessible and up-to-date and managed in accordance with the TB Directive on Recordkeeping.

A key component in national historic sites are the archaeological resources. Regardless of location, Parks Canada manages its archaeological sites within the context of the CRM Policy following the PCA Guidelines for the Management of Archaeological Resources (2005) and the Standards and Guidelines for the Conservation of Historic Places in Canada. As part of the CRIA process, an Archaeological Overview Assessment (AOA) will be done for the Project Area, including vehicular access routes, staging areas and areas proposed for signage and fencing. Based on the results of the AOA, an Archaeological Impact Assessment (AIA) and/or additional mitigation measures may be required, prior to construction activities. These guidelines provide direction to all Parks Canada personnel, other organizations and individuals undertaking projects and activities that may affect terrestrial and submerged archaeological resources in heritage areas administered by Parks Canada.

1.6.4 Environmental Protection

To meet Parks Canada's mandate, section 67 of the *Canadian Environmental Assessment Act* and conditions under the *Species at Risk Act*, the project must include exploring the opportunities available to reduce the environmental impact of the project, operations and maintenance, and improve the nearby aquatic and terrestrial environment.

An Environmental Impact Assessment (EIA) will be undertaken by PCA for each site and the EIA reports will be made available to all stakeholders. Design and construction is to be compliant with the final EIA report and the environmental mitigations laid out therein.

1.7 Operations

1.7.1 Navigation

Operations at the dams are typically limited to the navigation season of May to October to provide a minimum draft of 1.8 m along the reach for navigational requirements.

Work is to be planned in co-ordination with the waterway navigation season and site operations such that no interruption in navigation occurs.

Parks Canada's navigation season typically starts Victoria Day weekend and ends Thanksgiving weekend. Anticipated Navigation Seasons:

1. 2016 - May 20th to October 10th.
2. 2017 - May 19th to October 9th
3. 2018 - May 18th to October 8th.
4. 2019 - May 17th to October 14th.
5. 2020 - May 15th to October 12th.

Marine traffic shall not be interrupted during the Navigation Season, except intermittently and for a very short period at a time, if absolutely necessary and approved by the Departmental Representative.

In order to ensure continuity of operations the construction of elements below water surface level are to be undertaken 'in the dry' to the extent possible while maintaining a discharge capacity to assure the effective and safe water management of the waterway.

The waterway is an interconnected system and water flow management requirements at any one site may involve water flow management at a number of upstream and downstream installations. Design and construction must take into consideration the upstream and downstream impacts.

1.7.2 Flood Mitigation

A key objective of this project is to provide an effective water management of the waterway and enhanced safety for people, and protection of property, located upstream and downstream from the basin. The project is to be delivered while maintaining, at all times, a discharge capacity to ensure the water management of the waterway in a safe manner. Management of the operational facilities at the work site as well as any upstream and downstream adjustments will remain with PCA.

1.7.3 Environmental Constraints

The following concerns and issues will be addressed by the Prime Consultant during the early stage of the design phases of the project.

1. The Ontario Ministry of Natural Resources and Forestry (OMNRF) may have restrictions on allowable range of flow rates to support fish spawning in various locations along the waterway.
2. Fisheries and Oceans Canada (DFO) review/authorization and OMNRF review may be required to perform some of the Work.
3. A species at risk authorization from PCA may be required to perform some of the work.
4. Construction works that require tree removal may require municipal permits or other approvals from jurisdictions having authority. There may be tree species at risk within the construction areas.
5. Bird species at risk and nesting habits may require that tree removal and work on structures be limited to specific time windows.

1.8 Project Delivery

The full scope of the project is to be delivered on time, on budget and to a high standard of quality compliant with PCA's requirements. Additional information may come to light during site investigations and the current scope as defined herein may have to be adjusted to meet these findings.

1.8.1 Municipal Approvals and Access to Property

Municipal approvals may be required for site access and traffic control during construction. Use of right-of-ways and encroachment on adjacent lands used by the public or residents may require collaboration and special arrangements to minimize disruptions.

1.8.2 Health and Safety

PWGSC recognizes the responsibility to ensure the health and safety of all persons on Crown construction projects and the entitlement of both federal employees and private sector workers to the full protection afforded them by occupational health and safety regulations.

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 Health and Safety Regulations.

1.8.3 Sustainable Development

Parks Canada is committed to helping Canada combat climate change and reduce greenhouse gas emissions, consistent with our nation's international obligations and our nation's need for sustainable economic growth. The Trent Severn Waterway National Historic Site is a holding for the long-term that is to be maintained for the enjoyment and benefit of Canadians today and in future generations. Parks Canada therefore wishes the work to be implemented under the 2016-2021 Trent Severn Waterway program of projects to endure for many decades with minimized maintenance and O&M costs - a long-term capital investment that illustrates excellence in environmental sustainability.

Accordingly, the projects are to be implemented in an environmentally responsible manner that balances environmental performance, social and cultural sustainability and conservation objectives.

The Real Property Branch (RPB) of PWGSC, has developed a Sustainable Development Strategy that sets out principles, goals and actions for integrating sustainable development principles into its policies and operations.

1. To sustain our natural resources, by ensuring sustainable use of renewable resources and efficient use of non-renewable resources.
2. To protect the health of Canadians and of ecosystems, by managing the risks associated with toxic substances, by protecting representative areas, and by developing effective warning and adaptive response capability to both natural and human-caused disasters.
3. To meet our international obligations, by contributing to the protection of the ozone layer, the reduction of greenhouse gas emissions, and the conservation of biodiversity.
4. To improve our quality of life and well-being, by fostering improved productivity through environment efficiency, including environmentally friendly maintenance procedures and products, and by supporting innovation towards sustainable development.
5. To contribute to the prevention, reduction and, where possible, the elimination of negative impacts on humans and the environment in their land and marine / fresh water activities.
6. To contribute to the prevention, reduction and, where possible, the elimination of negative impacts of contaminated sites on humans and the environment.
7. To contribute to the use and promotion of more efficient, environmentally friendly alternative sources of energy.
8. To include the principle of life-cycle management in the analysis of project development options and design solutions.
9. To actively encourage and support the prevention, reduction and, where possible, the elimination of impacts of toxic or hazardous substances and wastes on human health.
10. To promote the conservation of renewable and non-renewable resources through appropriate waste management, including the application of 3R concepts (reduce, reuse, recycle) for the reduction of waste.

The project shall be aligned with the Federal Sustainable Development Strategy (FSDS) and federal government's framework for sustainability. Priorities include life cycle assessments,

reduce energy usage and greenhouse gas emissions, and use durable and low environmental impact materials wherever possible and appropriate.

1.8.4 Codes and Standards

Work under this contract must comply with the latest edition of Federal, Provincial and Municipal Acts, Regulations, Bylaws, Codes, Guidelines and decisions of Authorities having jurisdiction. In addition PWGSC and PCA Policies, Directives and Standards must be adhered to.

Design and construction must comply with the latest edition of Federal, Provincial and Municipal Acts, Regulations, Bylaws, Codes, Guidelines and decisions of Authorities having jurisdiction. In addition PWGSC and PCA Policies, Directive and Standards must be adhered to. The following is provided for information only. Compliance to the regulatory requirements is a condition of the contract. The following list is not to be considered inclusive. The Prime Consultant is to become familiar with all applicable regulatory requirements. Any conflict or inconsistencies with the regulatory requirements and this Project Brief is to be brought to the attention of the Departmental Representative for resolution. The Prime Consultant will be responsible for designing to code where applicable and the Construction Manager must construct to code.

1. Navigation Protection Act;
2. Transport Act;
3. Historic Canal Regulations;
4. Parks Canada Agency Act;
5. Historic Sites and Monuments Act;
6. Canada National Parks Act;
7. Standards and Guidelines for the Conservation of Historic Places in Canada (Second Edition, 2010);
8. PCA Guiding Principles and Operational Guidelines: National Historic Sites Policy (1994);
9. PCA Cultural Resource Management Policy (2013);
10. PCA Guidelines for Management of Archeological Resources (2005);
11. Archaeological Heritage Policy Framework (1990);
12. Unearthing the Law: Archaeological Legislation on Lands in Canada;
13. National Building Code of Canada;
14. Canadian Highway Bridge Design Code;
15. Canada Labour Code;
16. Canada Occupational Health and Safety Regulations;
17. Treasury Board of Canada Secretariat, Directives and Standards;
18. Environment Canada Codes of Practice;
19. Canadian Standards Association, Standards and Guidelines;
20. ANSI, ASHRAE, ASTM, AWMAC, FM, MPI, TSSA, ULC Standards;
21. Provincial Codes and Municipal Codes and By-Laws, as applicable.

Authorities having jurisdiction may choose to review the design in order to provide approvals and permits required for the project.

As per the Historic Canal Regulations applicable to lands administered by the Trent-Severn Waterway Historic Site of Canada, a permit signed by Parks Canada's Ontario Waterways Director will be required to authorize the project work prior to commencement of project activities.

There are no Canadian codes that specifically cover dam structure design. Design criteria have been developed by the Canadian Dam Safety Association, the Permanent International Association of Navigation Congresses, the Quebec's Dam Safety Act and Regulation, and various sources such as handbooks, manuals and texts of various origins.

Standards and codes to be used for the design and construction of the asset must be the latest edition of the following (including all amendments, supplements and revisions thereto). In case of conflict or discrepancy between codes and standards, the most stringent requirement shall apply.

1. Canadian Dam Association Guidelines 2007;
2. Canadian Dam Association Technical Bulletins;
3. Conservation Guidance for the 2016-2021 Capital Works Program for dams on the Trent Severn Waterway National Historic Site (Parks Canada, 2016);
4. Parks Canada Directive for Safety on Dams and Water Retaining Structures;
5. Permanent International Association of Navigation Congresses Design Criteria;
6. Lakes and Rivers Improvement Act (LRIA);
7. Canadian Manual on Foundation Engineering, National Research Council, Canada;
8. Concrete design in accordance with CAN3-A23.3, steel design in accordance with CAN/CSA-S16.1;
9. Environmental loads in accordance with the Supplement to the National Building Code of Canada;
10. "Design of Small Dams", document published by U.S. Dept. of the Interior, Washington;
11. Gravity Dam Design, EM 1110-2-2200, US Army Corps of Engineers;
12. Deck design in accordance with CAN/CSA-S6, Canadian Highway Bridge Design Code is the primary code to be used for design with appropriate live load levels;
13. Specific reference to the following codes may be required for clarification: American Association of State Highways and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges and Interim Specifications and the National Building Code of Canada;
14. Load factors and resistance factors to be compatible with a target safety Beta index appropriate for ultimate limit states construction design, for an 80 to 100 year design service.

Other design codes may be available from different jurisdictions reflecting new developments in structural engineering and may be utilize whenever they appear appropriate in accordance with proper engineering practice.

1.8.5 Solid Waste Management

The project will be implemented in an environmentally responsible manner.

The Construction Renovation and Demolition (CRD) waste management practices must be carried out in line with industry standards to support Federal Sustainable Development Strategy, and, at minimum, should seek to reuse and/or recycle all possible materials where local services and markets exist, and should ensure that CRD waste management practices meet any provincial regulations, city and/or municipal bylaws concerning CRD waste.

A waste management program must comply with applicable provincial regulations and federal policies. For all Real Property Branch projects greater than \$1 million, a solid waste management program must be implemented to maximize reuse and recycling opportunities where the infrastructure exists. This requirement exists by regulation in the province of Ontario for projects greater than 2,000 m² (O. Reg. 102/94 and 103/94) and by policy for the rest of Canada. It is a PWGSC best practice to achieve a minimum landfill diversion rate of 75%.

1.8.6 Constraints and Challenges

There are a number of challenges associated with the Work in addition to cost and time constraints including:

1. The Work is being undertaken on a navigable public waterway normally in operation between the middle of May to the end of October. The fall drawdown of the water level is typically completed by the 1st week of November;
2. Much of the Work is being undertaken with the public being immediately at hand as waterway users and owners/operators of adjacent properties;
3. Public safety;
4. Cultural resources of Other Heritage Value that are essential to the commemorative integrity of the Trent-Severn Waterway NHS. A Cultural Resource Impact Analysis (CRIA) along with a Statement of Heritage Value (SoHV) will be required for the each site / cultural resource impacted by the projects. Cultural resource management (CRM) advice and mitigation measures will be incorporated into the detailed impact assessment (DIA) report by PCA.
5. Environmental restrictions are significant including:
 - a. Compliance with OMNRF guidelines, "*Ontario Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat*", which limits shoreline disturbance affecting aquatic wild life. Work in the water is restricted between March 15 and July 15 yearly;
 - b. Fisheries Act Authorization may be required (obtained by PCA). Potential for implementation of offsetting (habitat creation) required during construction;
 - c. Bird nesting habitat activities will need to be accommodated for construction works in treed areas and structures during the breeding bird window for C2 Area {April 1- August 27};
 - d. Potential for disturbing species at risk– individuals and habitats;
 - e. Potential for significant environmental impact including risk of excessive waterway drainage and possible flooding.
6. The number of potential stakeholders extending beyond the immediate area of the work, both upstream and downstream;

7. As part of the CRIA process, an Archaeological Overview Assessment (AOA) will be done for the projects areas, including vehicular access routes, staging areas and areas proposed for signage and fencing. Based on the results of the AOA, an Archaeological Impact Assessment and/or additional mitigation measures may be required, prior to and during construction activities. Restricted site access and local traffic impedance to large equipment and construction traffic;
8. Restricted laydown areas for site facilities, equipment, materials and supplies;
9. The work will require permitting under the Historic Canal Regulations of the Transport Act by Parks Canada;
10. Work will be impacted by weather conditions and design must account for construction during winter and spring thaw;
11. All of the work will require consultation with aboriginal communities. This consultation will be led by Parks Canada.

1.9 Technical Requirements

1.9.1 Design Philosophy

Given the Trent-Severn Waterway is a National Historic Site, Parks Canada seeks to ensure that the interventions it is making are physically and visually compatible with the historic place and respect the heritage character of the asset. The Trent-Severn Waterway is part of our cultural heritage and requires special attention and treatment. The success of every conservation project depends upon understanding a site's cultural values and character-defining elements. It is the common thread that holds all aspects of the project together and forms the aim of any intervention undertaken.

The project managers and design consultants participating on the Trent-Severn Waterway capital works program are encouraged to study the Standards and Guidelines for the Conservation of Historic Places in Canada, second edition (especially sections 1, 2, 3, 4, 4.1, 4.4 and 4.5) and the TSW Conservation Guidance document to:

- Ensure a proper understanding of Parks Canada's vision and expectations vis-à-vis interventions on the Trent-Severn;
- Ensure that their processes and design work uphold the best practices and recommendations outlined in the Standards and Guidelines for the Conservation of Historic Places in Canada, second edition and the TSW Conservation Guidance.

At the basis of the Standards & Guidelines lies a careful approach to change. This approach calls for all action necessary for the care and use of the sites, but that also mandates changing as little as possible – minimal intervention approach - in order to preserve the cultural significance of the asset. The design process should include the requirements stipulated within the cultural resource management process that influence the selection of materials, forms and features of structural and mechanical components including landscape features. Therefore, the primary approach is to provide the least intrusive intervention to the components to meet current standards and code requirements, while preserving the heritage value and character-defining elements.

In broad terms:

- For engineering works of “national significance”, the primary conservation treatment is one of “Preservation” (primarily repairing in kind, secondarily replacing in kind). If the

entire engineering work is too deteriorated to repair and has to be replaced, the new work should match the existing as closely as possible in form, materials and detailing.

- For engineering works of “other heritage value”, the primary conservation treatment is one of “Rehabilitation” (repairing in kind, replacing in kind or replacing some features with new). If the entire engineering work is too deteriorated to repair and has to be replaced, the new work will be expected to be physically and visually compatible with its cultural landscape and the heritage character of the TSW.
- Clearly, it is hoped that project teams that understand and properly align their proposals/designs to the Standards and Guidelines for the Conservation of Historic Places in Canada and the TSW Conservation Guidance will enjoy expedited review and approval of project work during the CRIA process.

1.9.2 Structures

The intent of this project is to replace and/or rehabilitate the existing structures through the design and construction of new or rehabilitated structures complete with all auxiliary installations, operator safety features, fencing for public safety, shoreline stabilization and protection, landscape and embankment works, commissioning, demolition and/or removal of replaced installations and site restoration. This work also involves providing temporary installations including coffer dams, and establishing flow diversion system, the salvage of historical operational features, and de-mobilization including removal of the cofferdams, flow diversion system, and all associated temporary ancillary works that facilitate the construction effort.

The existing dams, to be fully replaced with new dams, should be designed for a minimum 80 to 100-year service life. This may be achievable in one of three ways: in-place replacement, immediately-downstream replacement, or even immediately-upstream replacement dam positioning. An options analysis will be performed considering time to construct, time to de-construct, risk and cost as appropriate. Each option will consider the applicability and use of a temporary waterway flow diversion channel and full-width coffer dams; single stage construction, as well as alternative multi-stage, half-width or third-width construction with limited coffer dams.

The work includes but is not limited to:

1. The dams are to be designed and constructed to provide the required strength, durability, overall stability, safety and serviceability with appropriate safeguards against excessive cracking, fatigue, unacceptable deformation, pre-mature corrosion, deterioration of material, commensurate with a design service life of eighty (80) to one hundred (100) years.
2. The new dams are to have generally the same overall appearance and operational feel, the manual log hoist system is to be retained in the new design with operational safety features investigated and adjusted as may be necessary except in the case of a dam being converted from manual to mechanized operations.
3. The dam decks may currently be open to the public with the exception of the operation equipment that is isolated by guardrails. In such cases the general arrangement will be maintained for the new structures and public safety measures will be designed and constructed for this accommodation and considering site specific conditions. The measures will include but are not necessarily limited to:

- a) Installation of permanent (considering ice loads) safety boom upstream of dam in compliance with Transport Canada approval for boom installation. Boom positioning will be constrained by existing private homes upstream of dam and will have to terminate at PCA property;
 - b) Public safety and operator enhancements based on CDA Guidelines and PCA practice and standards including handrails, floatation devices and fall arrest systems;
 - c) A combination of security fence and handrail, as applicable, to be installed all around perimeter of dam and the operation deck;
 - d) Upgrading signage throughout dam site using PCA templates including signs to inform public to stay out of operation area of the dam;
 - e) The deck designs are to follow the Cultural Resource Management requirements process to determine the final materials and design features. Materials to be considered include: wood; concrete and steel grating or a combination of these.
4. The piers are to retain the same overall appearance and operational feel however the shape will be verified to meet current standards to diminish hydraulic turbulence and losses, in accordance with the requirements of the "Design of Small Dams", document published by U.S. Dept. of the Interior, Washington.
 5. The design is to incorporate an evaluation of high performance construction materials including life cycle costing and environmental sustainability analyses of various design alternatives (e.g. zinc-coated re-bar (galvanized) or Glass Fibre Reinforced Polymer (GFRP), high performance concrete, etc.).
 6. Repair and/or replacement of the existing concrete approach walls, training walls, and downstream shoreline protection walls if and as required for minimum 100-year service life. Downstream retaining walls and/or training walls, if present will be either replaced or fully rehabilitated to achieve the same service life. New or extended training walls may be required at some sites to adequately protect the shoreline.
 7. All sluice gates of the replacement dams are to be fully mechanized using steel gate arrangement with gate lifting mechanism located directly on a mechanical deck, which is level with the main dam deck (gantries shall not be used). Two options will be investigated, vertical gates and radial gates, considering as a minimum cost benefit analysis including delivery, installation, operations and maintenance.
 8. Vehicular access decks, if such access is specified for a given site, shall be designed and constructed in compliance with the latest edition of the Canadian Highway Bridge Design Code (CHBDC) for a typical maintenance vehicle to be specified.
 9. Replacement dams shall include provision for a new prefabricated control house, and for an enclosed emergency backup power generating system. Emergency power backup system shall be built to supply emergency power to: the dam control, instrumentation, and alarm equipment, gate hoisting motors, gate and gain heaters, and lighting.
 10. Both 220V and 110V power supply shall be provided to the dam from available sources adjacent to the site. Wiring and electrical power systems as required for 65-year time-to-first-major-repair, and for possible future needs (requirement to be provided by User Department).

11. Replacement of the entire electrical system, new lighting, signalization and controls systems, control house and enclosed back-up generator.
12. Full mechanization of the dam using standardized gates, lifting mechanisms, heaters, controls, instrumentation, safety equipment, etc.
13. Mechanical, Electrical and Instrumentation/Control Systems and elements shall achieve three possible modes of operating the gates: fully automated mode (push-to-open-fully), selectively automated mode (controlled lift height), and manual operation mode using a single piece of self-powered equipment standardized for use at all dams with the same gate/lifter design. Automatic modes shall be operable using either main electrical power supply network, or using on-site backup generator as automatically and manually-forced switchable sources. The accepted standardized gate design shall feature an active braking system feature of high reliability and low maintenance requirements.
14. All new structural components installed are to be protected against corrosion. Stainless steel for vertical gate gain sleeves, service gain sleeves, spillway sill beams, pier liner plates for radial gates, pier nosing plates and for concrete-embedded heating element ducts, is preferred. All structural steel installations will be subject to inspection by a NACE (National Association of Corrosion Engineers) accredited inspector.
15. The up-stream and down-stream shore lines are to be stabilized and protected from erosion.
16. The work site is to be restored to “as-before” conditions, including the riverbed.

Other Requirements:

17. The sill beam of each sluice to be machined and ground to fit the stop logs/gates to minimize leakage.
18. The timber stop logs to be designed for the hydrostatic and hydrodynamic forces caused by the water at maximum water elevations and flows.
19. All stop log gains are to receive bent plate gain liners and aluminium gain covers.
20. An options analysis is to be provided for the fall arrest safety system to potentially include an overhead gantry structure or fall arrest tie-off system to protect dam operators. An appropriate solution will be determined following the options analysis.

1.9.3 Earth Dam Rehabilitation

The design and construction are to include the requirements stipulated within the cultural resource management process to influence the selection of landscape features. The primary approach is to provide minimal intervention to the existing cultural resources to meet current standards and code requirements, while preserving the heritage value and character-defining elements of the historic site.

A number of design options with cost estimates are to be developed for consideration

- .1 Gabions;
- .2 Rip-rap;
- .3 Natural vegetation;
- .4 Combinations of these installations; and
- .5 Other appropriate solutions.

The design and construction is to be defensive, using redundant systems with multiple lines of protection against erosion, leakage and piping.

1.10 Summary of Services Required

The Prime Consultant and its team will provide professional services associated with the required rehabilitation and restoration work on the sites referenced herein.

1. Review all of the related documentation with respect to sites H and I;
2. Visit the sites to determine site conditions as may affect the restoration and rehabilitation work;
3. Prepare Scopes of Work for undertaking supplemental intrusive (sub-surface) investigations, topographical surveys and site specific measurements;
4. Supervise intrusive investigations and surveys so as to obtain the necessary information;
5. Identify the requirement for temporary installations for construction including coffer dams, water diversion systems, and environmental mitigation measures as may be required and agreed upon with the Construction Manager, prepare scopes of work and construction documents so the temporary installation can be initiated prior to the main construction works as may be determined;
6. Establish design and performance criteria;
7. Prepare the design including options analysis and Class C construction cost estimates;
8. Prepare the Construction Documents suitable for tender and construction;
9. Review and implement as appropriate the construction documents prepared by the other Design Consultant(s);
10. Provide technical assistance during tender, construction and post construction project phases;
11. Provide engineer inspection during construction and commissioning; and
12. Provide services related to construction closeout and warrantee support.

1.11 Resource Requirements

The Prime Consultant shall assign suitably qualified and experienced personnel from across an appropriate range of disciplines to undertake and complete the work. The following list is provided for reference only and is not to be considered 'all-inclusive'. The Prime Consultant will establish the expertise and experience necessary to complete the assignment based on the information provided herein and referenced documents.

- a) Structural engineering (dams);
- b) Structural engineering (seismic specialist);
- c) Civil engineering (hydraulics);
- d) Geotechnical engineering;
- e) Heritage masonry
- f) Hydrogeological engineering;
- g) Landscape architecture;
- h) Municipal infrastructure engineering;
- i) Environmental impact assessment and monitoring, including but not limited to: terrestrial and aquatic ecology, erosion and sediment control, geomorphology, and site remediation;
- j) Sustainable development;
- k) Conservation engineering works /architecture

- l) Waste management;
- m) Risk management;
- n) Cost management;
- o) Time Management; and
- p) Emergency preparedness planning

1.12 Existing Documentation

The existing drawings and documents provided for this project are to be treated as reference material only. PWGSC and PCA cannot ensure their completeness and accuracy. As such the Prime Consultant is responsible to review and confirm all information and inform PWGSC of any discrepancies.

Documents related to the South Bundle project are provided in Annex AA of this Project Brief.

It is important to note that the structures may have been repaired and strengthened over time and features may have changed since original construction. The existing drawings and documents, including “as built” records may not be accurate.

Note that some bathymetric information of the area may not be available.

2 PROJECT ADMINISTRATION (PA)

2.1 Roles and Responsibilities

2.1.1 PWGSC

PWGSC administers the project on behalf of Canada and exercises continuing control over the project during all phases of development. This project is to be organized, managed and implemented in a collaborative manner. Under the leadership of the Departmental Representative, all team members are responsible for establishing and maintaining a professional and cordial relationship.

2.1.1.1 Departmental Representative

The PWGSC Project Manager assigned to the project is the Departmental Representative (DR). The DR is the overall Project Technical Authority, providing direction to the Prime Consultant in all project matters. The DR will coordinate with the Prime Consultant, The Construction Manager, the Project Team and the technical Resource Team to ensure the Prime Consultant is provided with all required information in a timely manner.

The DR may assign others to provide project management support to PWGSC during the life of the project.

Furthermore, the DR:

1. Is directly concerned with the Project and is responsible for its progress;
2. Liaises with PCA and other stakeholders, obtains their requirements, and conveys these requirements to the Prime Consultant and the Construction Manager as required;
3. Briefs and directs the Prime Consultant and is the official conduit for the exchange of information between the Prime Consultant, the Construction Manager, the PCA and other stakeholders;
4. Arranges with the Prime Consultant and others for review, feedback and acceptance of all design and contract documents, conveys review comments to the Prime Consultant, and co-ordinates any discussion arising from the reviews and comments;
5. Liaises with PWGSC Contracting Authority, RPC – Ontario Region.

2.1.1.2 PWGSC Contracting Authority

The PWGSC Contracting Authority (Real Property Contracting (RPC) is responsible for the establishment and management of the Prime Consultant contract, including Contract Amendments, and any contractual issues related to it. The PWGSC Contracting Authority will, at times, attend and participate in Project Meetings.

2.1.1.3 PWGSC Technical Resources

PCA technical staff and other consultants, retained by PWGSC, will be considered members of the PWGSC Technical Resources Team providing professional services to ensure technical requirements are suitably defined and incorporated through all phases of research, planning, design and implementation. The PWGSC Technical Resources Team will participate regularly in design and construction phases and will review all deliverables at the request of the Departmental Representative.

2.1.1.4 PWGSC Commissioning Manager

The Construction Manager will act as Commissioning Manager for the Crown for installations requiring commissioning. The Prime Consultant is to support and coordinate with the Commissioning Manager on all commissioning matters.

2.1.1.5 PWGSC Project Management Consultants

PWGSC may engage the services of a Project Management Consultant reporting directly to the Departmental Representative to assist with the management of the project.

2.1.1.6 PWGSC Specialty Consultants

PWGSC may, from time to time, engage specialty consultants to undertake investigations and provide reports on various aspects of the Work, including quality assurance services.

2.1.2 Client Department

PCA is the Client Department for this project, and will participate and provide input to deliverable reviews and acceptance processes at the request of and through the Departmental Representative. PCA will work closely with the Departmental Representative to define the project requirements, facilitate access to the site and support the Project Team.

2.1.3 Design Consultants

A Design Consultant with extensive relevant experience will be retained by PWGSC for Sites H and I to provide design services to PWGSC during the following Project Phases: Requirement Analysis; Design Concept; Design Development and Construction Documents.

2.1.4 Prime Consultant

The Prime Consultant will be contracted directly with, and report to, PWGSC to provide design services including the following Project Phases: Requirement Analysis; Design Concept; Design Development and Construction Documents for up to eight (8) identified sites A, B, C, D, E, F, G and J. The Prime Consultant will also be required to provide tender, contract administration, construction and post construction phase services for the assigned eight (8) Sites A, B, C, D, E, F, G and J, as well as the other two (2) sites H and I.

The Prime Consultant must:

- Assign and make available qualified staff for the duration of the work;
- Retain, direct and coordinate sub-consultants, as may be required, to provide the services;
- Ensure assigned personnel have the authority to take decisions on behalf of the Prime Consultant;
- Ensure continuity of key personnel and maintain a dedicated working team;
- Have an in-depth understanding of the project requirements and comprehensive knowledge of the services to be provided under the contract;
- Work constructively to ensure a collaborative and cooperative team approach with knowledgeable and timely input and contribution;

- Fully interact with the Construction Manager throughout the Work to achieve cost effective and timely delivery of the Work;
- Coordinate and cooperate with the Construction Manager to achieve fully integrated construction documents suitable for competitive tendering, prepare comprehensive schedules, construction cost estimates, quality management and risk management plans and other project requirements;
- Undertake the defined services in a professional and timely manner and complete the Work according to the timelines provided herein and adjusted from time to time as mutually agreed with the Departmental Representative;
- Prepare and submit deliverables compliant with all applicable regulatory requirements, PWGSC standards, project plans and specifications as provided in the reference documents;
- Provide tender, contract administration, construction and post construction phase services; and
- Become and remain familiar with all related project documentation.

2.1.4.1 Requirement Analysis

1. Obtaining and reviewing all available project information, previous studies, project reports, statutes, regulations, codes and bylaws which may have an impact on the Work;
2. Meeting with the extended project team, Construction Manager and stakeholders to establish clear project objectives;
3. Identifying requirements for additional investigations to supplement available information;
4. Reviewing all applicable statutes, acts, regulations, codes and bylaws which may impact on the proposed work;
5. Preparing information packages and presenting to the project team and other stakeholders as may be required;
6. Preparing a Design Plan; and
7. Preparing a preliminary schedule in collaboration with the Construction Manager.

2.1.4.2 Design Concept Phase

1. Assisting the Departmental Representative with preparation of the Environmental Impact Assessment;
2. Developing design criteria and parameters;
3. Developing a design strategy to ensure that the design complies with project objectives incorporating all Project Plans;
4. Identifying and providing analysis of three design options for each installation identifying benefits and challenges of each options;
5. Assessing the impact on construction implementation including cost, schedule and quality of results in collaboration with the Construction Manager; and

6. Preparing presentations and participating in public information sessions.

2.1.4.3 Design Development Phase

1. Working with the Construction Manager to define the construction packages and establish the structure and form of the construction documents;
2. Receiving and reviewing the investigative reports for each site;
3. Undertaking additional investigations as may be necessary and authorized by PWGSC;
4. Conducting site assessments with the Construction Manager including topographical surveys to determine the most effective strategy for access and construction;
5. Establishing rehabilitation requirements for each property identifying significant issues; and
6. Advancing the design with enough detail to allow the Construction Manager to develop a Class B construction cost estimate.

2.1.4.4 Construction Documents Phase

1. Completing the construction documents compliant with PWGSC standards including: PWGSC Doing Business; CADD Standards dated 2011; and the National master Specifications (NMS);
2. Preparing and submitting construction documents at 66% and 99% for review and comment;
3. Incorporating review comments as applicable; and
4. Preparing and submitting construction documents for tender purposes (100%).

2.1.4.5 Tender Phase

The Prime Consultant will provide technical support to PWGSC during the tender phase as follows:

1. Attending tenderers briefing meetings and pre-tender site visitations;
2. Providing technical support in response to tenderer's questions and for tender amendments;
3. Participating in technical evaluations of tender submissions as may be requested by the Construction Manager and Departmental Representative; and
4. Ensuring that lessons learned during tendering are incorporated in future tender documents as may be required.

2.1.4.6 Construction Phase

The Prime Consultant will provide technical and administrative services during the Construction Phase including:

1. Preparing "Issued for Construction" documents reflecting any changes identified during the Tender Phase and issued as addenda.

2. Attending construction meetings and providing technical support with interpretation of construction documents, responses to Request for Information, Site Instructions and Contemplated Change Notices;
3. Developing contractor submittals tracking sheets, tracking submittals, reviewing for contract compliance and accepting submittals;
4. Identifying and resolving unanticipated site condition issues as they relate to design;
5. Ensuring construction is compliant with design intent and with the contractor's approved environmental management plan;
6. Assisting with the development of cost and time recovery options as may be requested by the Construction Manager and Departmental Representative;
7. Reviewing prices submitted in response to Contemplated Change Notices and make a determination as to whether the prices are fair and reasonable and advise the Construction Manager and Departmental Representative;
8. Providing technical support for quality assurance, deficiency inspections and contract completion inspections;
9. Advising the Departmental Representative on the progress and quality of the work and report any concerns, defects, and/or deficiencies in the work observed during routine inspections;
10. Validating field measurements and quantity calculations where payment for work is based on unit prices or per diem rates;
11. Assisting the Departmental Representative with validation of Construction Manager performance and progress billings;
12. Witnessing any equipment and/or installation commissioning activities performed by the Construction Manager or sub-contractors as may be appropriate;
13. Providing technical support in discussions with stakeholders; and
14. Performing final inspections and certifying completion of the Work.

2.1.4.7 Post Construction Phase

The Prime Consultant will provide technical and administrative services during the Post Construction Phase Services including:

1. Reviewing the red-line drawings prepared by the Construction Manager and preparing drawings-of-record reflecting the site conditions on completion of the Work;
2. Reviewing the warranty certificates and providing technical support during the warranty period;
3. Providing assistance to the Departmental Representative in resolving all outstanding issues; and
4. Providing technical assistance to the Construction Manager and Departmental Representative on warranty issues.

2.1.5 Construction Manager

A Construction Manager will be contracted directly with PWGSC to provide services to PWGSC throughout the project as follows:

- Subject Matter Expert providing Advisory Services;
- Sub-Contracting Authority, and
- General Contractor and Constructor.

There may be an overlap of the phases with multiple construction packages being developed, tendered and constructed at any one time thus the Construction Manager will be required to fill all three roles concurrently.

2.1.5.1 Design Phases

Tasks assigned to the Construction Manager as Subject Matter Expert and in its capacity as Advisor during the Requirement Analysis, Design Concept, Design Development and Construction Document Phases include:

1. Research market conditions;
2. Review all available project documentation and identify any concerns related to build-ability and effective implementation;
3. Estimate construction costs, Class B and A as appropriate;
4. Prepare and maintain construction schedules including task identification, durations and dependencies as well as track progress;
5. Establish site access routes, site facilities requirements and organization;
6. Develop construction strategy (construction package composition and timing, trade contractor requirements);
7. Review construction methods establishing resource and equipment requirements, trade coordination, sequencing, etc.;
8. Prepare site-specific management plans including:
 - Construction Process and Procedures Manual;
 - Tendering Strategy and Process Plan;
 - Construction Cost Management Plan;
 - Construction Time Management Plan;
 - Construction Scope Management Plan;
 - Construction Risk Management Plan;
 - Construction Quality Management Plan;
 - Commissioning Plan;
 - Site Specific Occupational Health and Safety Plan;
 - Site Specific Surface and Ground Water Management Plan;
 - Site Specific Erosion and In-water Sediment Management Plan
 - Site Specific Dust Management Plan;
 - Site Specific Noise Management Plan;
 - Site Specific Security Plan; and
 - Spill Response Plan;
9. Participate in design meetings and value engineering workshops;

10. Recommend number and structure of construction packages;
11. Review tender and construction documents for bid-ability and build-ability; and
12. Prepare tender strategy and Request for Tender (RFT) documents (other than technical documents, drawings and specifications) including pricing form, tender instructions, sub-contract general conditions, surety and insurance requirements.

2.1.5.2 Tender Phase

Tasks assigned to the Construction Manager as Sub-Contract Authority during the tender phase include:

1. Verify completeness of technical documents (drawings and specifications) for each construction package as prepared by the Prime Consultant and adding the tender documents (forms, instructions, General Conditions, insurance and surety requirements, etc.);
2. Make the tender documents available for public tendering;
3. Arranging and administering pre-tender site visits as may be appropriate;
4. Respond to queries during the tender period;
5. Request and Obtain design clarification as may be required from the Prime Consultant through the Departmental Representative;
6. Managing tendering period, including answering bidder questions, and receiving tenders;
7. Evaluating tenders with technical support from the Prime Consultant as may be required;
8. Making recommendations and obtaining funding commitments from PWGSC; and
9. Awarding contracts.

2.1.5.3 Construction Phase

During the construction phase the Construction Manager will undertake Constructor responsibilities and provide all General Contractor services including sub-contract administration; managing Shop Drawings and other sub-contractor submittals, Requests for Information (RFIs), Site Instructions (SIs), Contemplated Change Notices (CCNs) and Change Orders; coordinating site access and inspections; arranging for utility locates, site inspections, lock outs and commissioning; tracking progress and costs; undertaking quality management tasks including pre-verification screening; coordinating deficiency inspections and processing sub-contractor payments. The Construction Manager may undertake all or part of Division 1 requirements as defined by the National Master Specification (NMS). Any Division 1 work that is not undertaken by the Construction Manager will be included in the specifications prepared by the Prime Consultant for each construction package. The extent of Division 1 work to be done by the Construction Manager will be established and approved by the Departmental Representative during the design phase.

2.1.5.4 Post Construction Phase

During the post-construction phase, the Construction Manager will obtain all necessary information on products and installations from the sub-contractors and suppliers; gather and provide all required construction information to allow the Prime Consultant to prepare as-built documents and warranty certificates; coordinate all deficiency repairs and warranty work and assist with project close out.

2.2 Communications

2.2.1 Document Submissions to PWGSC

All deliverables and submissions required for this project are to be submitted to the Departmental Representative as follows. The deliverables are to be site specific unless clearly and equally incorporating all sites and/or directed otherwise by the Departmental Representative.

Type of Submission	No of Hard Copies	No of Digital Copies	Format
Written Reports	4	2	Microsoft Word (*.doc)
Spreadsheets and Cash Flows	4	2	Microsoft Excel (*.xls)
Schedules	4	2	Microsoft Project
Specifications for Review	4	2	NMS format
Drawings for Review	4	2	Auto Cad (*.dwg)
Tender Documents including Specifications and Drawings	6	2	NMS format and Auto Cad
Issued for Construction Documents including Specifications and Drawings	6	2	NMS format and Auto Cad
Presentation Materials	10	2	Microsoft Office as Appropriate
All Other Submissions	4	2	Microsoft Office as Appropriate

Documents provided as digital copies attached to e-mails may be submitted in PDF format. Additional copies are to be submitted on a DVD or USB Flash Drive in the format specified above. One digital copy is to be provided in “editable” version with the second copy “locked”. Digital versions of professionally signed and sealed Issued for Construction documents are to be locked.

All deliverables must comply with the requirements specified in the PWGSC document ‘*Doing Business*’ unless specifically provided for otherwise herein. Any conflict between *Doing Business* and other referenced documents are to be brought to the attention of the

Departmental Representative. Unless directed otherwise by the Departmental Representative, the Project Brief will take precedence.

Provide and maintain an on-line file sharing platform for the project team to share project information.

2.2.2 Acceptance of Document Submissions

The following applies to documentation deliverables, including; reports, plans, drawings and various documents defined herein.

The Prime Consultant is required to submit documentation as defined in this Project Brief and is responsible and accountable for the quality and timely delivery of these documents. The Departmental Representative is entitled to review the documents submitted by the Prime Consultant and has the right to reject undesirable or unsatisfactory submissions as determined by Departmental Representative.

The Prime Consultant must obtain the Departmental Representative's acceptance of all required deliverables. Acceptance by the Departmental Representative is based on a general review of the deliverable, confirmation that it meets the intent of the requirements and is in compliance with the Project Brief. Acceptance by the Departmental Representative does not relieve the Prime Consultant of full responsibility for the deliverable. The Departmental Representative reserves the right to revisit the deliverable should there be cause to do so. Acceptance does not prohibit rejection of work, which is determined to be unsatisfactory at later stages of review.

Generally the review period for major deliverables will be identified in the Prime Consultant's schedule. Typically the Departmental Representative will provide comment or acceptance as quickly as possible but no more than twenty (20) days of receipt of a deliverable or the review time provided for in the specific deliverables defined in the section titled Required Services. The Prime Consultant must re-submit the deliverable incorporating the Departmental Representative comments as agreed with the Departmental Representative within a further ten (10) days.

Some deliverables are subject to acceptance by the Client/Users Department and other agencies and levels of government. It is the Departmental Representative's responsibility to obtain and coordinate these requirements; however the Prime Consultant is to cooperate and provide the required information and make necessary changes to the deliverables as may be requested through the Departmental Representative.

2.2.3 Correspondence

The Prime Consultant must distribute all correspondence related to this project as directed by the Departmental Representative. The Prime Consultant must also develop a communication protocol to be approved by the Departmental Representative and incorporate into the Project delivery.

All communications must carry the Contract name/number, PWGSC Project title and PWGSC Project number. The date format will be yyyy-mm-dd. The only exception to this requirement is email correspondence. All email correspondence must have subject lines with the specific PWGSC Project Name; and wording of the subject line must be clear to indicate the reference and subject of the message. Every effort is to be made to limit emails to one topic.

2.2.4 Lines of Communication

Direct communications between and within the project team is encouraged; however, all formal correspondence related to this project is to be directed to the attention of the Departmental Representative. The Prime Consultant must not direct or copy correspondence directly to the

PCA Project Lead (Client Department), the Construction Manager, or other stakeholders unless so instructed by the Departmental Representative - in which case the Departmental Representative must be copied. The Prime Consultant must assist with the development of a project communication protocol to be approved by the Departmental Representative and incorporated into the Project delivery model.

All communications must carry the Contract name/number, PWGSC Project title and PWGSC Project number. The date format will be yyyy-mm-dd.

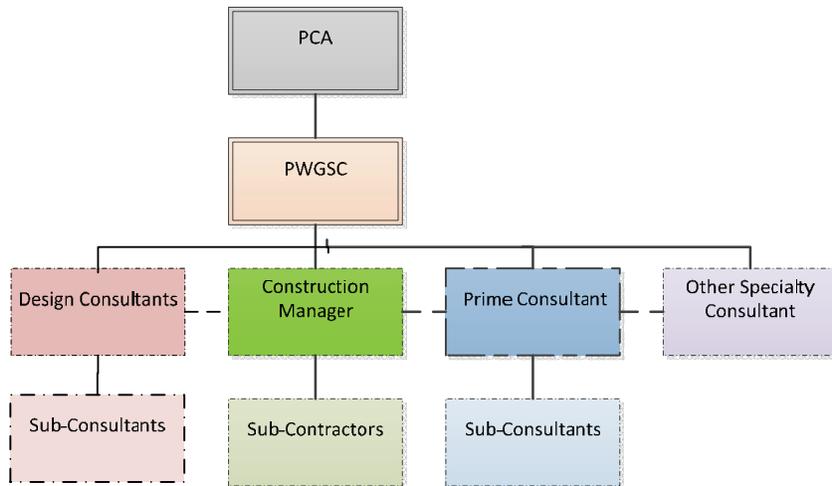


Figure 2.2.4: Communication Structure

2.3 Media Relations

The Client Department (PCA) will manage all external communications related to the Work and/or the Project. The Prime Consultant must ensure that no one including Prime Consultant staff, sub-consultants, suppliers or other related staff and/or persons communicate with anyone external to the project, including stakeholders, project site neighbours, special interest individuals/groups, and the media, unless instructed to do so by the Client Department and the Departmental Representative. If contacted by reporters or others, the Prime Consultant must refer them to the Departmental Representative immediately. The Prime Consultant must not share, distribute, post/publish or agree to have published for marketing or any other reason information on or related to this Project without the prior written approval of the Client Department and the Departmental Representative.

All Drafts and Final Reports together with other associated notes, preliminary reports, e-mails, etc., are to be considered confidential and are not to be used or shared by the Prime Consultant or any firms or persons engage by the Prime Consultant for any purpose other than the work under contract. This requirement will continue to apply after completion or termination of the contract for any reason.

2.4 Public Relations

The construction work will be undertaken in close proximity to the public use of the waterways and associated facilities. The public may also have a general interest in the Work and ask for information related to the Work.

The Prime Consultant is to work hand-in-hand with the Client Department, the Departmental Representative and the Construction Manager in all matters dealing with public relations. All dealings with the public will be professional and courteous. Any actual, perceived or anticipated conflicts are to be brought to the attention of the Client Department and the Departmental Representative in a timely manner and the Prime Consultant is to make themselves available for discussion and resolution.

2.5 Response Time

There are numerous stakeholders and considerable planning requirements on the project. Key Prime Consultant personnel must be available to attend meetings and respond to inquiries promptly. Response time will vary depending on the project phase generally as defined below. When time measurement is expressed in days it means working days excluding holidays and weekends.

2.5.1 Design Phases

The Prime Consultant Project Manager is to be available for, and attend, all regularly planned project meetings.

The Prime Consultant Project Manager is to be available for, and attend, all regularly planned design meetings unless excused by the Departmental Representative. The design meetings and design charrettes typically will be held in the Prime Consultant's office.

The Prime Consultant Project Manager must respond to PWGSC inquiries within one (1) day and provide required input in a timely manner as agreed with the Departmental Representative.

The Prime Consultant must make available other named key staff members for meetings at the request of the Departmental Representative with three (3) days of notice or request.

The Prime Consultant must ensure deliverables are submitted on time or better, as established by the accepted project schedule.

2.5.2 Tender Phase

1. The Prime Consultant Project Manager is to be available for, and attend, all regularly planned project meetings.
2. The Prime Consultant Project Manager must respond to PWGSC inquiries within one (1) day and provide required input in a timely manner as agreed with the Departmental Representative.
3. The Prime Consultant Project Manager is to be available and attend all pre-tender site meetings, tender openings and tender evaluation meetings.
4. The Prime Consultant must make available other named key staff members with three (3) days of notice to provide specific expertise on technical matters arising from tender submissions as may be required and requested by the Departmental Representative.
5. The Prime Consultant Project Manager must be available with two (2) days of notice and attend meetings with PWGSC and the Construction Manager to discuss tendering strategy, process and results as may be requested.

2.5.3 Construction Phase

1. The Prime Consultant Project Manager is to be available for, and attend, all regularly planned project meetings.

2. The Prime Consultant Project Manager, Resident Engineer and/or the assign Field Representative must be available and attend all regular Construction Meetings
3. The Prime Consultant must make available other named key staff members for regular meetings as may be required to ensure compliance with project requirements and maintain a clean and productive site.
4. The Prime Consultant Resident Engineer and/or assigned Field Representative must be available as required on site during the construction work.
5. The Prime Consultant Resident Engineer or assigned Field Representative must be available after hours during construction to respond to emergencies with four (4) hours of notification of a problem or concern and provide technical direction in a timely manner as agreed with the Departmental Representative and/or dictated by the specific situation. Public safety issues must be dealt with immediately.

2.5.4 Post-Construction Phase

1. The Prime Consultant Project Manager is to be available for, and attend, all regularly planned project meetings.
2. The Prime Consultant must make available other named key staff members for meetings on request from the Departmental Representative with three (3) days of notice or request.
3. The Prime Consultant Project Manager must be available and attend meetings with the Departmental Representative to discuss complaints or resolution of deficiencies with three (3) days of notice.

2.6 Meetings

It is anticipated that the project phases will overlap such that there will be periods when two and sometimes three series of regular bi-weekly meetings (every two weeks) require Prime Consultant participation:

1. Project meetings;
2. Design meetings; and
3. Construction meetings.

Every effort will be made to coordinate meeting schedules to minimize disruption and costs. Meetings may also be held through teleconferencing at the discretion of the Departmental Representative. The meetings will typically consist of the Departmental Representative(s), Client Department Representative(s), the Prime Consultant, The Construction Manager, the Client representative (PCA) and other invitees including specialist consultants and operational personnel as determined by the Departmental Representative.

2.6.1 Project meetings

Regular bi-weekly project meetings will be held at the PWGSC offices, the Prime Consultant's offices, the Construction Manager's offices or at a Client office as may be mutually convenient and time and cost effective as determined by the Departmental Representative. The project meetings will be chaired by the Departmental Representative. The agenda typically will include all aspects of the project: progress, coordination, design, scope, cost, schedule, quality, environmental plans and mitigations, risk, constructability, lessons learned, etc. The focus will gradually shift from design to construction as the work progresses. The meetings will not be used to discuss contractual nor personnel matters.

The Prime Consultant Project Manager must attend these meetings and lead the discussions related to design issues. Other named key Prime Consultant staff members will attend as required subject to the project status and specific agenda. These meetings will provide project direction and allow collaboration between team members.

The Prime Consultant, in consultation with the Departmental Representative, will prepare the agenda, invite appropriate participants, chair, record discussion, issues, and decisions made or recommended and prepare and distribute draft minutes within five days of the meeting. Final minutes will be issued within two (2) days of receiving comments from other participants.

2.6.2 Design Meetings

Design meetings, charrettes or workshops will be organized and documented by the Prime Consultant during the design phase to discuss detailed design requirements. Frequency of the meetings will be determined based on design needs. The meetings will not be used to discuss contractual nor personnel matters. The meetings will be held at the Prime Consultants office unless specific requirements dictate site visitations or the Departmental Representative request specific meetings to be held in other venues. Meeting participants to include as a minimum: key staff from the Prime Consultant team; the Construction Manager Project Manager; the Departmental Representative; and other stakeholders identified by the Departmental Representative as deemed necessary and subject to the meeting agenda. Decisions taken at design workshops are subject to review at the next project meeting and are not binding until duly authorized by the Prime Consultant for purely design issues and the Departmental Representative for scope adjustments.

The Prime Consultant will prepare the agenda, invite appropriate participants, chair, record discussion, issues, and decisions made or recommended and prepare and distribute draft minutes within five days of the meeting. Final minutes will be issued within two (2) days of receiving comments from other participants.

2.6.3 Construction Meetings

The Construction Manager will hold and chair bi-weekly meetings to discuss and manage construction and site issues starting on award of the first sub-contract. The construction meeting will be organized and documented by the Construction Manager. Meeting participants to include: Construction Manager Project Manager, Superintendent and site Safety Officer as a minimum; the Departmental Representative(s); Client Department Representative(s); and the Prime Consultant Project Manager, Resident Engineer and/or assigned Field Representative. A representative from each key sub-contractor may be invited at the discretion of the Construction Manager. The agenda will be prepared by the Construction Manager and will typically include but not be limited to:

1. Site Communications;
2. Schedule and Progress;
3. Submittals;
4. Site Health and Safety;
5. Environmental Issues and Mitigation Measures;
6. Construction Risk Identification and Mitigation;
7. Site Conditions and Constraints including: site access, site security, utilities, haulage routes, restoration requirements, etc.;
8. Scope Management including: Site Instructions, Requests for Information, Contemplated Changes; and
9. Current and anticipated issues which may impact on the Work.

The meetings will not be used to discuss contractual nor personnel matters.

The Construction Manager will record discussion, issues, and decisions made or recommended and prepare and distribute draft minutes within three (3) days of the meeting asking for comment. Final minutes will be issued within two (2) days of receiving comments from other participants.

Any decisions or directions as a result of a meeting which have a contractual impact must be documented through formal contract correspondence.

2.6.3.1 Commissioning Meetings

Once commissioning commences, the Construction Manager as Commissioning Manager, shall hold separate commissioning meetings with Subcontractors, PWGSC, the Client Department Representative(s) (as required), and the Prime Consultant to discuss and coordinate the commissioning of work and its progress. The Commissioning Meeting may be an extension of the bi-weekly construction meeting but must be documented separately. The Commissioning Manager will record discussion, issues, and decisions made or recommended and prepare and distribute draft minutes within three (3) days of the meeting asking for comment. Final minutes will be issued within two (2) days of receiving comments from other participants and prior to the next meeting.

3 REQUIRED SERVICES (RS)

3.1 General Requirements

The Prime Consultant will be considered the expert in matters of design and provide services during the pre-construction (design and tender), construction, and post-construction phases of the project. The Prime Consultant is required to review and become familiar with all relevant project documentation and the sites so as to provide cost and time effective quality services. The assignment is broken down into phases with tasks and deliverables defined accordingly.

There may be a number of construction packages with each package in turn having more than one construction subcontract. Each construction package could advance through each phase at different times. As such there will be complex overlapping of phases.

All services provided shall comply with the requirements specified in the '*Appendix D: Doing Business with PWGSC*' unless specifically provided for otherwise herein. Any conflict between *Doing Business* and the requirements set forth herein are to be brought to the attention of the Departmental Representative. Unless directed otherwise by the Departmental Representative the Project Brief will take precedent.

3.2 Project Reports

The Prime Consultant must prepare and submit regular reports to the Departmental Representative including a monthly report over the duration of the Work as well as various other specified design stage and activity dependent reports.

The Prime Consultant must provide a report template and sample report structure for review by the Departmental Representative within the first month after contract award. The accepted report template and structure will be used for all subsequent reports. Each report must be delivered in a timely manner as agreed with the Departmental Representative and the Prime Consultant Project Manager must be available to discuss the contents of the report and take the necessary actions as may be required to address any concerns of the Project Team as provided by the Departmental Representative.

3.2.1 Monthly Progress Reports

The Prime Consultant must submit a monthly report reflecting the past, current and ongoing status of the design work providing a system for project monitoring, reporting and documentation from a design perspective through each phase of the project. The report will become part of the permanent project records and must, as a minimum, include monitoring and documenting of:

1. Costs
2. Schedule
3. Quality
4. Risk
5. Outstanding issues, concerns, problems
6. Major accomplishments over the preceding reporting period
7. Planned major activities for the next reporting period.

The report is also to include as appendices:

8. A monthly cost report tracking and predicting design costs throughout the duration of the Work.
9. An updated schedule, in Gantt chart format, tracking design progress and forecasting future milestone and completion dates.

Each section is to identify any gaps between the planned versus actual achievements and provide a recovery strategy as may be applicable.

3.2.2 Milestone Reports

At each of the project milestones specified in this document, the Prime Consultant must provide a complete submission including the required Elemental Summaries, supported by all backup work sheets clearly detailing the process used in preparing the estimate.

The detailed work sheets are to be the prime basis on which estimates will be reviewed by PWGSC. Cost comparisons and cost reports identifying and explaining the differences between each succeeding cost estimate and their cost effect are also required.

Milestone Reports must contain as a minimum:

1. Project Estimate Summary;
2. Elemental Estimate Summary;
3. Basis for escalation, inflation and contingency calculations;
4. Detailed measurement and pricing;
5. Outline description of estimate basis;
6. Description of information obtained and used in the estimate including the date received;
7. Listing of notable inclusions;
8. Listing of notable exclusions;
9. Listing of items/issues carrying significant risk;
10. Estimate Reconciliation with last submission and with Construction Cost Plan.

3.2.3 Exception Reports

The Prime Consultant must provide continuous cost and schedule monitoring with timely identification and early warning of all changes, events or situations that affect or potentially affect the estimated design and construction costs and timely delivery of the project. The Prime Consultant must advise the Departmental Representative and must prepare and submit an Exception Report to include sufficient description and details to clearly identify changes to estimated cost and delivery including as a minimum:

- Scope Change: Identifying the nature, reason and total cost impact of all identified and potential project scope changes affecting Construction Cost Estimate and delivery;
- Cost Overruns and Underruns: Identifying the nature, the reason and the total cost impact of all identified and potential cost variations;
- Delayed deliverables or milestone dates including schedule project completion; and
- Development of options and recommendations to recover from any cost or time impacts.

3.3 Project Management

The Prime Consultant must manage all aspects of the contract and work described herein and ensure they are compliant with generally accepted processes and procedures including the management of costs, time, quality, scope and risk as provided below for the duration of the Work. The Prime Consultant is also to ensure the design effort is fully integrated within the design team and other related project tasks.

3.3.1 Cost Management

The Prime Consultant must develop a cost plan and cost control system to ensure all design stages are proceeding in accordance with the projected design costs and that construction costs are staying within the predetermined limits. The Prime Consultant is to incorporate a Value Analysis process from start of the assignment to ensure the design provides best value for the funds expended including consideration for the long term operation and maintenance of the constructed facilities. The Construction Manager will advise on construction costs and contribute to the selection of best construction methodology.

The Prime Consultant must provide a preliminary construction cost estimate, Class C, for each construction package with the Requirements Analysis Report identifying any variance with the initial construction budget and providing options to mitigate any cost gaps. Thereafter, the Prime Consultant must assist with, review and provide comment on the Construction Manager's cost estimate updates as each construction package progresses. The Prime Consultant must also review and provide comment on sub-contractor cost submission on Contemplated Change Notices during the construction phase as these relate to technical issues.

3.3.2 Time Management

The Prime Consultant must develop a comprehensive Design Schedule using the Critical Path Method (CPM) incorporating all the design work at all the sites included in the contract. The Prime Consultant will also provide, through the Departmental Representative, the required design task information (description, duration and dependencies) to allow the Construction Manager to integrate the design schedule with the construction schedule. The Prime Consultant is to track progress on all design tasks and take assertive action to maintain the baseline schedule, identifying slippage, recommending and implementing recovery plans as may be required, updating the Design Schedule and preparing the schedule for inclusion in the monthly report.

The Design Schedule is to be developed, maintained and presented applying best industry practices and standards for a project of this size and complexity. A draft Design Schedule is to be submitted as an attachment to the sample monthly report. Once accepted by the Departmental Representative the agreed schedule will become the baseline for the design subject to change only with the approval of the Departmental Representative. An updated Design Schedule is to be an appendix to the monthly report.

3.3.3 Quality Management

The Prime Consultant must ensure all design work and activities pertaining to the rehabilitation and restoration of the TSW facilities subject to the Project Brief are conducted in accordance with an ISO 9001 2008 quality management program or equivalent.

Furthermore, the Prime Consultant must develop and submit for the Departmental Representative's review a Design Quality Management System specific to this assignment applying best industry practices and standards for a project of this size and complexity to ensure that the appropriate quality standards are achieved. Although there is a process of PWGSC review of all documents prepared by the Prime Consultant, the Prime Consultant remains responsible for the execution of the Design Quality Plan and compliance of the deliverables to the Plan.

The Design Quality Management System must provide a mechanism for identification and retention of records essential to document that the design meets specified safety, technical, legal and quality requirements. The System process must define how such records are

identified, completed, authenticated, legible, retrievable and traceable. The System process must also allow for the identification and application of lessons learned to the design as the remedial program advances through the various stages.

A draft Design Quality Management System is to be submitted to the Departmental Representative within one (1) month of contract award. Once accepted by the Departmental Representative the Design Quality management System shall be applied to the design assignment. Any variations or changes to the System must be brought to the Departmental Representative for consideration prior to implementation.

3.3.4 Risk Management

The Prime Consultant must provide support to the project team in identifying risks throughout the project life cycle, including review of the Project Risk Management Plan and analysis as well as participation in risk management meetings and workshops on request and as organized by the Departmental Representative. The Prime Consultant must identify, evaluate and mitigate design risk throughout the duration of the Work and apply lessons learned as may be applicable to future construction packages. Any significant changes to the design risk profile must be brought to the attention of the Departmental Representative with recommended mitigation measures and options. The Prime Consultant must ensure that PWGSC approved risk mitigation measures are incorporated in the construction documents.

3.3.5 Scope Management

The Prime Consultant must become familiar with the overall scope of the Work considering both design and construction requirements and remain abreast of changed requirements which may have an impact on project delivery (cost, time and/or quality). The Prime Consultant must immediately notify the Departmental Representative in writing of any potential increases or decreases in the Work that could impact on project delivery.

The design solutions will be determined by the Prime Consultant, in consultation with the Departmental Representative and the Construction Manager, from reasonable interpretation of the investigative results such as to allow cost and time effective rehabilitation and restoration on the various sites.

3.4 Design Phases

The Prime Consultant must provide the services for Sites A, B, C, D, E, F, G, J and Sites H & I including: Requirement Analysis; Design Concept; Design Development; and Construction Documents as defined below.

3.4.1 Requirements Analysis

The objective of the Requirement Analysis stage is to ensure that the Prime Consultant has the opportunity to obtain and review all relevant documentation, fully understand the design requirements, develop a design strategy and satisfy the Departmental Representative that the work will comply with project objectives. The Departmental Representative will convene a start-up meeting within ten (10) days after contract award to review contract administrative requirements; introduce the project team; and provide an overview of the project and expectations including project costs, schedule, quality requirements and constraints.

3.4.1.1 Tasks

The Prime Consultant tasks in this stage must include, but are not limited to:

1. Obtaining and reviewing all available information including project documentation, plans, processes and investigative reports;
2. Visiting and inspecting the project site and surrounding areas to:
 - i. Become familiar with the site's geographical and hydrological features;
 - ii. Obtain any additional detailed data that may be required to supplement information contained in existing documentation;
 - iii. Identify any local issues and constraints that may impact the project
 - iv. Identify any Designated Substance and Hazardous Materials;
 - v. Identify any issues and/or opportunities relating to environmental protection, sustainable development or waste management, that may warrant further consideration;
 - vi. Consult with Client project lead and personnel with respect to site specific performance issues and operational requirements; and
 - vii. Identify potential locations and constraints related to the temporary installations including coffer dams and water diversion systems.
3. Identifying requirements for additional investigations to supplement available information to ensure a comprehensive and complete design mitigating costs and delays associated with unexpected site conditions during the construction phase.
4. Identifying and reporting to the Departmental Representative any requirements stipulated in the referenced project documents which may significantly impact on the ability to do the work and/or achieve project objects including quality, cost and schedule;
5. Meeting with the extended project team and establish clear design objectives;
6. Reviewing all applicable statutes, regulations, codes and by-laws which may impact on the work;
7. Establishing a preliminary design strategy including design concepts, construction document (drawings and specification) formats;
8. Preparing a Design Plan addressing:
 - o Organization,
 - o Communications,
 - o Record management,
 - o Risk management,
 - o Scope, time and quality management;
9. Preparing and submitting a Monthly Report template for the Departmental Representative review and acceptance;
10. Preparing a preliminary schedule compliant with project milestone dates, determine logical construction packages in collaboration with the Construction Manager and Departmental Representative, establish design timelines to achieve those milestone dates and identify staff assignments and tasks;
11. Preparing information packages and presentations as may be required to the project team to get buy-in to the design strategy and plan;
12. Developing a strategy and process to ensure lessons learned from the early construction packages will be identified and incorporated into later construction documents;

13. Attending regularly scheduled project meetings prepared to discuss design progress and issues, prepare agendas, issue minutes and ensure that design matters are appropriately documented; and
14. Identifying and addressing the needs, concerns and restrictions that may be imposed by other stakeholders.

3.4.1.2 Deliverables

Specific deliverables during this stage includes submission of monthly reports; attendance at meetings; and the submission of a final Requirement Analysis Report.

The Requirements Analysis Report must provide the results of the tasks identified above and, as a minimum, include:

1. Project delivery strategy;
2. Schedule analysis with complete work breakdown structure (WBS);
3. Regulatory compliance analysis;
4. Budget analysis including a review of current design and construction budgets (Class C cost estimate);
5. Draft work plan;
6. Draft design risk management plan;
7. Identification of any information gaps in the available investigative reports;
8. List of additional requirements to allow for the successful completion of the assigned work; and
9. Identification of circumstances and possible mitigation measures to be taken in the event of conditions leading to infrastructure failures during construction due to flooding or other natural disasters. The Construction Manager is responsible for the Evacuation Preparedness Plan.

The Report will be submitted to the Departmental Representative in draft for review within six (6) weeks of contract award in accordance with the section on Acceptance of Deliverables. A review meeting will be convened by the Departmental Representative within ten (10) days of receipt of the draft Report as may be required to clarify any matters and validate the design assumptions and strategies. At this time the sequencing of the construction packages will be prioritized to the extent possible. The meeting will be attended by the Construction Manager and the Client Department (PCA) as determined by the Departmental Representative. A final Report, adjusted as may be appropriate, will be issued by the Prime Consultant within fifteen (15) days of the review meeting.

3.4.1.3 Other Deliverables

1. Minutes of meetings, records of discussion and other project related documentation and correspondence;
2. A Project Work Breakdown Structure: within five (5) working days after the Project Start-Up Meeting, the Prime Consultant must prepare and submit a detailed Project Work Breakdown Structure (PWBS) outlining deliverable-oriented groupings of project elements that organize and define total scope of work of the project, including all required reviews and approvals;
3. A Project Master Schedule and Cash Flow Projections: within ten (10) working days after Project Start-Up Meeting, the Prime Consultant must prepare and submit a Project

Master Schedule and Cash Flow Projections that account for all major project milestones and deliverables associated with each project phase. The original Project Master Schedule and Cash Flow Projections shall be "frozen" to provide an original Project Baseline against which the progress of the overall project to be monitored;

4. A Detailed Project Schedule: within twenty (20) working days after the Project Start-Up Meeting, the Prime Consultant to prepare and submit a Detailed Project Schedule to include, as a minimum, all Prime Consultant activities, as well as all necessary reviews and approvals, throughout each and every phase of the project. The schedule to include sufficient details to clearly demonstrate the sequence and interdependency of all activities and to provide a reasonable basis for progress monitoring and coordination of all project activities; and
5. Proposed additional investigation plans and a comprehensive strategy to gather field data to support available material. The investigative plan must be submitted as developed to allow timely field tasks.

3.4.2 Site Studies and Technical Investigations

Site studies and technical investigations may occur concurrently with Requirements Analysis. Studies and investigations are to be coordinated and executed in a manner than minimizes impact on operations and maintenance activities.

3.4.2.1 Tasks

Subject to the determinations in the previous section the Prime Consultant must:

1. Plan and undertake inspections of the existing infrastructures including dams, locks, bridges, and all associated structures and installations in accordance with the PWGSC Dam Inspection Manual and Bridge Inspection Manual and applicable regulations, codes, standards, and guidelines as may be required to supplement current available information. The existing dam structures are to be inspected to analyze and verify that the size and configuration of the piers, abutments, and sills can withstand all loads configurations including earthquakes;
2. Incorporate PWGSC and PCA information requirements for the Environmental Impact Assessment in the supplemental investigation plans and implementation;
3. Develop Terms of Reference and Scopes of Work to undertake the additional subsurface site studies and investigations necessary for the design and submit to the Departmental Representative for review and approval;
4. Collaborate with the Construction Manager to tender and award contracts to undertake the construction services related to the subsurface investigations (drilling, excavation, concrete coring, topographical bathymetric surveys, etc.);
5. Attend to the site work, and undertake sampling and analysis;
6. Provide the services of a qualified person to supervise the field investigation, document the findings, witness sampling activities and interpret the results;
7. Incorporate the Site Studies and Technical Investigations into the project Work Breakdown Structure and Detailed Project Schedule.

These requirements apply to all subsurface investigative requirements including Geotechnical and Bathymetry Studies and Analysis.

3.4.2.2 Deliverables

The Prime Consultant must produce and submit stand-alone reports for each investigative initiative providing the findings and analyses including: an Executive Summary, Scope of Work, Methodology, Analysis, Results, Drawings and Sketches, Recommendations and Conclusions;

3.4.3 Design Concept

3.4.3.1 General Requirements

The Prime Consultant is to obtain written authorization from the Departmental Representative before proceeding with the services related to the Design Concept.

The objective of this stage of the design process is to explore design options and analyse them against priorities, project objectives and constraints. The Prime Consultant must translate the Requirements Analysis Report into design criteria and parameters and develop as a minimum three (3) options which meet the requirements. Each option is to be advanced to allow comparison and selection of the most effective rehabilitation restoration approach. Out of this process the Prime Consultant is to recommend the best option to proceed to Design Development. The Departmental Representative in consultation with the Prime Consultant, Construction Manager, PCA and other stakeholders will finalise the selected option.

3.4.3.2 Tasks

1. Assist PWGSC with preparing the Environmental Impact Assessment by providing necessary information obtained from supplementary site investigations.
2. Develop and describe, with supporting background and technical justification, Design Criteria and Parameters to govern the design.
3. Prepare and submit, for the Departmental Representative's review and approval, a detailed Report on Design Criteria and Parameters.
4. Identify three (3) options for each installation which meet project requirements:
 - a. Dams:
 - i. Rehabilitation of the existing dam;
 - ii. Partial or full replacement of the dam structure in place with the same footprint; and
 - iii. Replacement of the dam structure slightly up or downstream of the existing footprint.
5. Complete a detailed analysis of each option including as a minimum:
 - a. Project objectives, issues, constraints and challenges;
 - b. Design principles, criteria and parameters;
 - c. Findings and recommendations from the Environmental Impact Assessment, when completed;
 - d. Impact on cultural landscape and how the option conforms with the standards and guidelines for the conservation of historic places in Canada.
 - e. Findings and recommendations from the various Site Studies and Technical Investigations, as they become available;
 - f. All applicable codes, regulations and standards;
 - g. Extent of required temporary installations.

- h. Cofferdam and water diversion system options;
 - i. Upstream and downstream protection and stabilization options;
 - j. Cost and schedule impacts; and
 - k. Potential risks and/or benefits with mitigating measures.
6. In collaboration with the Construction Manager, assess the impact on construction implementation including costs, duration, dewatering, public interaction, etc.
7. Select the best option and develop reasons why it most effectively satisfies the project objectives.
8. Based on the results of the Option Analysis, develop an appropriate combination of handouts, drawings, electronic slide show, etc., for presentations to PWGSC and, as required, to Authorities Having Jurisdiction.
9. Participate in public and other presentations as requested by the Departmental Representative.
10. Keep records of the comments received, changes requested, concurrence with presented material and approval of the recommended option, or decisions to select another option, for further design development.

3.4.3.3 Deliverables

Specific deliverables during this stage includes submission of monthly reports; attendance at meetings; presentation of options analysis and the submission of a final Design Concept Option Development and Analysis Report which is essentially an update of the Requirements Analysis Report and must be presented with the same structure and Table of Contents.

Organize and deliver a presentation of options including an overview of the options analysis with suitable drawings, sketches, calculations, compliance issues, cost and schedule impacts, risks and benefits, etc. Maintain and issue a record of discussions and comments, identify required additional analysis and resubmit as may be necessary.

The Design Concept Option Development and Analysis Report will be submitted to the Departmental Representative in draft for review in accordance with the section on Acceptance of Deliverables. A review meeting will be convened by the Departmental Representative within ten (10) days of receipt of the draft Report as may be required to clarify any matters and validate the design assumptions and strategies. The meeting will be attended by the Construction Manager and the Client Department as determined by the Departmental Representative. A final Report, adjusted as may be appropriate, will be issued by the Prime Consultant within fifteen (15) days of the review meeting.

The following deliverables are 'standalone' however may be appended to the Design Concept Option Development and Analysis Report as directed by the Departmental Representative:

1. Presentation material, and supporting documentation in sufficient quantities;
2. A record of the outcome of all presentations including directions on the selected options;
3. A detailed Designated Substance and Hazardous Materials Report;
4. Updates to the other Analysis of Project Requirements deliverables including:
 - a. Project Work Breakdown Structure,
 - b. Project Master Schedule and Cash Flow Projections,
 - c. Detailed Project Schedule,

- d. Emergency Preparedness Plan;
5. A detailed Report on Approved Design Concept Option;
6. A design specific Risk Management Plan and analysis including risk elements, probabilities, impacts and mitigation measures;
7. A detailed Report on Design Criteria and Parameters; and
8. A report on the operations and maintenance (O&M) Criteria.

3.4.4 Design Development

3.4.4.1 General Requirements

The Prime Consultant must obtain written authorization from the Departmental Representative before proceeding with the services related to the Design Development.

The objective of this design stage is to further develop the selected option presented at the Design Concept stage. The Prime Consultant must develop the design option selected for refinement and produce Design Development Documents to describe the scope, quality and cost of the project in sufficient detail to: define the details of design components, systems and materials, for all applicable disciplines, and confirm their compliance with codes, standards and all other Project Requirements; identify and assess potential risks, and recommend mitigation measures; facilitate the reviews, discussions and decisions relating to the design; and obtain the necessary approvals to proceed to the development of Construction Documents.

3.4.4.2 Tasks

3.4.4.2.1 Design Development Work Breakdown Structure and Schedule

Prepare and submit, for the Departmental Representative's approval, a detailed Design Development Work Breakdown Structure and Schedule outlining:

- i. key activities, deliverables and milestones of the Design Development process, as outlined in the sub-sections that follow;
- ii. key activities, sequence and targets for completing the design of the various major technical elements comprising this project, including all related detailed components, systems, materials and appurtenances; and
- iii. the milestone dates and degrees of completion at which the Design Development Documents to be submitted for interim review and approval (at least at 50% stage).

3.4.4.2.2 Project Requirements / Design Criteria and Parameters

1. Verify and confirm the ongoing validity of the approved Project Requirements, including applicable Regulatory Requirements, Codes and Standards.
2. Recommend, for the Departmental Representative's review and approval, any adjustments to the Project Requirements that may be deemed necessary as the Design Development advances or as other pertinent project related data becomes available.
3. Revise the Project Requirements as required, to reflect approved adjustments.

4. Based on the latest approved Project Requirements and confirmed Regulatory Requirements, Codes and Standards:
 - i. further develop, update as required, and describe, with supporting background and technical justification, the Detailed Design Criteria and Parameters that govern the design development; and
 - ii. prepare and submit, for the Departmental Representative's review and approval, a Report on Detailed Design Criteria and Parameters.

3.4.4.2.3 Design Development Documents

Coordinate the design work of all relevant disciplines and prepare an integrated set of Design Development Documents, using an appropriate combination of drawings, specifications and narrative reports that covers all of the activities and requirements outlined in the paragraphs that follow:

1. Clearly describe and substantiate the details of all design components, systems, materials and appurtenances associated with the various major technical elements comprising this project, including but not limited to:
 - i. The substructure components (including foundation systems and hydraulic features, as applicable);
 - ii. The superstructure components (including inspection access and operational features, as applicable);
 - iii. Mechanical equipment and electrical equipment and systems, including lighting and special operational equipment such as hoists, as applicable;
 - iv. Environmental mitigation measures outlined in the Environmental Impact Assessment report, when completed;
 - v. Embankment protection, surface drainage, erosion control, sediment control, etc.;
 - vi. All temporary works such as water diversion systems, cofferdams, access to work, etc.; and
 - vii. Landscape design and site restoration.
2. Demonstrate how the design incorporates and responds to the latest approved Detailed Design Criteria and Parameters, and the latest approved Project Requirements including, but not limited to:
 - i. project objectives, issues, constraints and challenges;
 - ii. Technical and performance requirements;
 - iii. Design principles, criteria and parameters;
 - iv. All applicable codes, regulations and standards;
 - v. Principles and goals of sustainable development;
 - vi. Findings and recommendations from the Environmental Impact Assessment, as well as compliance with environmental constraints;
 - vii. Requirements for cultural resource management;

- viii. Findings and recommendations from the various Site Studies and Technical Investigations, as they become available;
 - ix. Waste management requirements;
 - x. Commissioning; and
 - xi. Operations and maintenance (O&M) requirements;
3. Collaborate with the Construction Manager to demonstrate how the design incorporates and responds to Construction Implementation Strategies and Requirements including, but not limited to:
- i. Mobilization;
 - ii. Construction staging and scheduling, including lead times for special equipment, components and materials;
 - iii. Seasonal and environmental constraints;
 - iv. Demolition staging and duration;
 - v. Traffic control;
 - vi. Ongoing operation and functionality of existing assets;
 - vii. Construction site access, field office, storage areas and temporary installations including cofferdams and water diversion systems.
4. Develop and submit fully coordinated and integrated Design Development drawings at a sufficient level of detail to make design decisions and develop a Substantive Class “C” construction cost estimate.
5. The Design Development drawings to include all necessary sketches, plans, elevations, cross-sections and perspectives views to ensure effective graphical representation of all design features and Construction Implementation Strategies and Requirements.
6. Ensure that all design and construction elements, components, systems and materials included in the project are covered, and integrating all applicable disciplines: develop and submit lists and outlines of:
- i. All applicable National Master Specifications (NMS) sections to be used; Ontario Master NMS Sections and In-House Master Sections as directed by the Departmental Representative;
 - ii. Any additional specification sections, not currently covered in the NMS, to be created (in NMS format) based on manufacturers’ technical information, on provincial specifications or on other information from a recognized technical authority;
7. Describe and submit detailed technical information and support data relating to the Design Development including, but not limited to:
- i. A description and explanation of technical and/or operational assumptions that may have been made, based on the preferred design option;
 - ii. Design calculations and results of technical analyses;

- iii. Design loads, geotechnical/foundation design requirements, hydrologic and hydraulic design requirements, seismic design requirements, traffic control requirements, etc.;
 - iv. Dimensions, locations, alignments and sizes of all design components in sufficient detail to enable the design to be checked;
 - v. Identify materials and products requiring approval, with all related manufacturers' technical literature and specifications;
 - vi. Specify quality control and quality assurance plan to be integrated into the specifications.
 - vii. A Utility Demand and Consumption study, an Electrical Load Determination study, Short circuit Studies, Protective Device Evaluation Studies, Protective Device Coordination Studies and Flash Protection Studies; Site Lighting Study, coordination study (to support the selection of instrument transformer ratios, protective relay characteristics and settings, fuse ratings, low-voltage circuit breaker ratings, characteristics, and settings). The Arc-Flash Hazard Analysis shall be performed in conjunction with a short-circuit analysis and a time-current coordination analysis.
8. Collaborate with the Construction Manager in preparing a construction schedule that reflects the design and the proposed Construction Implementation Strategies and Requirements. The Construction Manager will take the lead in the development of the Construction Implementation Strategies and Requirements and the construction schedule;
 9. In collaboration with the Construction Manager identify/quantify potential risks associated with the design and construction. Develop risk mitigation measures as necessary to enhance project delivery;
 10. Provide a Substantive, Class "C" Construction Cost Estimate, with a cost breakdown, and quantify any impacts on overall project cost.

3.4.4.2.4 Presentations

1. Submit the presentation material, and supporting documentation, to the Departmental Representative for review and approval;
2. Based on Design Development Documents, develop an appropriate combination of handouts, drawings, electronic slide show, etc., for presentations to PWGSC and, as required, to Authorities Having Jurisdiction;
3. Provide sufficient quantities of approved presentation materials, organize and deliver the presentations. Keep records of the comments received, changes requested, concurrence with presented material and approvals.
4. Participate in public and other presentations as requested by the Departmental Representative.
5. Prepare a report on the outcome of each presentation made and submit for the Departmental Representative's review and approval.

3.4.4.2.5 Waste Management Audit and Workplan

Waste Management will be the responsibility of the Construction Manager. The Prime Consultant must collaborate with the Construction Manager to ensure that design elements support the Waste Management Plan.

3.4.4.3 Deliverables

Specific deliverables during this stage includes submission of monthly reports; attendance at meetings; and the submission of a final Design Development Report which is essentially an update of the Design Concept Option Development and Analysis Report and must be presented with the same structure and Table of Contents.

Organize and deliver a presentation of options including an overview of the options analysis with suitable drawings, sketches, calculations, compliance issues, cost and schedule impacts, risks and benefits, etc. Maintain and issue a record of discussions and comments, identify required additional analysis and resubmit as may be necessary.

The Design Development Report will be submitted to the Departmental Representative in draft for review in accordance with the section on Acceptance of Deliverables. A review meeting will be convened by the Departmental Representative within ten (10) days of receipt of the draft Report as may be required to clarify any matters and validate the design assumptions and strategies. The meeting will be attended by the Construction Manager as determined by the Departmental Representative. A final Report, adjusted as may be appropriate, will be issued by the Prime Consultant within fifteen (15) days of the review meeting.

The following deliverables are 'standalone' however may be appended to the Design Development Report as directed by the Departmental Representative:

1. Presentation material, and supporting documentation in sufficient quantities;
2. A record of the outcome of all presentations;
3. Updates to the other Design Concept deliverables including:
 - i. Project Work Breakdown Structure,
 - ii. Project Master Schedule and Cash Flow Projections,
 - iii. Detailed Project Schedule,
 - iv. Emergency Preparedness Plan,
 - v. Designated Substance and Hazardous Materials Report,
 - vi. Design specific Risk Management Plan, and
 - vii. Report on Design Criteria and Parameters;
4. An Environmental Impact Assessment Compliance Report documenting how the design addresses all required mitigation measures and requirements as specified in the EA;
5. Construction Documents including drawings and specifications sufficiently advanced for general discussion with the Departmental Representative, Client Department and Construction Manager as to suitability of the design. All technical aspects of the Construction Documents must be co-ordinated, and the majority of the specification sections and drawings are identified.
6. Definition of the 66% and 99% construction documents including the extent of completion for specifications and drawings.

3.4.5 Construction Documents

3.4.5.1 General Requirements

The Prime Consultant must obtain written authorization from the Departmental Representative before proceeding with the services related to the development of Construction Documents.

The objective of the Construction Documents phase is to prepare tender and construction documents (drawings and specifications) detailing the site requirements allowing contractors to competitively tender and complete the necessary work.

The temporary facilitating installations including cofferdams, water diversion systems and any other temporary requirements may be advanced faster than the main infrastructure design allowing for an early construction start (fast track). The Prime Consultant is to coordinate with the Construction Manager to identify such advanced work and prepare necessary construction documents in the same manner as that defined for main construction. The demolition and removal of temporary installation may be included with the installation packages, as a component of the main work, or as separate decommissioning construction packages.

The various stages of Construction Document preparation reflect the degree of completion of the documents and are defined, in broad terms, as follow:

1. 66% complete: indicates substantial technical development of the project and well-advanced plans, details, schedules, and specifications for all disciplines. All drawings and specifications are fully coordinated;
2. 99% complete: is the submission of complete Construction Documents ready for final technical reviews and approvals, and for submission to local authorities for permit purposes. All drawings and specifications are fully coordinated;
3. 100% complete: incorporates all revisions required in the 99% version and is intended to provide PWGSC with complete Construction Documents for tender call. The 100% construction documents are to be sealed and signed by an appropriate certified professional or professionals.

3.4.5.2 Tasks

3.4.5.2.1 Construction Documents

Scope and activities at the various stages of Construction Document preparation (66%, 99%, and 100%) are very similar. The main differences between stages are the degree of completeness of the Construction Documents as described above.

For each stage of Construction Document preparation the Prime Consultant shall:

- i. coordinate the work of all the relevant disciplines and prepare integrated sets of construction drawings and specifications covering all disciplines; submit drawings and specifications for PWGSC review and approval;
- ii. Organize, attend, and document technical and document production meetings necessary to coordinate the design effort. In addition to the design team, the meetings shall include the Departmental Representative and the Construction Manager.
- iii. Submit drawings and specifications, at appropriate stages, to the Client Department and other Authorities Having Jurisdiction, for review and, as

required, for approval. Report to the Departmental Representative any comments received, approvals granted or changes requested;

- iv. Incorporate in the construction documents Construction Implementation Strategies developed and provided by the Construction Manager including such elements as: mobilization, phased construction, demolition, dewatering, flow diversion system, erosion and sediment control, traffic control, duration, field office and storage areas, and erosion control, etc.; and
- v. Prepare and submit to the Departmental Representative, written response to comments made by the Departmental Representative and the Construction Manager on earlier submission reviews including confirmation of acceptance or challenges of comments.

3.4.5.2.2 Associated Tasks

1. Develop presentation material, deliver presentations to PWGSC and to Authorities Having Jurisdiction as directed by the Departmental Representative;
2. Collaborate with the Construction Manager with the update of:
 - i. The construction schedule that reflects the design and the proposed Construction Implementation Strategies and Requirements. The Construction Manager will take the lead in the development of the Construction Implementation Strategies and Requirements and the construction schedule,
 - ii. The potential risks associated with the design and construction. Develop risk mitigation measures as necessary to enhance project delivery,
 - iii. The Substantive, Class “B” (at 66% complete) and Class “A” at 99% complete) Construction Cost Estimate, with a cost breakdown, and quantify any impacts on overall project cost. The Construction Manager will take the lead in the development of, and take responsibility for, the Class “B” and “A” construction cost estimates, and
 - iv. The Commissioning Plan at 66% and 99% complete.
3. Collaborate with the Construction Manager with the preparation of a Systems Operations Manual (SOM) for equipment including installation/start-up checklists, operations and maintenance instructions.
4. Review all technical reports to be appended to the construction documents and validate the information provided and recommendations. Verify that the technical reports are signed and sealed by respective discipline specialists licensed in the province where the work is being carried out.
5. Coordinate with Authorities Having Jurisdiction providing suitable documentation to allow for review and issuance of permits or other approvals. Address comments as may be appropriate.
6. Develop Terms of Reference in collaboration with the Construction Manager for a complete program of Field Quality Control Testing specifying the scope of work, methodology, type, number and frequency and estimated unit costs, as well as total estimated cost, for all testing to be required during construction.

3.4.5.3 Deliverables

Specific deliverables during this stage includes: submission of monthly reports; attendance at meetings; submission of Construction Documents at various stages of development; and the submission of a final Construction Document Report which is essentially an update of the Design Development Report and must be presented with the same structure and Table of Contents.

There may be multiple construction documents submissions using a “fast-track” approach. The composition and schedule of individual work packages will be coordinated with the Construction Manager and Departmental Representative. The makeup and schedule of the construction packages will be determined at the completion of the Design Development stage. Each construction package shall be delivered as follows:

1. 66% complete Construction Documents.
2. 99% complete Construction Documents.
3. 100% complete Construction Documents.
4. Written responses to review comments of each submission in tabular format:

The Construction Document Report will be submitted to the Departmental Representative in draft for review in accordance with the section on Acceptance of Deliverables. A review meeting will be convened by the Departmental Representative within ten (10) days of receipt of the draft Report as may be required to clarify any matters and validate the design assumptions and strategies. The meeting will be attended by the Construction Manager as determined by the Departmental Representative. A final Report, adjusted as may be appropriate, will be issued by the Prime Consultant within fifteen (15) days of the review meeting.

The following deliverables are ‘standalone’ however may be appended to the Construction Document Report as directed by the Departmental Representative:

1. Presentation material and supporting documentation for the review meeting after receipt of the Draft Construction Document Report.
2. A record of the outcome of all presentations.
3. Updates to the other Design Development deliverables including:
 - i. Project Work Breakdown Structure,
 - ii. Project Master Schedule and Cash Flow Projections,
 - iii. Detailed Project Schedule,
 - iv. Emergency Preparedness Plan,
 - v. Designated Substance and Hazardous Materials Report,
 - vi. Design specific Risk Management Plan, and
 - vii. Report on Design Criteria and Parameters including environmental compliance and cultural landscape impacts.

3.5 Post Design Phases

The Prime Consultant must provide Tender, Construction and Post Construction Phase services for all sites including sites H and I designed by others and sites A, B, C, D, E, F, G and J designed under this Project Brief and detailed herein.

3.5.1 Construction Document Review and Acceptance

The Prime Consultant must review the final design prepared by the Design Consultants for sites H and I including the tender and construction documents, related analysis and calculations and all other appropriate information. The documents will be made available by the Departmental Representative. All communication with the Design Consultant(s) will be pre-authorized by and include the Departmental Representative. The Prime Consultant will prepare and submit to the Departmental Representative a list of concerns, issues and/or questions related to the review and will collaborate with the Departmental Representative and Construction Manager in resolving any and all design matters. A formal peer review report will be completed by Prime Consultant and provided to the design consultant.

Once the Prime Consultant has accepted the design and provided confirmation to that effect, the Prime Consultant will become the Engineer of Record for the Work.

3.5.2 Tender Phase

3.5.2.1 General Requirements

The Prime Consultant must obtain written authorization from the Departmental Representative before proceeding with the services related to Tender Phase.

The Construction Manager will manage the tendering process during the Tender Phase and obtain competitive prices for construction using the Issued for Tender documents (100% complete construction documents) provided by the Prime Consultant. The Prime Consultant will provide Tender Phase Services during this phase.

There may be multiple construction documents submissions using a “fast-track” approach and thus an equal number of tender packages. Tasks and deliverables apply for each tender package.

3.5.2.2 Tasks

1. Respond to any questions or concerns expressed by the Construction Manager prior to tendering the Work.
2. Attend tenderers briefing meetings and pre-tender site visitations.
3. Provide technical support in response to tenderer’s questions.
4. Maintain a log off all inquiries of a technical nature during the bidding period and record response to each with reference to an amendment as may be appropriate. Submit same to the Construction Manager and the Departmental Representative.
5. Prepare addenda based on questions arising from tenderers briefing meetings or tenderers questions for issue by the Construction Manager as authorized by the Departmental Representative.
6. Assist in tender evaluation at the request of the Departmental Representative by providing advice on the following:
 - i. The completeness of tender documents in all respects;
 - ii. The technical aspects of the tenders;
 - iii. The effect of alternatives and qualifications which may have been included in the tender;
 - iv. The tenderers capability to undertake the full scope of work; and

- v. The availability of adequate equipment to carry out the work.
7. Ensure that lessons learned during tendering are incorporated in future tender documents as may be required.

It is anticipated that sub-contracts will be awarded to the lowest compliant bidder however, should a tender be unsuccessful due to cost or technical issues the Prime Consultant may be required to re-visit the design and revise the tender documents.

3.5.2.3 Deliverables

Specific deliverables during this stage includes submission of monthly reports; attendance at meetings; and the submission of a final Tender Phase Report which is essentially an update of the Construction Documents Report and must be presented with the same structure and Table of Contents.

The Report will be submitted to the Departmental Representative in draft for review in accordance with the section on Acceptance of Deliverables. A review meeting will be convened by the Departmental Representative within ten (10) days of receipt of the draft Report as may be required to clarify any matters and validate the design assumptions and strategies. The meeting will be attended by the Construction Manager as determined by the Departmental Representative. A final Report, adjusted as may be appropriate, will be issued by the Prime Consultant within fifteen (15) days of the review meeting.

Additional Deliverables include:

1. Technical Addenda;
2. Log of inquiries and responses; and
3. Technical advice as may be requested by the Departmental Representative.

3.5.3 Construction Phase

3.5.3.1 General Requirements

The Prime Consultant must request and obtain written authorization from the Departmental Representative before proceeding with the services related to the Construction Phase.

The Construction Manager will manage the construction during the construction phases in accordance with the construction documents. The Prime Consultant will provide Construction Phase Services on behalf of the Departmental Representative. The Prime Consultant is to act as the technical authority by supporting the implementation of the design and interpretation of the contract documents.

3.5.3.2 Tasks

1. Ensure assigned staff is qualified and fully familiar with the technical specifics of each respective construction package and that their contribution is timely and consistent with the demands of the construction schedule.
2. Incorporate all design information provided through amendments during the tender phase in the specifications and on the drawings. The drawings and specifications are to be identified as "Issued for Construction", signed and sealed by the appropriate professional.

3. Attend construction meetings and be prepared to discuss design matters and ensure that decisions made meet design intent.
4. Undertake site inspections to ensure construction is compliant with design intent, monitor site activities to confirm contract compliance and advise the Departmental Representative of any deviation or non-compliance.
5. Provide technical support and assistance with the implementation of the environmental mitigation measures during construction works as required.
6. Advise the Departmental Representative and Construction Manager with respect to alternative construction methodologies and/or alternate materials as proposed by sub-contractors;
7. Coordinate with the Departmental Representative, Client Department and Construction Manager and provide technical support for site visitations by representatives of Authorities Having Jurisdiction who are required to inspect or visit the construction site. Record any requirements, comments or instructions.
8. Provide interpretation and clarification of construction documents as they relate to design.
9. Identify and resolve unanticipated site conditions as these relate to design issues.
10. Provide technical support related to the preparation and cost estimation of contemplated changes, issuance of Site Instructions (SIs), response to Requests for Information (RFIs), verification of progress billings and recommendation to the Departmental Representative of acceptance of the Work.
11. Develop a contractor submittals tracking sheet/application identifying each submittal requirement (shop drawings, product information, reports, etc.) and allowing for recording all required submittals as received, reviewed, returned and accepted.
12. Review contractor submittals for compliance with technical requirements and design intent in a timely manner and accepting or rejecting as appropriate.
13. Assist the Construction Manager in the development of cost and time recovery options as may be required.
14. Prepare the technical component of Contemplated Change Notices (CCNs) and Contract Change orders (COs).
15. Review prices submitted by the Construction Manager in response to CCNs and make a determination as to whether the prices are fair and reasonable and advise Departmental Representative accordingly.
16. Provide technical support to the Construction Manager for quality assurance, deficiency inspections and contract completion inspections.
17. Review inspection and testing services to verify that all aspects of the Work are carried out in accordance with the requirements of the contract documents.
18. Identify the need for additional testing to validate compliance with the contract documents.
19. Advise the Departmental Representative on the progress and quality of the work and report any concerns, defects and/or deficiencies in the work observed during routine inspections.

20. Assist the Departmental Representative with validation of the Construction Manager's performance and progress billings.
21. Validate the field measurements and quantity calculations where payment for work is based on unit prices or per diem rates.
22. Provide technical support in discussions with the public and other stake holders.
23. Collaborate with the Construction Manager and the Client Department on the implementation of the Commissioning Plan. Witness any equipment and/or installation commissioning activities performed by the Construction Manager or sub-contractors as may be appropriate.
24. Collaborate with the Construction Manager and the Departmental Representative for interim and final inspection and acceptance of the Work.
25. Identify and quantify any deficient or incomplete work and advise the Construction Manager and Departmental Representative accordingly.
26. Issue a Certificate of substantial Performance and Certificate of Completion as appropriate.

3.5.3.3 Deliverables

Specific deliverables during this stage includes submission of monthly reports; attendance at meetings; site inspection reports and the submission of a final Construction Phase Report which is essentially an update of the Construction Documents Report and Tender Phase Report and must be presented with the same structure and Table of Contents.

The Report will be submitted to the Departmental Representative in draft for review in accordance with the section on Acceptance of Deliverables. A review meeting will be convened by the Departmental Representative within ten (10) days of receipt of the draft Report as may be required to clarify any matters and validate the design assumptions and strategies. The meeting will be attended by the Construction Manager as determined by the Departmental Representative. A final Report, adjusted as may be appropriate, will be issued by the Prime Consultant within fifteen (15) days of the review meeting.

Additional deliverables include as a minimum:

1. Duly signed and sealed by an appropriate professional practitioner '*Issued for Construction*' documents incorporating all changes resulting from tender addenda;
2. Assorted drawings, sketches, and other documents prepared in response to Requests For Information (RFIs), Site Instructions (SIs), and other site discussions and clarifications;
3. Submittals log listing all contractor submittals with dates of reviews, rejections and approvals as appropriate;
4. Site inspection reports identifying site conditions, field activities, discussions, observations, and any potential issues going forward;
5. Technical aspects of CCNs and COs including drawings, sketches and specifications;
6. Certificates of Payment for progress billings;
7. Site inspection logs and reports;

8. Deficiency and incomplete work lists/reports;
9. Certificate of Substantial Performance; and
10. Certificate of Completion.

3.5.4 Post Construction

3.5.4.1 General Requirements

The Prime Consultant is to request and obtain written authorization from the Departmental Representative before proceeding with the services related to the Post Construction Phase.

The Construction Manager will manage the post construction phases in accordance with the construction documents. The Prime Consultant will provide Post Construction Phase Services on behalf of the Departmental Representative during this phase.

3.5.4.2 Tasks

1. Review the red-line drawings prepared by the Construction Manager and prepare 'drawings-of-record' reflecting the site conditions on completion of the work:
 - i. incorporate relevant data from approved shop drawings and installed component data, and
 - ii. show deviations in construction from the original contract drawings, including changes resulting from Change Orders or from on-site instructions;
2. Review the warranty certificates and validate compliance with contractual requirements;
3. Provide technical support to the Construction Manager during the warranty period as may be required. The Construction Manager is responsible for addressing all warrantee claims:
 - i. Participate and collaborate with the Construction Manager for the ten-month Warranty Inspection of the project,
 - ii. Prepare a deficiency report and verify warrantee work,
 - iii. Participate and collaborate with the Construction Manager for the final Warranty Inspection of the project,
 - iv. Verify that all deficiencies identified at the ten-month Warranty Inspection and on final inspection have been corrected;

3.5.4.3 Deliverables

Specific deliverables during this stage includes submission of monthly reports; attendance at meetings; and the submission of a final Post Construction Phase Report or Close-Out Report, which is essentially an update of the Construction Phase Report and must be presented with the same structure and Table of Contents. If there are no significant updates to the Construction Phase Report, the Post Construction Report may be issued as an amendment at the sole discretion of the Departmental Representative.

The Report will be submitted to the Departmental Representative in draft for review in accordance with the section on Acceptance of Deliverables. A review meeting will be convened by the Departmental Representative within ten (10) days of receipt of the draft Report as may be required to clarify any matters and validate the design assumptions and strategies. The meeting will be attended by the Construction Manager as determined by the Departmental

Representative. A final Report, adjusted as may be appropriate, will be issued by the Prime Consultant within fifteen (15) days of the review meeting.

Additional deliverables include as a minimum:

1. Drawings of Record to be submitted two (2) weeks after construction completion;
2. Record of warranties within two (2) weeks after construction completion;
3. Ten-month warranty inspection report with listing of deficiencies and required action within two weeks of the inspection;
4. Final warranty report with confirmation of corrections.

End of Document

Annex AA - Existing Documentation

Solicitation No. - N° de l'invitation

EQ754-171285/A

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

R.076951.138

Amd. No. - N° de la modif.

File No. - N° du dossier

PWL-6-39078

Buyer ID - Id de l'acheteur

pw1041

CCC No./N° CCC - FMS No/ N° VME

APPENDIX A - TEAM IDENTIFICATION

Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

EQ754-171285/A

pwl041

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

R.076951.138

PWL-6-39078

APPENDIX A - TEAM IDENTIFICATION FORMAT

The Consultant and other members of the Consultant Team to 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 Geotechnical, Mechanical, Environmental and Electrical/Controls personnel is to be listed only once, either under Consultant or under Sub-consultant.

I. 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 Dam Engineer:
.....

Geotechnical Engineer:
.....

Mechanical Engineer:
.....

Electrical / Controls Engineer:
.....

Environmental Engineer:
.....

Engineering Team Members:

Civil/Structural Dam Engineer:
.....

Civil/Structural Dam Engineer:
.....

Geotechnical Engineer:
.....

Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

EQ754-171285/A

pwl041

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

R.076951.138

PWL-6-39078

APPENDIX A - TEAM IDENTIFICATION FORMAT (CONT'D)

Geotechnical Engineer:

.....

Mechanical Engineer:

.....

Mechanical Engineer:

.....

Electrical / Controls Engineer:

.....

Electrical / Controls Engineer:

.....

Environmental Engineer:

.....

Environmental Engineer:

.....

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

Geotechnical

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

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

Senior Team Leaders:

Geotechnical:

.....

Engineering Team Members:

Geotechnical:

.....

Geotechnical:

.....

Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

EQ754-171285/A

pw1041

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

R.076951.138

PWL-6-39078

APPENDIX A - TEAM IDENTIFICATION FORMAT (CONT'D)

Mechanical

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

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

Senior Team Leaders:

Mechanical:
.....

Engineering Team Members:

Mechanical:
.....

Mechanical:
.....

Electrical / Controls

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

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

Senior Team Leaders:

Electrical:
.....

Engineering Team Members:

Electrical:
.....

Electrical:
.....

Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

EQ754-171285/A

pw1041

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

R.076951.138

PWL-6-39078

APPENDIX A - TEAM IDENTIFICATION FORMAT (CONT'D)

Environmental

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

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

Senior Team Leaders:

Environmental:
.....

Engineering Team Members:

Environmental:
.....

Environmental:
.....

Additional Information to be provided:

- a) Name of Proponent, and name of the Sub-Consultant(s), if used.
- b) Copy of Proponent's Certificate of Authorization issued by Professional Engineers Ontario. If the Certificate is not provided with the proposal, it must be provided within two (2) days of request from the Contracting Authority.
- c) Names and roles of key personnel to be assigned to the project per Section a) above.
- d) For the Senior Team Leaders and Engineering Team Members indicate current professional license status and affiliation, and/or how you intend to meet the Ontario professional licensing requirements.
- e) 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, G19 Limitation of Submissions).

Solicitation No. - N° de l'invitation

EQ754-171285/A

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

R.076951.138

Amd. No. - N° de la modif.

File No. - N° du dossier

PWL-6-39078

Buyer ID - Id de l'acheteur

pw1041

CCC No./N° CCC - FMS No/ N° VME

APPENDIX B - DECLARATION/CERTIFICATIONS FORM

Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

EQ754-171285/A

pw1041

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

R.076951.138

PWL-6-39078

APPENDIX B - DECLARATION/CERTIFICATIONS FORM

Project Title: Trent-Severn Waterway Infrastructure – South Bundle

Name of Proponent: _____

Street Address:

Mailing Address:

Telephone Number: (____) _____

Fax Number: (____) _____

E-Mail: _____

Procurement Business Number: _____

<p>Type of Organization:</p> <p>_____ Sole Proprietorship</p> <p>_____ Partnership</p> <p>_____ Corporation</p> <p>_____ Joint Venture</p>	<p>Size of Organization:</p> <p>Number of Employees _____</p> <p>Graduate Architects / Professional Engineers _____</p> <p>Other Professionals _____</p> <p>Technical Support _____</p> <p>Other _____</p>
---	---

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

Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

EQ754-171285/A

pw1041

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

R.076951.138

PWL-6-39078

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)

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.

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.

Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

EQ754-171285/A

pwl041

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

R.076951.138

PWL-6-39078

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.

Solicitation No. - N° de l'invitation

EQ754-171285/A

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

R.076951.138

Amd. No. - N° de la modif.

File No. - N° du dossier

PWL-6-39078

Buyer ID - Id de l'acheteur

pwl041

CCC No./N° CCC - FMS No/ N° VME

APPENDIX C - PRICE PROPOSAL FORM

Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

EQ754-171285/A

pwl041

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

R.076951.138

PWL-6-39078

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.

PROPOSANTS SHALL NOT ALTER THIS FORM

Project Title: Trent-Severn Waterway Infrastructure – South Bundle

Name of Proponent: _____

The following will form part of the evaluation process:

REQUIRED SERVICES

Sites A, B, C, D, E, F, G and J

Percentage Fee (R1230D (2016-01-28), GC 5 - Terms of Payment – Architectural and/or Engineering Services)

Firm Percentage Fee of _____ % **X**

Indicative Estimate of Construction Cost (excluding Applicable Taxes) \$68,893,863.00

ESTIMATED TOTAL PERCENTAGE FEE \$ _____

Sites H and I

Percentage Fee (R1230D (2016-01-28), GC 5 - Terms of Payment – Architectural and/or Engineering Services)

Firm Percentage Fee of _____ % **X**

Indicative Estimate of Construction Cost (excluding Applicable Taxes) \$30,297,433.00

ESTIMATED TOTAL PERCENTAGE FEE \$ _____

APPENDIX C - PRICE PROPOSAL FORM (CONT'D)

The actual percentage fee for Required Services will recognize the variability of the Construction Cost Estimate as the project develops (refer to formula specified in GC 5.2 Fee Arrangement(s) for Services). Payments will be made as specified in GC 5.4 Payments for Services.

**TOTAL ESTIMATED PERCENTAGE FEE (ALL SITES)
(Sites A, B, C, D, E, F, G, and J + Sites H and I)**

\$ _____¹

Time Based Fees (R1230D (2016-01-28), GC 5 - Terms of Payment– Architectural and/or Engineering Services)

The Estimated Hours provided below are for evaluation purposes only.

The resulting Time Based Fees will not form part of the awarded contract value, however, the Hourly Rates will be incorporated into the contract and may be used for future contract amendments should the services below be required beyond the estimated construction period duration.

Sites A, B, C, D, E, F, G and J

Technical Assistance During Construction	ESTIMATED HOURS Column A	HOURLY RATES** Column B	TIME BASED FEE Columns AxB
Project Manager	2000	\$.....	\$.....
Senior Engineer; Structural	1000	\$.....	\$.....
Senior Engineer; Mechanical	1000	\$.....	\$.....
Senior Engineer; Environmental	1000	\$.....	\$.....
Senior Engineer; Geotechnical	1000	\$.....	\$.....
Senior Engineer; Hydraulics	1000	\$.....	\$.....
Senior Engineer; Hydrogeology	1000	\$.....	\$.....

Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

EQ754-171285/A

pw1041

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

R.076951.138

PWL-6-39078

Senior Cost Estimator	2000	\$.....	\$.....
Senior Scheduler	2000	\$.....	\$.....
Senior CADD Operator	2000	\$.....	\$.....
Licensed Land Surveyor	50	\$.....	\$.....
Administrative Assistant	200	\$.....	\$.....

TOTAL TIME BASED FEES FOR SITES A, B, C, D, E, F, G and J \$ _____

Sites H and I

Technical Assistance During Construction	ESTIMATED HOURS Column A	HOURLY RATES** Column B	TIME BASED FEE Columns AxB
Project Manager	500	\$.....	\$.....
Senior Engineer; Structural	500	\$.....	\$.....
Senior Engineer; Mechanical	500	\$.....	\$.....
Senior Engineer; Environmental	500	\$.....	\$.....
Senior Engineer; Geotechnical	500	\$.....	\$.....
Senior Engineer; Hydraulics	500	\$.....	\$.....
Senior Engineer; Hydrogeology	500	\$.....	\$.....
Senior Cost Estimator	100	\$.....	\$.....
Senior Scheduler	100	\$.....	\$.....
Senior CADD Operator	100	\$.....	\$.....
Licensed Land Surveyor	50	\$.....	\$.....
Administrative Assistant	100	\$.....	\$.....

Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

EQ754-171285/A

pwl041

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

R.076951.138

PWL-6-39078

APPENDIX C - PRICE PROPOSAL FORM (CONT'D)

TOTAL TIME BASED FEES FOR SITES H and I \$ _____

** All inclusive hourly rate is applicable to both normal working hours and any other shift work as required. Travel time and/or expenses will not be reimbursed separately (Refer to R1230D (2016-01-28), GC 5.12 – Disbursements).

***Payment to be based on actual hours spent.

TOTAL ESTIMATED TIME BASED FEE (ALL SITES)
(Sites A, B, C, D, E, F, G and J + Sites H and I) \$ _____²

TOTAL COST OF SERVICES FOR PROPOSAL EVALUATION PURPOSES

Total Percentage Fee \$ _____¹

Total Estimated Time Based Fees + \$ _____²

Total Evaluated Fee = \$ _____

END OF PRICE PROPOSAL FORM

Solicitation No. - N° de l'invitation

EQ754-171285/A

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

R.076951.138

Amd. No. - N° de la modif.

File No. - N° du dossier

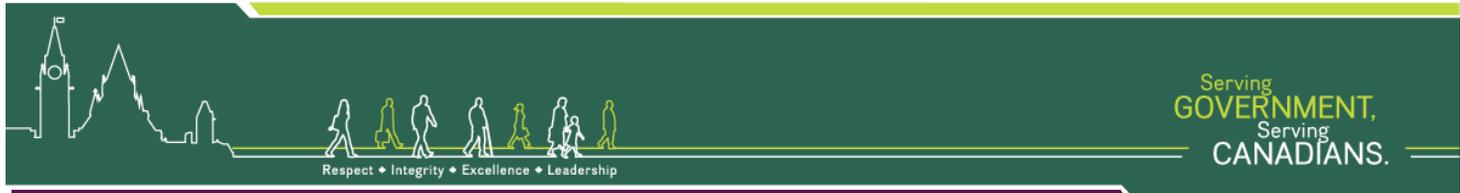
PWL-6-39078

Buyer ID - Id de l'acheteur

pw1041

CCC No./N° CCC - FMS No/ N° VME

**APPENDIX D - DOING BUSINESS WITH PUBLIC WORKS AND GOVERNMENT
SERVICES CANADA (PWGSC)**



Doing Business with Public Works and Government Services Canada (PWGSC)



TABLE OF CONTENTS

SECTION	PAGE
SECTION 1 INTRODUCTION	3
SECTION 2 PWGSC NATIONAL CADD STANDARD	4
SECTION 3 GUIDE TO PREPARATION OF CONSTRUCTION DOCUMENTS FOR PWGSC	4
SECTION 4 CLASSES OF CONSTRUCTION COST ESTIMATES USED BY PWGSC	14
SECTION 5 TIME MANAGEMENT	16

Appendices

Appendix 'A'	Checklist for the Submission of Construction Documents
Appendix 'B'	Sample Addendum Format
Appendix 'C'	Sample Index for Drawings and Specifications
Appendix 'D'	User Manual on Directory Structure and Naming Conventions Standards for Construction Tender Documents on CDROM, dated May 2005
Appendix 'E'	Basic Reference Guide on Converting Construction Drawings into Portable Document Format (PDF), dated May 2005

SECTION 1 INTRODUCTION

This document must be used in conjunction with the Terms of Reference (TOR), as the two documents are complimentary. The TOR describes project-specific requirements while this document deals with information common to all projects. In case of a conflict between the two documents, the requirements of the TOR override this document.

SECTION 2 PWGSC NATIONAL CADD STANDARD

Drawings shall be in accordance with PWGSC National CADD Standards and Canadian Standards Association (CSA) B78.3.

Refer to:

<http://www.tpsgc-pwgsc.gc.ca/biens-property/cdao-cadd/index-eng.html>

The above link is subject to change. The Consultant shall check with the Project Manager to ensure that the link and related information are current and relevant with regards to PWGSC National CADD Standards.

SECTION 3 GUIDE TO PREPARATION OF CONSTRUCTION DOCUMENTS FOR PWGSC

1 Purpose

This document provides direction in the preparation of construction contract documents (namely specifications, drawings and addenda) for Public Works and Government Services Canada (PWGSC).

Drawings, specifications and addenda must be complete and clear, so that a contractor can prepare a bid without guesswork. Standard practice for the preparation of construction contract documents requires that:

- drawings are the graphic means of showing work to be done, as they depict shape, dimension, location, quantity of materials and relationship between building components.
- specifications are written descriptions of materials and construction processes in relation to quality, colour, pattern, performance and characteristics of materials, installation and quality of work requirements.
- Addenda are changes to the construction contract documents or tendering procedures, issued during the tendering process.

2 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 site: <http://sacc.pwgsc.gc.ca/sacc/query-e.jsp>. Any questions should be directed to the Project Manager.

3 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.

SPECIFICATIONS

1 National Master Specification

The National Master Specification (NMS) is a master construction specification available in both official languages, which is divided into 48 Divisions and used for a wide range of construction and/or renovation projects. In preparing project specifications, the Consultant must use the current edition of the NMS in accordance with the "NMS User's Guide".

The Consultant retains overriding responsibility for content and shall edit, amend and supplement the NMS as deemed necessary to produce an appropriate project specification free from conflict and ambiguity.

2 Specification Organization

Narrowscope sections describing single units of work are preferred for more complex work, however, broadscope sections may be more suitable for less complex work. Use either the NMS 1/3 - 2/3 page format or the Construction Specifications Canada full-page format.

Start each Section on a new page and show Project Number, Section Title, Section Number and Page Number on each page. Specification date, project title, and consultant's name are not to be indicated.

3 Terminology

Use the term "Departmental Representative" instead of Engineer, PWGSC, Owner, Consultant or Architect. "Departmental Representative" means the person designated in the Contract, or by written notice to the Contractor, to act as the Departmental Representative for the purposes of the Contract, and includes a person, designated and authorized in writing by the Departmental Representative to the Contractor.

Notations such as: "verify on site", "as instructed", "to match existing", "example", "equal to" or "equivalent to", "to be determined on site by "Departmental Representative", should not be indicated in the specifications as this promotes inaccurate and inflated bids. Specifications must permit bidders to calculate all quantities and bid accurately. If quantities are impossible to identify (i.e. cracks to be repaired) give an estimated quantity for bid purposes (unit prices). Ensure that the terminology used throughout the specifications is consistent and does not contradict the applicable standard construction contract documents.

4 Dimensions

Dimensions are to be in metric only (no dual dimensioning).

5 Standards

As references in the NMS may not be up to date, it is the responsibility of the consultant to ensure that the project specification uses the latest applicable edition of all references quoted. The following is a list of some of the Internet websites which provide the most current publications of standards for reference in the construction specification document.

- CSA standards: <http://www.csa.ca>
- CGSB standards: <http://www.pwgsc.gc.ca/cgsb>
- ANSI standards: <http://www.ansi.org>
- ASTM Standards: <http://www.astm.org>
- ULC standards: <http://www.ulc.ca>
- General reference of standards: <http://www.cssinfo.com>

The NMS website (<http://www.tpsgc-pwgsc.gc.ca/biens-property/ddn-nms/index-eng.html>) also links to other documents references in the NMS under its "Links" feature.

6 Specifying Materials

The practice of specifying actual brand names, model numbers, etc., is against departmental policy except for special circumstances. The method of specifying materials shall be by using recognized standards such as those produced by Canadian Gas Association (CGA), Canadian General Standards Board (CGSB), Canadian Standards Association (CSA), and Underwriters' Laboratories of Canada (ULC), or by trade associations such as Canadian Roofing Contractors' Association (CRCA) and Terrazzo, Tile, Marble Association of Canada (TTMAC). Canadian standards should be used wherever possible.

If the above method cannot be used and where no standards exist, specify by a non-restrictive, non-trade name "prescription" or "performance" specifications.

In exceptional or justifiable circumstances or if no standards exist and when a suitable non-restrictive, non-trade name "prescription" or "performance" specification cannot be developed, specify by trade name. Include all known materials acceptable for the purpose intended, and in the case of equipment, identify by type and model number.

Acceptable Materials: set up the paragraph format as follows:

Acceptable Materials:

1. ABC Co. Model [_____].
2. DEF Co. Model [_____].
3. GHI Co. Model [_____].

Alternative materials to those specified may be considered during the solicitation period, however, the onus will be on the Consultant to review and evaluate all requests for approval of alternative materials.

The term "Acceptable Manufacturers" should not be used, as this restricts competition and does not ensure the actual material or product will be acceptable. A list of words and phrases that should be avoided is included in the NMS User's Guide.

Sole Sourcing: Sole sourcing for materials and work can be used for proprietary systems (ie. fire alarm systems, EMCS systems). **Substantiation and/or justification will be required.**

Wording for the sole source of work should be in Part 1 as:

Designated Contractor

- .1 Hire the services of [_____] to do the work of this section."

Wording for the sole source of EMCS systems should be in Part 1 as

Designated Contractor

- .1 Hire the services of [_____] or its authorized representative to complete the work of all EMCS sections."

and in Part 2 as Materials

- .1 There is an existing [_____] system presently installed in the building. All materials must be selected to ensure compatibility with the existing [_____] system.

Wording for the sole source of materials (ie. fire alarm systems) should be in Part 2 as:

Acceptable materials

.1 The only acceptable materials are [] .”

Prior to including sole source materials and/or work, the Consultant should contact the Project Manager to obtain the approval for the sole sourcing.

7 Unit Prices

Unit prices are used where the quantity can only be estimated (eg. earth work) and the approval of the Project Manager must be sought in advance of their use.

Use the following wording:

[The work for this section] or [define the specific work if required, e.g. rock excavation] will be paid based on the actual quantities measured on site and the unit prices stated in the Bid and Acceptance Form.

In each applicable NMS section, replace paragraph title "Measurement for Payment" with "Unit Prices".

Sample of Unit Price Table:

The Unit Price Table designates the Work to which a Unit Price Arrangement applies.

- (a) The Price per Unit and the Estimated Total Price must be entered for each Item listed.
- (b) Work included in each item is as described in the referenced specification section.

Item	Specification Reference	Class of Labour, Plant or Material	Unit of Measurement	Estimated Quantity	Price per Unit GST/HST extra	Estimated Total Price GST / HST extra
TOTAL ESTIMATED AMOUNT						
Transfer amount to subparagraph 1)(b) of BA03						

8 Cash Allowances

Construction contract documents should be complete and contain all of the requirements for the contractual work. Cash allowances are to be used only under exceptional circumstances (ie. utility companies, municipalities), where no other method of specifying is appropriate. Obtain approval from the Project Manager in advance to include cash allowances and then use "Section 01 21 00 - Allowances" of the NMS to specify the criteria.

9 Warranties

It is the practice of PWGSC to have a 12 month warranty and to avoid extending warranties for more than 24 months. When necessary to extend beyond the 12 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 "Extended Warranty":

- "For the work of this Section [], the 12 month warranty period 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 [] the 12 month ... [] months."

Delete all references to manufacturers' guarantees.

10 Scope of Work

No paragraphs noted as "Scope of Work" are to be included.

11 Summary and Section Includes in Part -1 General of Section

Do not use "Summary" and "Section Includes."

12 Related Sections

In every section of the specification at 1.1 "Related Sections": coordinate the list of related sections and appendices. Ensure co-ordination among the sections of the specification and ensure not to reference any section or appendices which do not exist.

13 Index

List all the plans and specification sections with correct number of pages, section names and correct drawing titles in the format shown in Appendix A.

14 Regional Guide

The Consultant should contact the Project Manager to obtain the region's requirements for Division 01 or other short form specifications as might be appropriate. For example, it is required in the National Capital Region that regional Section 01 00 10 - General Instructions be used on all projects.

15 Health and Safety

It is required that all project specifications include "Section 01 35 29.06 - Health and Safety Requirements." Confirm with the Project Manager to determine if there are any instructions to meet regional requirements.

16 Designated Substances Report

Include "Section 01 14 25 - Designated Substances Report"

17 Subsurface Investigation Reports

Subsurface Investigation Report(s) are to be included after Section 31 and the following paragraph should be added to Section 31:

Subsurface investigation report(s)

.1 Subsurface investigation report(s) are included in the specification following this section.

When the Project Manager determines that it is not practical to include the subsurface investigation report(s), alternate instructions will be provided.

Where tender documents are to be issued in both official languages, the subsurface investigation report(s) shall be issued in both languages.

In addition to the provision of the Subsurface Investigation Report, the foundation information required by the National Building Code of Canada 2005 (Division C, Part 2, 2.2.4.6) shall be included on foundation drawings.

18 Experience and Qualifications

Remove experience and qualification requirements from specification sections.

19 Prequalification and Pre-award submissions

Do not include in the specification any mandatory contractor and/or subcontractor prequalification or pre-award submission requirements that could become a contract award condition. If a prequalification process or a pre-award submission is required, contact the Project Manager.

There should be no references to certificates, transcripts or license numbers of a trade or subcontractor being included with the bid.

20 Contracting Issues

Specifications describe the workmanship and quality of the work. Contracting issues should not appear in the specifications. Division 00 of the NMS is not used for PWGSC projects.

Remove all references within the specifications, to the following:

- General Instructions to Bidders
- General Conditions
- CCDC documents
- Priority of documents
- Security clauses
- Terms of payment or holdback
- Tendering process
- Bonding requirements
- Insurance requirements
- Alternative and separate pricing
- Site visit (Mandatory or Optional)
- Release of Lien and deficiency holdbacks

DRAWINGS

1 Title Blocks

Use PWGSC title block for drawings and sketches (including addenda).

2 Dimensions

Dimensions are to be in metric only (no dual dimensioning).

3 Trade Names

Trade names on drawings are not acceptable. Refer to SECTION 3, SPECIFICATIONS, 6.0 Specifying Materials for specifying materials by trade name.

4 Specification Notes

No specification type notes are to appear on any drawing.

5 Terminology

Use the term "Departmental Representative" instead of Engineer, PWGSC, Owner, Consultant or Architect. "Departmental Representative" means the person designated in the Contract, or by written notice to the Contractor, to act as the Departmental Representative for the purposes of the Contract, and includes a person, designated and authorized in writing by the Departmental Representative to the Contractor.

Notations such as: "verify on site", "as instructed", "to match existing", "example", "equal to" or "equivalent to", "to be determined on site by "Departmental Representative", should not be indicated in the specifications as this promotes inaccurate and inflated bids. Specifications must permit bidders to calculate all quantities and bid accurately. If quantities are impossible to identify (i.e. cracks to be repaired) give an estimated quantity for bid purposes (unit prices). Ensure that the terminology used throughout the specifications is consistent and does not contradict the applicable standard construction contract documents.

6 Information to be included

Drawings should show the quantity and configuration of the project, the dimensions and details of how it is constructed. There should be no references to future work and no any information that will be changed by future addenda. The scope of work should be clearly detailed and elements not in contract should be eliminated or kept to an absolute minimum.

7 Drawing Numbers: Number drawings in sets according to the type of drawing and the discipline involved as follows (The requirements of SECTION 2 PWGSC NATIONAL CADD STANDARD will supercede these requirements, where warranted).

During the Design Phase of the project each submission and review must be noted on the Notes block of the drawing title, but at the time of construction document preparation, all revision notes should be removed.

Discipline	Drawing
Demolition	D1, D2, etc.
Architectural	A1, A2, etc.
Civil	C1, C2, etc.
Landscaping	L1, L2, etc.
Mechanical	M1, M2, etc.
Electrical	E1, E2, etc.
Structural	S1, S2, etc.
Interior Design	ID1, ID2, etc.

- 8 Presentation Requirements:** Present drawings in sets comprising the applicable demolition, architectural, structural, mechanical and electrical drawings in that order. All drawings should be of uniform standard size.
- 9 Prints:** Print with black lines on white paper. Blue prints are acceptable for document submissions at 33%, 66% and 99% stages. Confirm with Project Manager the size of prints to be provided for review purposes.
- 10 Binding:** 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.
- 11 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.
- 12 Schedules:** Where schedules occupy entire sheets, locate them next to the plan sheets or at the back of each set of drawings for convenient reference. *See CGSB 33-GP-7 Architectural Drawing Practices for schedule arrangements.*
- 13 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.
- 14 Drawing Symbols:** Follow generally accepted drawing conventions, understandable by the construction trades, and in accordance with PWGSC publications.

ADDENDA

1 Format

Prepare addenda using the format shown in Appendix B. No signature type information is to appear.

Every page of the addendum (including attachments) must be numbered consecutively. All pages must have the PWGSC project number and the appropriate addendum number. Sketches shall appear in the PWGSC format, stamped and signed.

No Consultant information (name, address, phone #, consultant project # etc.) should appear in the addendum or its attachments (except on sketches).

2 Content

Each item should refer to an existing paragraph of the specification or note/detail on the drawings. The clarification style is not acceptable.

DOCUMENTATION

Translation

When required, all documentation included in the construction contract documents shall be in both official languages.

Ensure that English and French documents are equal in all respects. There can be no statement that one version takes precedence over the other.

Consultant shall provide:

- Per construction document submission, a completed and signed Checklist for the Submission of Construction Documents. See Appendix 'A'.
- Specification: originals printed one side on 216 mm x 280 mm white bond paper.
- Index: as per Appendix 'C'
- Addenda (if required): as per Appendix 'B' (to be issued by PWGSC).
- Drawings: reproducible originals, sealed and signed by the design authority.
- Tender information:
 - Including a description of all units and estimated quantities to be included in unit price table.
 - Including a list of significant trades including costs. PWGSC will then determine which trades, if any, will be tendered through the Bid Depository.
 - Government Electronic Tendering System (MERX): Consultants to provide an electronic true copy of the final documents (specifications and drawings) on one or multiple CD-ROM in Portable Document Format (PDF) without password protection and printing restrictions. The electronic copy of drawings and specifications is for bidding purposes only and do not require to be signed and sealed. See Appendix 'D' and Appendix 'E'.

PWGSC shall provide:

- General and Special Instructions to Bidders
- Bid and Acceptance Form
- Standard Construction Contract Documents



SECTION 4 CLASSES OF CONSTRUCTION COST ESTIMATES USED BY PWGSC

DESCRIPTION OF THE CLASSES OF ESTIMATES USED BY PWGSC FOR CONSTRUCTION COSTING OF BUILDINGS PROJECTS

Class 'D' (Indicative) Estimate:

Based upon a comprehensive statement of requirements, and an outline of potential solutions, this estimate is to provide an indication of the final project cost, and allow for ranking all the options being considered.

Submit Class D cost estimates in elemental cost analysis format latest edition issued by the Canadian Institute of Quantity Surveyors with cost per m² for current industry statistical data for the appropriate building type and location. Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.

The level of accuracy of a class D cost estimate shall be such that no more than a 20% contingency allowance is required.

Class 'C' Estimate:

Based on a comprehensive list of requirements and assumptions, including a full description of the preferred schematic design option, construction/design experience, and market conditions. This estimate must be sufficient for making the correct investment decision.

Submit Class C cost estimates in elemental cost analysis format latest edition issued by the Canadian Institute of Quantity Surveyors with cost per m² for current industry statistical data for the appropriate building type and location. Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.

The level of accuracy of a class C cost estimate shall be such that no more than a 15% contingency allowance is required.

Class 'B' (Substantive) Estimate:

Based on design development drawings and outline specifications, which include the design of all major systems and subsystems, as well as the results of all site/installation investigations. This estimate must provide for the establishment of realistic cost objectives and be sufficient to obtain effective project approval.

Submit Class B cost estimates in elemental cost analysis format latest edition issued by the Canadian Institute of Quantity Surveyors. Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.

The level of accuracy of a class B cost estimate shall be such that no more than a 10% design contingency allowance is required.

Class 'A' (Pre-Tender) Estimate:

Based on completed construction drawings and specifications prepared prior to calling competitive tenders. This estimate must be sufficient to allow a detailed reconciliation/negotiation with any contractor's tender.

Submit Class A cost estimates in both elemental cost analysis format and trade divisional format latest edition issued by the Canadian Institute of Quantity Surveyors. Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.

The level of accuracy of a class A cost estimate shall be such that no more than a 5% design contingency allowance is required.

SECTION 5 TIME MANAGEMENT

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 presently utilizes the Primavera Suite software and 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.

1.1 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.

1.2 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.

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.

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.

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.

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.

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.

Activity List

An Activity List identifies all activities including milestones required to complete the whole project.

Milestone List

A Milestone List identifies all project Major and Minor milestones.

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.

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.

1.3 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 Baseline. 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.

1.4 Schedule Monitoring and Control

Once Baseline 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)

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

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.

1.5 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);

1.6 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.

APPENDIX 'A' - Checklist for the Submission of Construction Documents to PWGSC

Last updated November 21, 2012

Date:		
Project Title:	Project Location:	
Project Number:	Contract Number:	
Consultant's Name:	PWGSC Project Manager:	
Review Stage:	66%	99%
	100%	

Item	Verified by:	Comments:	Action by:
Specifications:			
1 National Master Specifications			
1a The current edition of the NMS has been used.			
1b Sections have been included for all work identified on drawings and sections edited.			
2 Specification Organization			
2a Either the NMS 1/3 - 2/3 page format or the Construction Specifications Canada full page format is used.			
2b Each Section starts on a new page and the Project Number, Section Title, Section Number and Page Number show on each page.			
2c Specification date and consultant's name are not indicated.			
3 Terminology			
3a The term Departmental Representative is used instead of Engineer, PWGSC, Owner, Consultant or Architect.			
3b Notations such as: "verify on site", "as instructed", "to match existing", "example", "equal to", "equivalent to" and "to be determined on site by" are not used.			
4 Dimensions			
4a Dimensions are provided in metric only.			
5 Standards			
5a The latest edition of all references quoted is used.			

6 Specifications Materials			
6a The method of specifying materials uses recognized standards. Actual brand names and model numbers are not specified.			
6b Materials are specified using standards and performance criteria (if not, the correct form of acceptable materials has been used).			
6c Identify if non-restrictive, non-trade name “prescription” or “performance” specifications are used.			
6d Indicate if a list of acceptable materials have been used.			
6e The term “Acceptable Manufacturers” is not used.			
6f No sole sourcing has been used.			
6g If sole sourcing has been used, the correct wording has been used and a justification provided to RPCD for the sole sourced products.			
7 Unit Prices			
7a Unit prices are used only for work that is difficult to estimate.			
8 Cash Allowances			
8a Indicate if cash allowances have been used.			
9 Warranties			
9a Indicate if warranties extend more than a 12 or 24 months period.			
9b Manufacturers guarantees are not indicated.			
10 Scope of Work			
10 No paragraphs noted as “Scope of Work” are included.			
11 Summary and Section Includes			
11a In part 1 of section, paragraphs “Summary” and “Section Includes” are not used.			
12 Related Sections			
12a The list of related sections and appendices are coordinated.			
13 Index			
13a The index shows a complete list of plans and specification sections with the correct number of pages and correct drawing titles and section names.			
14 Regional Guide Specifications			
14a General Instructions is included (Section 01 00 10 in the NCA).			

15 Health and Safety			
15a Section 01 35 29.06 - Health and Safety Requirements is included.			
16 Designated Substances Report			
16 a Section 01 14 25 - Designated Substances Report is included.			
17 Subsurface Investigation Reports			
17a Subsurface Investigation Reports are included in Division 31.			
18 Experience and qualifications			
18a Experience and qualification requirements do not appear in the specification sections			
19 Pre-qualifications			
19a There are no mandatory contractor and/or subcontractor pre-qualification requirements or references to certificates, transcripts or license numbers of a trade or subcontractor being included in the bid.			
20 Contracting Issues			
20a Contracting issues do not appear in the specifications.			
20b Division 00 of the NMS is not used.			
21 Quality Issues			
21a There are no specification clauses with square brackets “[]” or lines “_” indicating that the document is incomplete or missing information.			

Item	Verified by:	Comments:	Action By:
Drawings:			
1 Title Blocks			
1a The PWGSC title block is used.			
2 Dimensions			
2a Dimensions are provided in metric only.			
3 Trade Names			
3a Trade names are not used.			
4 Specification Notes			
4a There is no specification type notes.			
5 Terminology			
5a The term Departmental Representative is used instead of Engineer, PWGSC, Owner,			

Consultant or Architect.			
5b Notations such as: “verify on site”, “as instructed”, “to match existing”, “example”, “equal to”, “equivalent to” and “to be determined on site by” are not used.			
6 Information to be included			
6a Architectural and Engineering Drawings have been stamped and signed by the design authority.			
6b The project quantity and configuration, dimensions and construction details are included.			
6c References to future work and elements not in contract do not appear or are kept to an absolute minimum and clearly marked.			

I confirm that the plans and specifications have been thoroughly reviewed and that the items listed above have been addressed or incorporated. I acknowledge and accept that by signing, I am certifying that all items noted above have been addressed.

Consultant's Representative: _____

Firm name: _____

Signature: _____ Date: _____

APPENDIX 'B' - Sample of Addendum

Last updated April 22, 2008

ADDENDUM No. _____

Project Number: _____

The following changes in the bid documents are effective immediately. This addendum will form part of the contract documents

DRAWINGS

SPEC NOTE: indicate drawing number and title, then list changes or indicate revision number and date, and re-issue drawing with addendum.

- 1 A1 Architectural
 .1

SPECIFICATIONS

SPEC NOTE: indicate section number and title.

- 1 Section 01 00 10 - General Instructions

SPEC NOTE: list all changes (i.e. delete, add or change) by article or paragraph

- .1 Delete article (xx) entirely.
- .2 Refer to paragraph (xx.x) and change ...
- 2 Section 23 05 00 - Common Work Results - Mechanical
- .1 Add new article (x) as follows:

APPENDIX 'C' - Sample of Index

Last updated April 22, 2008

Project No: _____

Index
Page 1 of ____

DRAWINGS AND SPECIFICATIONS

DRAWINGS:

SPEC NOTE: List all Drawings by number and title.

- C-1 Civil
- L-1 Landscaping
- A-1 Architectural
- S-1 Structural
- M-1 Mechanical
- E-1 Electrical

SPECIFICATIONS:

SPEC NOTE: List all Divisions, Sections (by number and title) and number of pages.

<u>DIVISION</u>	<u>SECTION</u>	NO. OF PAGES
DIVISION 01	01 00 10 - General Instructions.....XX
	01 14 25 - Designated Substances Report.....XX
	01 35 30 - Health and Safety.....XX
DIVISION 23	23 xx xx	
DIVISION 26	26 xx xx	

APPENDIX 'D'

USER MANUAL ON DIRECTORY STRUCTURE AND NAMING CONVENTION STANDARDS FOR CONSTRUCTION TENDER DOCUMENTS ON CD ROM

Issued by:

Real Property Contracting Directorate

PWGSC

May 2005

Last Updated: June 3, 2008

Version 1.0

PREFACE

The Government of Canada (GoC) has committed to move towards an electronic environment for the majority of the services it offers. This covers the advertisement and distribution of contract opportunities, including construction solicitations. As a result, it is necessary to obtain a copy of construction drawings and specifications (in PDF format **without** password protection) on one or multiple CD-ROM to facilitate for the GoC the transfer of the construction drawings and specifications electronically to the Government Electronic Tendering System (GETS).

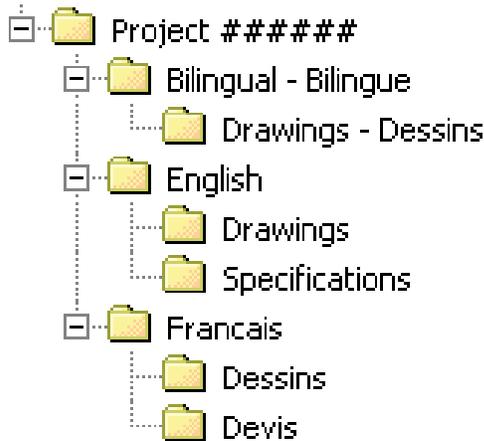
There is therefore a need to adopt a common directory structure and file-naming convention to ensure that the information made available to contractors electronically and in hard (printed) copy is in accordance with the sequence adopted in the real property industries, both for design and construction. This manual defines the standard to be followed by both consultants and print shops at time of formatting and organizing the information, whether drawings and specifications are created by scanning print documents or saved as PDF files from the native software (AutoCAD, NMS Edit, MS-Word, etc...) in which these were created.

It is important to note that the procedure described in this manual is not an indication that consultants are relieved from following the established standards for the production of drawings and specifications. The sole purpose of this manual is to provide a standard for the organization and naming of the electronic files that will be recorded on CD-ROM.

1. DIRECTORY STRUCTURE

1.1 1st, 2nd and 3rd Tier Sub-Folders

Each CD-ROM, whether it is for the original solicitation (tender call) or for an amendment (addendum), must have the applicable elements of the following high-level Directory Structure created:



The following important points are to be noted about the Directory Structure:

- The “*Project #####*” folder is considered the 1st Tier of the Directory Structure where *#####* represents each digit of the Project Number. The Project Number must always be used to name the 1st Tier folder and it is always required. Free text can be added following the Project Number, to include such things as a brief description or the project title;
- The “*Bilingual - Bilingue*”, “*English*” and “*Français*” folders are considered the 2nd Tier of the Directory Structure. The folders of the 2nd Tier **cannot** be given any other names since GETS uses these names for validation purposes. At least one of the “*Bilingual - Bilingue*”, “*English*” and “*Français*” folders is always required, and these must always have one of the applicable sub-folders of the 3rd Tier;
- The “*Drawings - Dessins*”, “*Drawings*”, “*Specifications*”, “*Dessins*” and “*Devis*” folders are considered the 3rd Tier of the Directory Structure. The folders of the 3rd Tier **cannot** be given any other names since GETS also uses these names for validation purposes. There must be always at least one of the applicable 3rd Tier folder in each document.

IMPORTANT: The applicable elements of the Directory Structure (1 st , 2 nd and 3 rd Tier folders) are always required and cannot be modified.

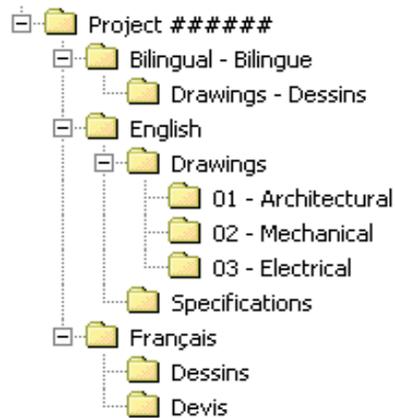
1.2 4th Tier Sub-Folders for Drawings

The “*Drawings – Dessins*”, “*Drawings*” and “*Dessins*” folders must have 4th Tier sub-folders created to reflect the various disciplines of the set of drawings.

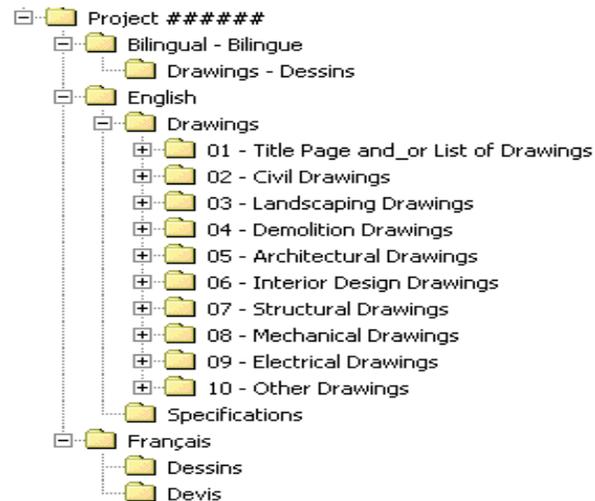
Because the order of appearance of the sub-folders on the screen will also determine the order of printing, it is necessary to start with a number the identification name of the sub-folders in the “Drawings – Dessins”, “Drawings” and “Dessins” folders.

Note: The first sub-folder must be always reserved for the Title Page and/or the List of Drawings unless the first drawing of the set is an actual numbered discipline drawing.

Examples of 4th Tier sub-folders for drawings:



or



1.2.1 Naming Convention

The 4th Tier sub-folders for drawings must adhere to the following standard naming convention.

For the “Drawings” and “Dessins” folders:

- Y

Where:

= A two digit number ranging from 01 to 99 (leading zeros must be included)

Y = The title of the folder

Example: 03 – Mechanical

For the “Drawings - Dessins” folder:

- Y - Z

Where:

= A two digit number ranging from 01 to 99 (leading zeros must be included)

Y = The English title of the folder

Z = The French title of the folder

Example: 04 - Electrical - Électricité

It should be noted that the numbering of the 4th Tier sub-folders is for sorting purposes only and is not tied to a specific discipline. For example, “*Architectural*” could be numbered 05 for a project where there is four other disciplines before “*Architectural*” in the set of drawings or 01 in another project where it’s the first discipline appearing in the set.

It is essential to ensure that the order of the drawings on the CD-ROM be exactly the same as in the hard copy set. GETS will sort each drawing for both screen display and printing as per the following rules:

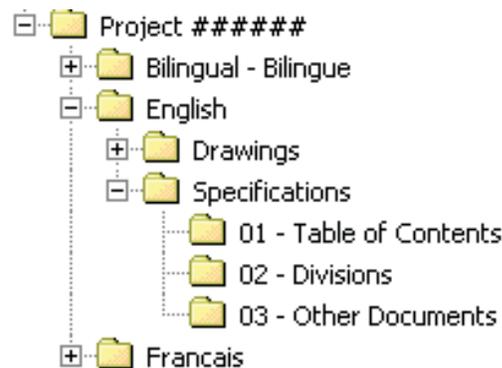
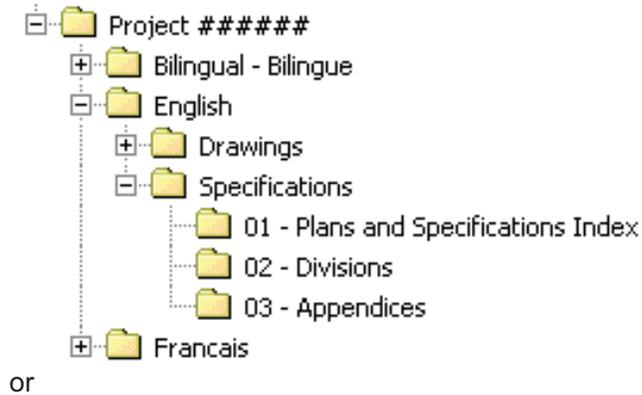
- The alphanumerical sorting is done on an ascending order;
- The alphanumerical order of the sub-folders determines the order of appearance on the screen as well as the order of printing (as an example: all the drawing PDF files in the 01 sub-folder will be printed in alphanumerical order before the drawings in the 02 sub-folder etc...);
- Each drawing PDF file within each sub-folder will also be sorted alphanumerically. This will determine the order of appearance on the screen as well as the order of printing (i.e. Drawing A001 will be printed before Drawing A002, Drawing M02 before Drawing M03, etc...).

1.3 4th Tier Sub-Folders for Specifications

The “*Specifications*” and “*Devis*” folders must have 4th Tier sub-folders created to reflect the various elements of the specifications.

Because the order of appearance of the sub-folders on the screen will also determine the order of printing, it is necessary to start with a number the identification name of the sub-folders in the “Specifications” and “Devis” folders.

Examples of 4th Tier sub-folders for specifications:



1.3.1 Naming Convention

The 4th Tier sub-folders for specifications must adhere to the following standard naming convention.

For the “Specifications” and “Devis” folders:

- Y

Where:

= A two digit number ranging from 01 to 99 (leading zeros must be included)

Y = The title of the folder

Example: 02 – Divisions

It should be noted that the numbering of the 4th Tier sub-folders is for sorting purposes only and is not tied to an element of the specifications.

It is essential to ensure that the order of the elements of the specifications on the CD-ROM be exactly the same as in the hard copy. GETS will sort each element of the specifications for both

screen display and printing as per the following rules:

- The alphanumerical sorting is done on an ascending order;
- The alphanumerical order of the sub-folders determines the order of appearance on the screen as well as the order of printing (as an example: all the specifications PDF files in the 01 sub-folder will be printed, in alphanumerical order before the PDF files in the 02 sub-folder, etc...);
- Each specifications PDF file within each sub-folder will also be sorted alphanumerically. This will determine the order of appearance on the screen as well as the order of printing (i.e. Division 01 will be printed before Division 02, 01 - Appendix A before 02 - Appendix B, etc...).

2. NAMING CONVENTION FOR PDF FILES

Each drawing, specifications division or other document that are part of the tender documents must be converted in PDF format (without password protection) in accordance with the following standard naming convention and each PDF file must be located in the appropriate sub-folder of the Directory Structure.

2.1 Drawings

Each drawing must be a **separate single page** PDF file. The naming convention of each drawing must be:

X### - Y

Where:

X = The letter or letters from the drawing title block (“A” for Architectural or “ID” for Interior Design for example) associated with the discipline

= The drawing number from the drawing title block (one to three digits)

Y = **The drawing name from the drawing title block (for bilingual drawings, the name in both English and French is to appear)**

Example: A001 - First Floor Details

Each drawing that will be located in the appropriate discipline 4th Tier sub-folders must be named with the same letter (“A” for Architectural Drawings for example) and be numbered. The drawing number used to name the PDF file must match as much as possible the drawing number of the actual drawing (the exception being when leading zeros are required).

The following important points about drawings are to be noted:

- The drawing PDF files within each sub-folder are sorted alphanumerically for both displaying and printing. If there are more than 9 drawings in a particular discipline the numbering must use at least two numerical digits (i.e. A01 instead of A1) in order to avoid displaying drawing A10 between A1 and A2. The same rule applies when there are more than 99 drawings per discipline i.e. three digits instead of two must be used for the numbering (for example M003 instead of M03);

- If drawing PDF files are included in the “*Bilingual - Bilingue*” folder, these cannot be included as well in the “*English*” and/or “*Français*” folders;
- If drawings not associated with a particular discipline are not numbered (Title Page or List of Drawings for example), these will be sorted alphabetically. While this does not represent a problem if there is only one drawing in the sub-folder, it could disrupt the order when there are two or more drawings. If the alphabetical order of the drawings name does not represent the order on the hard copy set, the drawings are to be named as per the following standard convention when converted in PDF format to ensure proper display and printing order.

- Y

Where:

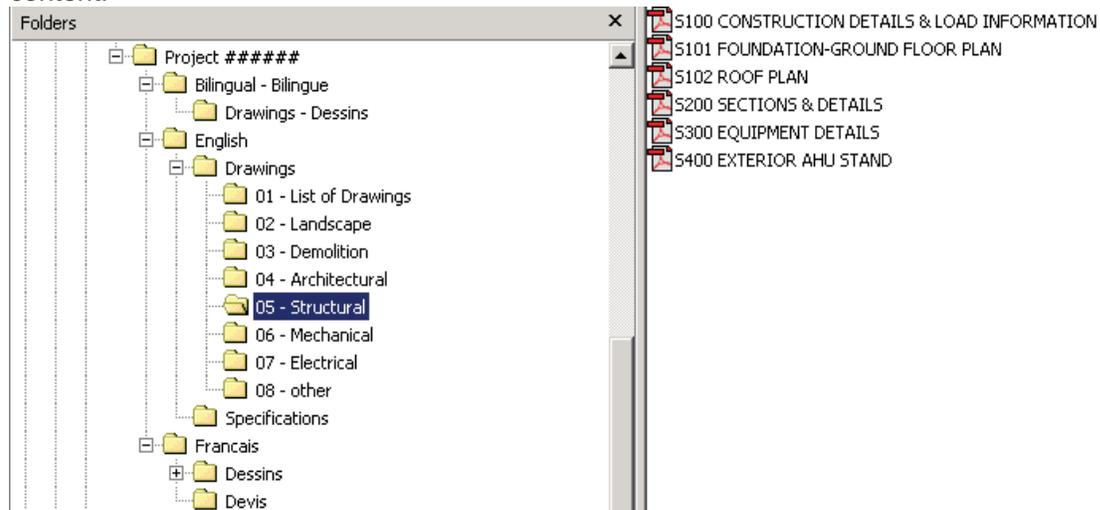
= A two digit number ranging from 01 to 99 (leading zeros must be included)

Y = The name of the drawing

Example: 01 - Title Page
02 - List of Drawings

If numbers are not used in the PDF files name, “*List of Drawings*” will be displayed before “*Title Page*” because “*L*” comes before “*T*” in the alphabet.

Example of a 4th Tier Drawings sub-folder’s content:



2.2. Specifications

Each Specifications Division must be a separate PDF file and all pages contained in each PDF file must have the same physical size (height, width). The Plans and Specifications Index must

also be a separate PDF file. If there are other documents that are part of the Specifications (e.g. Appendix or other) these are to be separate PDF files as well.

2.2.1 Documents other than Specifications Divisions

Because PDF files within the Specifications sub-folders are sorted alphanumerically (in ascending order) for both on screen display and printing order, all files that appear in folders other than the “*Divisions*” sub-folder must be named using a number:

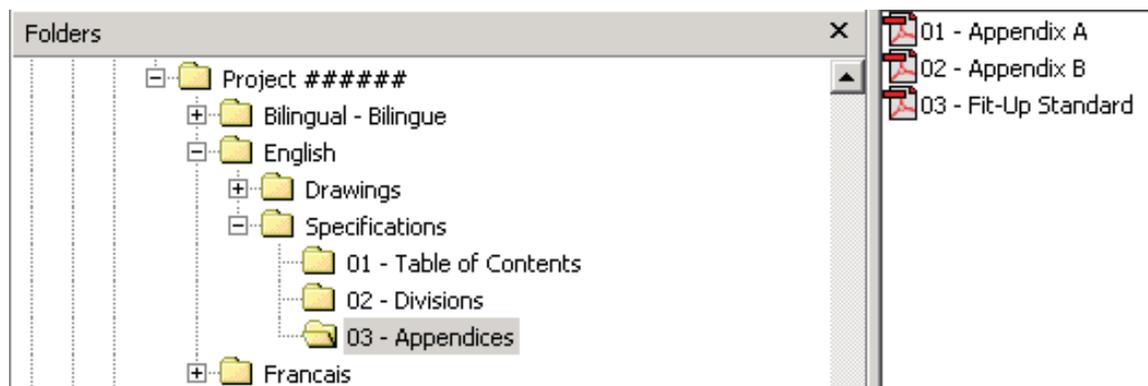
- Y

Where:

= Two digit number ranging from 01 to 99 with leading zeros required
Y = Name of the document

Example: 01 - Plans and Specifications Index

Example of a sub-folder content (sub-folder other than “*Divisions*”):



2.2.2 Specifications Divisions

The Specifications Divisions must be named as follows:

Division ## - Y

Where:

Division ## = The actual word “*Division*” followed by a space and a two digit number ranging from 01 to 99 (with leading zeros required)

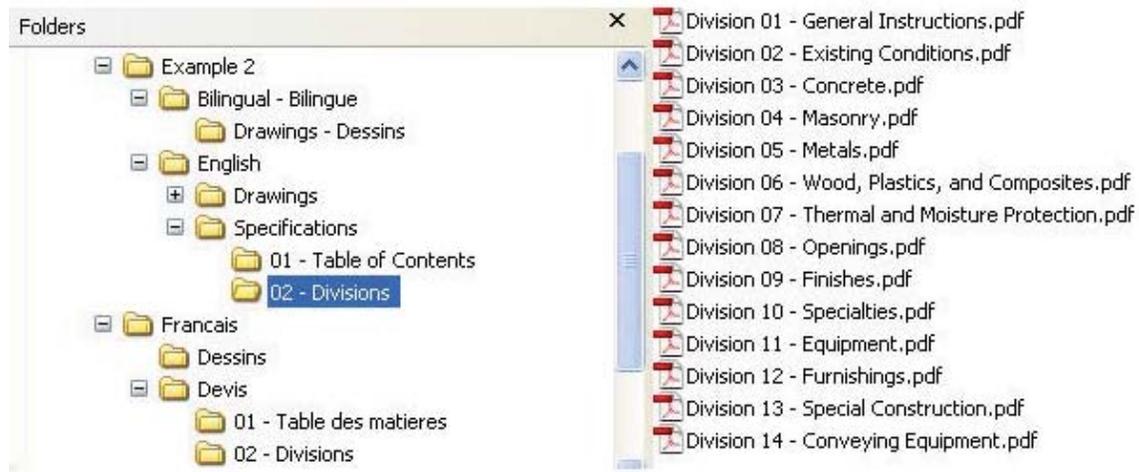
Y = Name of the Specifications Division as per **CSC/CSI MasterFormat™**

Example: Division 05 – Metals

The following important point about specifications is to be noted:

- The Numbering of the Divisions **cannot** be altered from **CSC/CSI MasterFormat™** even if some Divisions are not used in a given project. For example, Division 05 will always remain Division 05 even if Division 04 is not used for a given project.

Example of a “Divisions” sub-folder content:



3. CD-ROM LABEL

Each CD-ROM is to be labeled with the following information:

Project Number / Numéro de projet
Project Title / Titre du projet
Documents for Tender / Documents pour appel d'offres
CD X of/de X

Example:

Project 123456 / Projet 123456
Repair Alexandra Bridge / Réparation du pont Alexandra

Documents for Tender / Documents pour appel d'offres
CD 1 of/de 1

APPENDIX 'E'

BASIC REFERENCE GUIDE ON CONVERTING CONSTRUCTION DRAWINGS INTO PORTABLE DOCUMENT FORMAT (PDF)

Issued by:
Real Property Contracting Directorate
PWGSC

May 2005 Last Updated: May 3, 2005

Version 1.0

PREFACE

Portable Document Format (PDF) is the standard format for documents that are posted on the Government Electronic Tendering System (GETS). There is therefore a need to obtain from architectural and engineering consultants an electronic copy of drawings and specifications in PDF for tendering Government of Canada (GoC) construction projects.

In order to have the highest quality in term of resolution and printing, consultants should to the greatest extent possible have the PDF drawing and specification files derived from the native software in which they were created. Scanning is permissible but only in special circumstances, for example when there is no electronic version of a drawing being included in a construction tender package.

The purpose of this document is to provide basic information on the conversion of Computer Aided Design and Drafting (CADD) drawings in PDF. Creating a PDF file from a CADD drawing is a relatively simple process once all the necessary configurations and settings are in place. It actually should not take any longer than it would take to create a plot file or to send a drawing to a printer. The information in this guide is not intended to cover all technical aspects of the conversion, which can be done using various methods, but rather to highlight important points about the process and file settings. The conversion of specifications is not covered in this basic reference guide since it does not require any special configuration or setting.

The information provided in this basic reference guide is not an indication that consultants are relieved 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.

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. Before creating a PDF file from a CADD drawing, a choice must be made as to which one will be used.

Acrobat PDF Writer is a non-PostScript printer driver that works best with documents that don't contain complex graphics

Acrobat Distiller is a PostScript printer driver that works best with documents that contain PostScript fills, Encapsulated PostScript (EPS) graphics, or other complex elements.

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.

2. PRINTER CONFIGURATION

Before converting a CADD drawing to PDF, an Acrobat printer configuration file for the PDF paper size needs to be created. This function can be done in the CADD software rather than using a custom paper size defined for the Acrobat distiller feature. The recommended method is to add a PostScript Adobe plotter in the CADD software and making the necessary setting in terms of media source and size, scale and orientation. The configuration can then be re-used to simplify the conversion process for future files that use the same page size.

As an alternative, although not recommended, a custom-defined size can be created in Acrobat Distiller in the *properties* menu.

3. CREATING PDF FILES

Once the printer configuration has been done in the CADD software, open up Acrobat Distiller and make the necessary settings in the *preferences* and *job options* sub-menu. Ensure that the page size match the sheet size selected in the CADD software to create the file. Particular settings can be saved under different names for future use.

With the Acrobat Distiller application open, ensure the required sheet size is displayed in the *job options* window. Then it is simply a matter of bringing the CADD file into the Acrobat Distiller creation box.

A progress bar will show during the conversion and the newly converted PDF file should open up and be displayed for verification.

4. PDF FILES SETTINGS

4.1 Security

Adobe Acrobat contains security features that can be used to secure the files by restricting any changes to the files. However, since the files will be posted on GETS and will be used for printing copies, the files **must not** be password protected and **must** allow printing.

4.2 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. This can be achieved by adjusting the setup of the plotter. If the drawing is not oriented properly after the conversion, it can be rotated manually within Adobe Acrobat.

4.3 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*.

4.4 Resolution

Since the PDF files will be used for printing, it is important that a proper resolution be selected. It is recommended to select 600 dots per inch (dpi).

4.5 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.

5. SCANNING

Scanning is not recommended and should be done only when the drawing is not available electronically. When scanning a drawing, it is important that it be done in real size (scale 1:1) to ensure that the scale remains intact in subsequent printing. It is recommended that each scanned drawing be opened and verified to ensure that the resolution, scale and border are of an acceptable quality.

6. FINAL CHECKLIST

When the drawing file has gone through the PDF conversion, it is recommended to open it 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

7. 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.

Solicitation No. - N° de l'invitation

EQ754-171285/A

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

R.076951.138

Amd. No. - N° de la modif.

File No. - N° du dossier

PWL-6-39078

Buyer ID - Id de l'acheteur

pw1041

CCC No./N° CCC - FMS No/ N° VME

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

INTRODUCTION	4
1.1 Contract Drawing Frame	5
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
1.2 Folder Structure.....	9
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
1.3 CADD File Naming Conventions.....	10
1.3.1 Reference Files.....	12
1.3.1.1 Making Reference Files Portable.....	12
1.3.2 Drawing File Layout	12
1.4 Layers.....	13
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
1.5 Annotation Scaling.....	16
1.6 Dimension Styles	16
1.6.1 Guidelines for Dimensioning.....	17
1.6.1.1 Dimension Scale	18
1.7 Text Style and Size	18
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
1.8 Blocks	20
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





1.9	Patterns or Hatching.....	23
1.10	Element Offset Distances.....	23
AS-BUILT DRAWINGS		24
2.0	Definitions.....	24
2.1	Procedure.....	24
2.2	Submission.....	24

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:

David Rowan

Senior Engineering, Design Technologist		Ingénieur Principale, Dessin Technologie
Heritage Canals & Engineering Works		Canaux historiques et travaux d'ingénierie
Professional and Technical Services		Services professionnels et techniques
Ontario Region		Région de l'Ontario
Public Works and Government Services Canada		Travaux publics et Services Gouvernementaux Canada

2720 Riverside Drive
Sir Charles Tupper Building, A-wing Level A0
Ottawa ON K1A 0S5
Tel./Tél: 613-736-2972 Fax/Télé. 613-736-2887
E-mail / Courriel: David.Rowan@pwgsc-tps.gc.ca

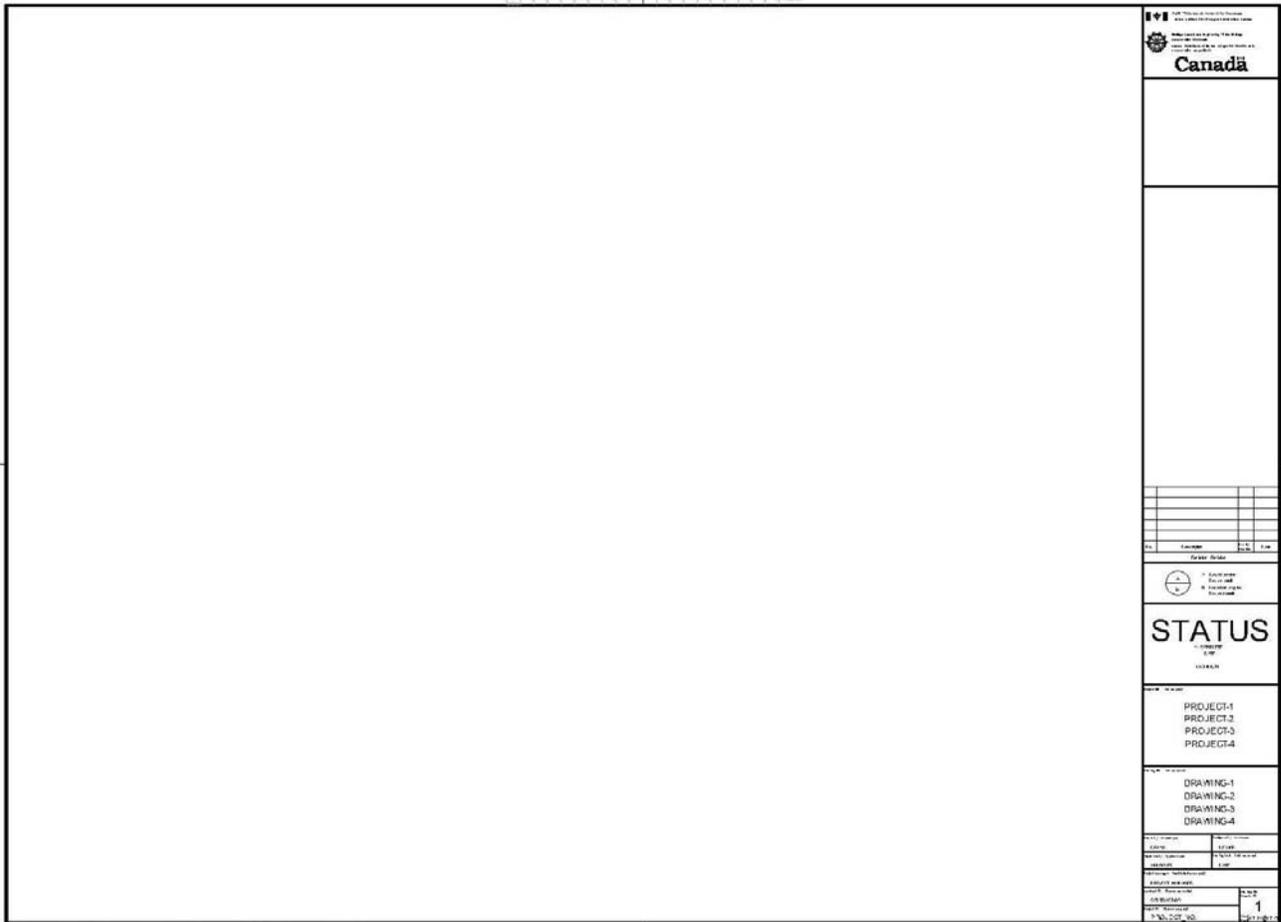




1.1 Contract Drawing Frame

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



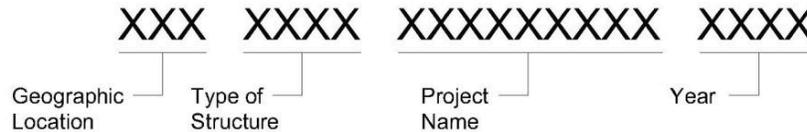


1.1.5 Plotting of Filename, Path, Date, and Time

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

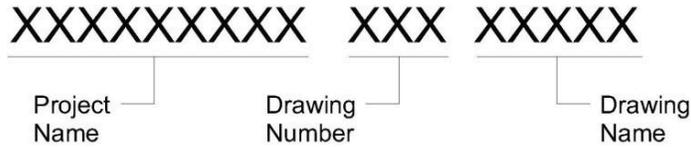
When CADD files are saved for major milestones, the references and all other supporting files, sketches and images shall be placed in the same folder as the contract drawing files. The folder name shall reflect the milestone for which it is being submitted.

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 XXXXXXXXXXX xxx xxxxx

The project name field is populated with the name of the project, shortened or abbreviated, as required.

Drawing Number Field xxxxxxxxxxx **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 xxxxxxxxxxx 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:

- | | |
|--|---------------------------------------|
| Cov - Cover | BmDim - Beam Dimensions |
| GA - General Arrangement | BmReinf - Beam Reinforcing |
| Stage - Construction Staging Plan | BmDet - Beam Details |
| Rem - Removals | DeckDim - Deck Dimensions |
| Found - Foundation Layout | DeckReinf - Deck Reinforcing |
| FtgDim - Footing Dimensions | DeckDet - Deck Details |
| FtgReinf - Footing Reinforcement | S&D - Sections and Details |
| Abut - Abutment | Jnt - Joint Details |
| NAbut - North [West] Abutment | BWall - Barrier Wall Details |
| NWW - North [West] Wingwall | Rail - Railing Details |
| SEAbut - South [East] Abutment | Appro - Approach Slab Details |
| SWWall - South [East] Wingwall | Slope - Slope Paving Details |
| wwall - Wingwalls/Retaining Walls | Stand - Standard Details |
| PierDim - Pier Dimensions | Elec - Electrical |
| PierReinf - Pier Reinforcement | Quant - Quantity Sheet |
| Brg - Bearings | Land - Landscaping |



Examples of valid filenames :

Crystal Lake - 107 - NWW.dgn	Crystal Lake, drawing number 107, North West Wingwall drawing
Ft. Henry - 102 - S&D3.dgn	Fort Henry, drawing number 102, Sections and Details, 3 rd drawing of type
Redstone Lake - base.dgn	Redstone Lake, Base drawing, reference file
Maria St. - 101 - GA.dgn	Maria St., drawing number 101, General Arrangement drawing
Jones Falls - 102 - PierDim.dgn	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...).

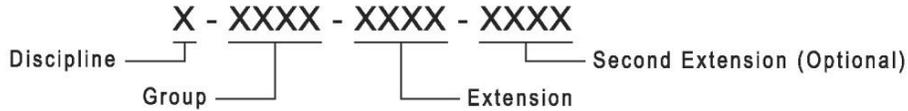
In some situations however, such as where better visibility control is required (freezing and thawing of levels), a mixed approach to level management may be used such that some elements are separated by what they represent and others grouped by their element properties.





1.4.1.2 Layer Naming Convention

The level structure consists of four fields separated by hyphens.



Discipline Field **X-XXXX-XXXX-XXXX**

The discipline field identifies the discipline responsible for the data on that level. The discipline designator is a one-character field.

In some cases the data is not applicable to any one discipline, such as a title block or a section marker. In these cases a 'G' for general may be used in the discipline field.

- B Bridge / Dam / Lock
- G General
- C Civil
- S Structural

Group Field **x-XXXX-xxxx-xxxx**

The group field identifies general groups of data relevant to each discipline.

- G-TBLK General-Titleblock
- C-ROAD Civil -Road
- S-CONT Structural-Contour

Extension Field **x-xxxx-XXXX-xxxx**

The extension field more precisely identifies the data from that of the group field. G-TBLK-TEXT
 General-Titleblock-Text

- C-ROAD-CURB Civil-Road-Curb
- S-CONT-MAJR Structural-Contour-Major

Second Extension Field **x-xxxx-xxxx-XXXX**

The second extension field is optional and further categorizes the data, if necessary.

- G-TBLK-TEXT-LOGO General-Titleblock-Text-Logo
- C-ROAD-CURB-FACE Civil-Road-Curb-Face
- S-CONT-MAJR-TEXT Structural-Contour-Major-Text

1.4.1.3 Level Colours and Weights

Level colour shall be used to define the line weight. The following is a list of acceptable colours and their corresponding colour number and line weight. Other colours may be used in rare cases when more data



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).





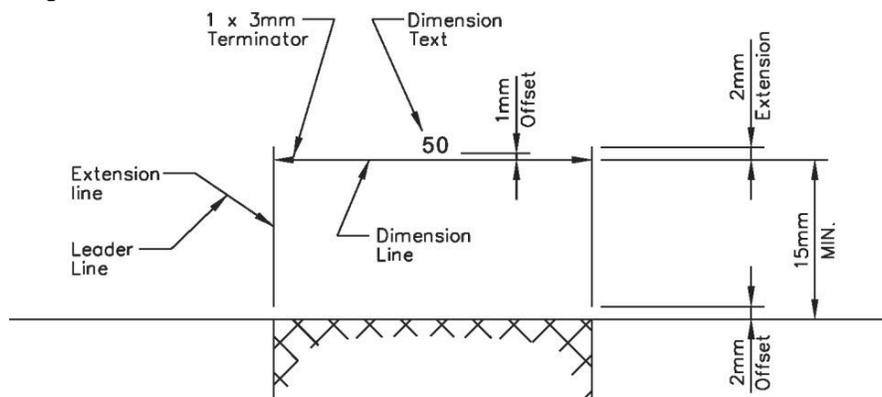
- The name given to additional styles must follow the naming convention outlined in Section 3.5.1 of the PWGSC National CADD Standards.
- All dimensions shall have the same size text as outlined in Section 1.3.6.1.
- Angular dimensions shall be expressed in decimal degrees.
- Line weight for all dimension 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.

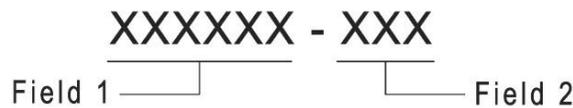
For example, if text at a plotted height of 2.5mm is required for some text elements but a plotted text height of 3.5mm is required for others, then two separate styles could be created with these preset settings.

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.

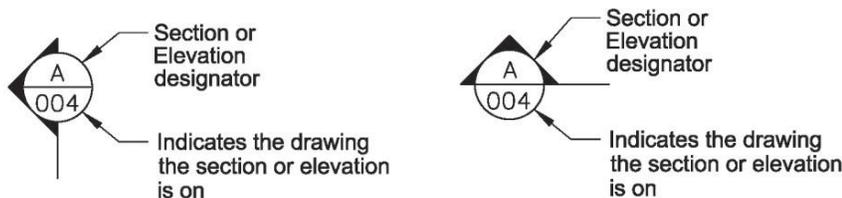
1.8.2.1 Symbol

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 :



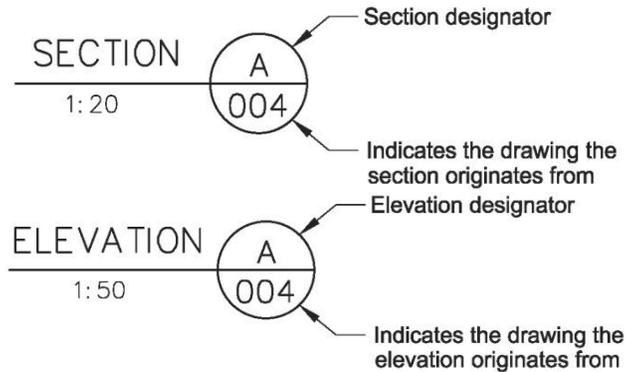
1.8.2.2 Label

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.

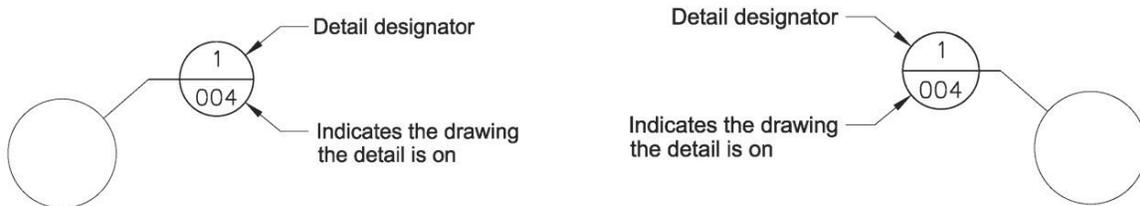
Details are shown using a symbol to delineate where the detail is taken from and a label to designate the actual detail. The symbol and labels are provided in the structural block library.

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

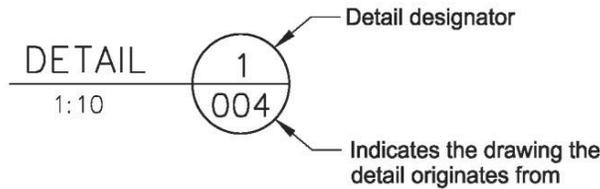
Labels are placed below the detail to cross-reference it with the symbol on the drawing from where the detail was taken.

- 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-Builts**' 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

