Ministry of Transportation

DESIGN-BUILD MINOR REQUEST FOR PROPOSALS

Replacement of the Welland River Bridges and Rehabilitation of Three Structural Culverts

Central

DB Contract Number: 2018-2013
Date Issued: November 14, 2018

Summary of Key Information

RFP Title and Contract Number	The title of this RFP is: **Replacement of Welland River Bridges and Rehabilitation of Three Structural Culverts, Design-Build Project** The DB Contract Number is: **2018-2013** Use this title and number on all correspondence to the Ministry.
Deadline for Submitting RFP Enquiries	All RFP enquiries shall be submitted by: **February 6, 2019 3:00:00 PM Local (Toronto) Time** using the bid enquiry function on the RAQS/MERX website: www.raqs.merx.com
Tender Registration Form Submission Deadline	**February 8, 2019 12:00:00 Noon Local (Toronto) Time**
RFP Closing	The RFP Closing date and time is: **February 13, 2019 1:30:00 PM Local (Toronto) Time**
Closing Location	Proponents shall submit their proposal, by electronic submission only to: www.raqs.merx.com
Anticipated Award Date	Within 60 days after RFP Closing
Rating	Necessary available financial rating is: **$ 20,000,000 in S** Necessary available maximum workload rating is: **$ 50,000,000**

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Chapter 1: Instructions to Proponents

1.1 Introduction

The Ontario Ministry of Transportation (the “Ministry”) is issuing this low bid Design-Build Request for Proposals (RFP) to solicit competitive proposals in the acquisition of design and construction services for Replacement of Welland River Bridges and Rehabilitation of Three Structural Culverts, Design-Build project (the “Project”). In the Design-Build format defined by this RFP document the design and construction services are combined under one Contract between the Ministry and the Design-Builder.

This is a two phase procurement. In phase one a Design-Build Expression of Interest (DB-EOI) was issued on September 12, 2018 resulting in the short-listing of proponents. Only the short-listed proponents shall be eligible to enter a Tender Registration Form (TRF) to submit proposals in response to the RFP which is phase two of the procurement.

All proponents shall confirm that by submitting a proposal in response to this RFP that they shall be required to meet all commitments identified in their DB-EOI Response including but not limited to the key personnel identified.

Companies or joint ventures submitting a proposal for this RFP shall be responsible for all professional and technical services, supervision, materials, labour and equipment and performing all duties and obligations necessary to design and construct this Project.

Throughout this document reference is made to the proponent as the entity preparing the response to the RFP. The term "Design-Builder" is used to represent the Preferred Proponent and the context in which it is used relates to Work to be performed once the Agreement is signed with the Preferred Proponent.

1.1 Definitions

For the purposes of this DB-RFP, the following definitions apply:

Bid: also means Proposal

Bidder: means a person, sole proprietorship, firm, partnership, corporation, or any other business/joint venture that submits a Bid to the Ministry and also means Proponent.

Compliant Proposal: means proposals submitted by proponents that meet the mandatory and minimum requirements to be set out in the Request for Proposal.

Confidential Information: means confidential information of the Crown (other than confidential information which is disclosed to proponents in the normal course of this RFP); the Confidential Information is relevant to the Work required by the RFP, the pricing of the Work or the RFP evaluation process; and the disclosure of which could result in prejudice to the Crown or any unfair advantage to the Design-Builder.

Design-Build (D-B): means the delivery model in which an Owner contracts with a single entity to provide both design and construction services.

Design-Builder: means the person, partnership, or corporation designated by the Owner to complete the Work, and also means Contractor.

Design-Build Expression of Interest, DB-Expression of Interest, DB-EOI: means this document, including any and all appendices and any and all Addenda that may be issued from time to time, as it may be amended from time to time by the Ministry. .

Issued For Construction Drawings: means drawings stamped by an Engineer as final documents to construct the Work.

Late Bid Submission: means a Bid received by the Ministry's Service Provider after the RFP Closing.

Late Bid Notification: is a statement sent by the Ministry's Service Provider to a Bidder notifying the Bidder that their Bid is a Late Bid and will not be considered and is rejected.

Lump Sum: means the total amount payable to the Design-Builder for completion of the Work as documented in the Design-Builder's bid.

MERX: means the company engaged by the Ministry to provide electronic tendering services in respect of this Bid, which is a subsidiary of Mediagrif Interactive Technologies Inc.

Ministry, MTO: means the ministry of the Province known as the Ontario Ministry of Transportation as that ministry may, from time to time, be reorganized, replaced, or renamed.

No Bid Statement: means a 'No Bid' selection on a Summary Bid Submission Form submitted to the Ministry's Service Provider from a Bidder who has an approved Tender Registration Form, but who does not intend on submitting a Summary Bid Submission Form containing a summary Bid prior to the RFP Closing, or intends to withdraw a summary Bid submitted on a Summary Bid Submission Form submitted to the Ministry prior to RFP Submission.

Non-Resident Contractor: means any Contractor residing outside of the Province of Ontario and with respect to a corporate contractor, not being incorporated pursuant to the laws of Ontario and who has not maintained a permanent place of business in Ontario continuously for twelve months prior to Tender Closing.

Preferred Proponent: means the proponent with the lowest evaluated bid.

Project: means the objectives and work described in this DB-RFP.

Qualification Procedures for Contractors: means the administrative routine established by the Ministry to determine that contractors have the financial, managerial, and technical capability to perform the work in accordance with the contract.

Qualified Contract: means a contract that is tendered in accordance with the Ministry's Qualification Procedures for Contractors.

RAQS: is an abbreviation for Registry Appraisal and Qualification System.

Rated Contractor: means a contractor who has been granted a basic financial rating or maximum workload rating in accordance with the Ministry's Qualification Procedures for Contractors.

Request for Proposals, RFP: means the document that may be issued by the Ministry inviting any short-listed proponents to submit a proposal for the Project.

Service Provider: means the person appointed by the Ministry to provide electronic tendering services on behalf of the Ministry.

Statutory Bonds: means the surety bonds executed by the Contactor and its Surety and required to be furnished by Part XI.1 of the Construction Act, R.S.O. 1990, c.30, as amended.

Summary Bid Submission Form: means the electronic form obtained from the Ministry's Service Provider prior to RFP Closing that the Bidder is to use to summarize the lump sum offer to perform the Work.

Tender or Bid: can be used interchangeably and means the offer submitted by a Bidder to perform the work required of the RFP Documents at the prices set out in the offer, which offer shall be set out in the forms approved by the Ministry and in accordance with the procedures more particularly described in these Instructions to Bidders. More particularly, the forms shall include, among other things, the Summary Bid Submission Form and the Itemized Bid Form.

Tender Closing or **Tender Opening** or **RFP Closing:** can be used interchangeably and mean the last date and time that the Ministry will receive Proposal Submissions.

RFP Documents: means the Proposal, MTO General Conditions of Contract, Standard Specifications and Drawings, Special Provisions, Contract Drawings, Addenda incorporated into any aforementioned document, and documents referenced in the aforementioned documents, but excludes the Qualification Procedures for Contractors.

Tender Registration Form (TRF): means the Ministry approved form supplied by the Ministry completed by Bidders to pre-qualify for Qualified Contracts in accordance with the procedures set out in the Qualification Procedures for Contractors.

Unbalanced Bid: means a Bid containing a lump sum or unit prices, which does not reflect reasonable actual costs to do the work as described in the Tender Documents,

plus a reasonable proportionate share of the Bidder's anticipated profit, overhead costs, and other indirect costs which are anticipated for the performance of the work.

1.2 Compliance With Instructions

Proponents must comply with these Instructions to Proponents and those failing to do so may have their Proposal response rejected, unless otherwise stated.

1.3 RFP Documents

1.3.1 RFP Structure

The RFP document consists of the following:

Chapter 1: Instructions to Proponents

Describes the RFP process to be followed and the proposal submission and evaluation requirements.

Chapter 2: Project Requirements

Describes the general roles and responsibilities and project specific requirements for the design and construction and warranty phases of the Project.

Chapter 3: Specifications

Outlines the mandatory standards that shall be utilized for design and identifies the performance requirements of the Design-Builder

Chapter 4: General Conditions of Contract

Describes amendments to OPSS.PROV 100, November 2016, MTO General Conditions of Contract that pertain to the Contract to be signed by the Ministry and the Design-Builder.

Appendix A: Submission Forms

Conflict of Interest – Certification Part 1 (submit with proposal)
Conflict of Interest – Disclosure Part 2 (submit with proposal)
Form of Offer (submit with proposal)
Itemized Bid and Evaluation Form (submit within 24 hours of RFP Closing)

Appendix B: Draft Agreement and Design-Build Guarantee

Draft Agreement (completed by the Ministry and the Preferred Proponent)
Design-Build Guarantee (submitted by the Preferred Proponent prior to award)

Appendix C: Ministry Supplied Information

Provides a list of information supplied by the Ministry.

All the documents described in Section 1.3 collectively constitute the RFP.

1.3.2 Examination of Documents

Each proponent shall be solely responsible for examining all the RFP documents, including any Addenda issued during the RFP period, and for independently informing itself with respect to any and all information contained therein, and any and all conditions which may in any way affect the proponents proposal. The proponent shall be deemed to have satisfied itself of the correctness and sufficiency of the Lump Sum price.

1.4 The Project

The project is located along the QEW from McLeod Road (Regional Road 49) to Sodom Road (Regional Road 116) within the City of Niagara Falls and the Region of Niagara. The project location is shown in Figure 1.

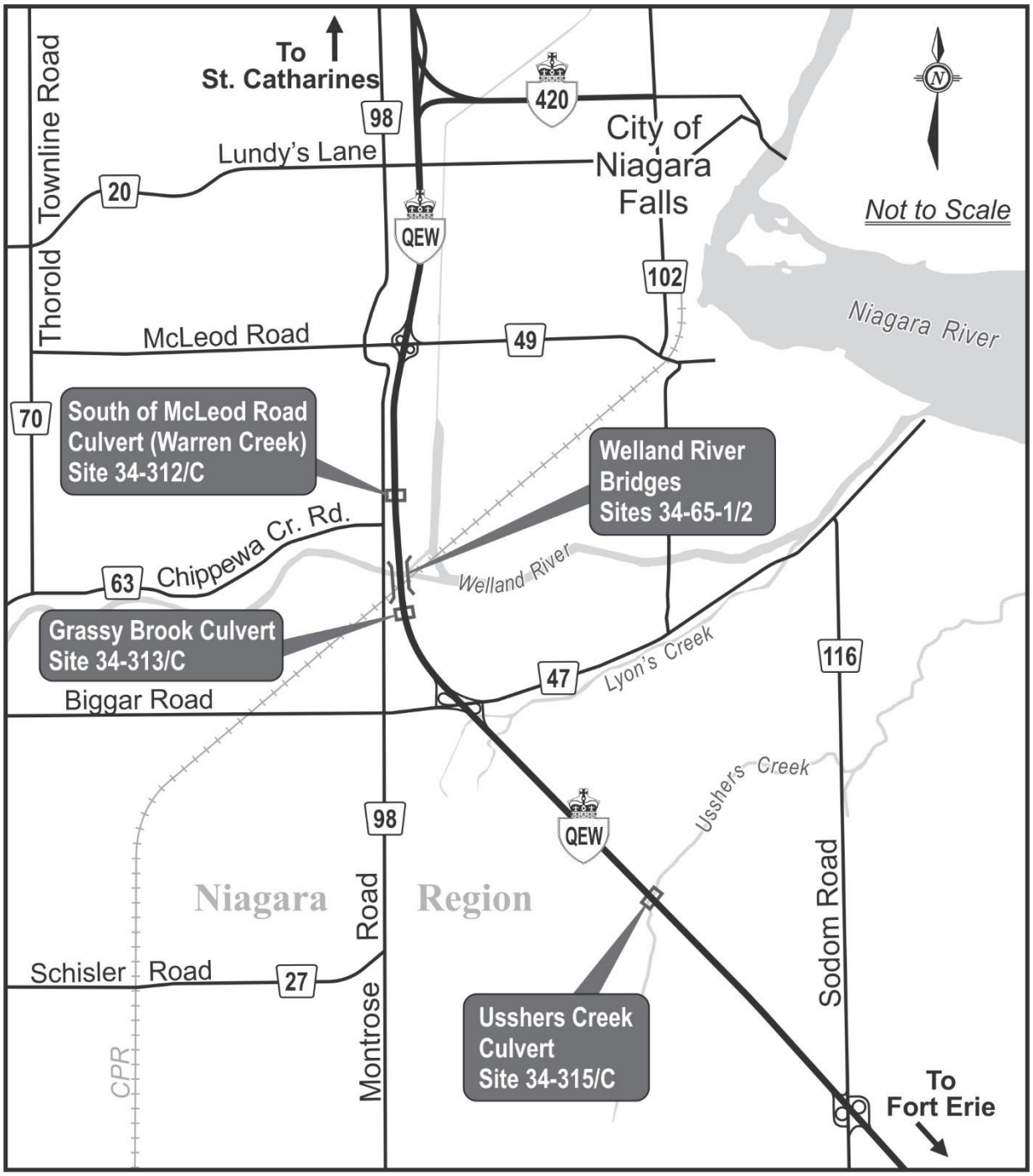
The work on the Project includes:

- The replacement of the Welland River Twin Bridges on the QEW over CP Rail, The Baden Powell Trail, The Welland River and Oakwood Drive;
- Rehabilitation of three structural culverts;
- Profile raise and profile improvements at the Welland River Bridges and bridge approaches including grading, pavement reconstruction and embankment grading with settlement mitigation measures (i.e. lightweight fill, ground improvements) in select locations;
- Relocation of existing Road Weather Information Systems (RWIS) Station, protection of existing Fixed Automated Spray Technology (FAST) pump house and contents and provisions for future FAST installation on the new bridge

This project followed the approved planning process for a Group ‘C’ project under the MTO Class Environmental Assessment for Transportation Facilities (2000) (Class EA).

The Preliminary Design of the replacement of the QEW Welland River Bridges and the rehabilitation of three structural culverts followed the approved planning process for a Group ‘C’ project and is documented in the Environmental Screening Document (ESD). The ESD documents the potential impacts, a summary of the proposed mitigation measures and commitments to future work for the next design phase of the project

Figure 1: Key Plan



The full scope of Work for the Project and final contract deliverables are set out in Chapter 2: Project Requirements and Chapter 3: Specifications of this RFP.

1.5 Project Goals

Quality

- Design and construct a high-quality product that considers the long-term performance by using quality and innovative design methods as well as quality

materials and innovative construction methods
- Provide a design/construction approach that minimizes future maintenance requirements
- Maintain quality control and quality assurance throughout the project

Schedule and Budget

- Complete the construction on schedule by November 1, 2022
- Consider accelerated construction techniques in an effort to complete the project ahead of schedule
- Complete the project within the budget
- Attain approvals from stakeholders (i.e. The City of Niagara, CPR, Hydro One etc.) in a timely manner as to not impede the schedule

Safety

- Design and construct a project that maximizes safety to the traveling public and workers by minimizing the length of work zones, maximizing the construction staging cross section (i.e. provide wider shoulders than minimum when possible) and utilizing high visibility pavement markings and signing
- Review safety of the site on a regular basis

Stakeholder Considerations

- Minimize disruption of traffic operations on QEW and local road network during construction, such as providing continuous construction operations
- Minimize disruption to residents and businesses during construction
- Communicate project updates, and impacts of construction activities (e.g. any required ramp/lane closures, detours) to the relevant stakeholders throughout construction as per Ministry policies or as specified in the RFP document and suggestions within the Preliminary Construction Staging Consultation and Engagement Plan
- Adhere to Hydro One requirements, processes and approvals
- Adhere to CPR requirements for vertical and horizontal clearances. flagging during construction, and processes for approvals

Environment

- Minimize environmental impacts, especially within the Welland River and adjacent wetland areas (e.g. tree and vegetation removals).
- Avoid and/or minimize impacts to any species-at-risk (SAR) identified within the study limits (e.g. mussels, turtles, fish, etc.).
- Develop an effective erosion and sediment control plan during construction.
- Obtain all required environmental permits and take the necessary measures to mitigate environmental issues (i.e. SAR, erosion and sediment control, dewatering).

1.6 Project Risk Allocation

In Design-Build, each risk area is typically allocated to the party that is best able to manage that risk. The Risk Allocation Matrix below provides a general summary of the allocation of risks in respect to the Project. Such risk allocation is intended to meet the Ministry's goals for the Project. Proponents are advised that the commercial and legal consequences of such risk allocation and the corresponding responsibilities of the Ministry and the Design-Builder for such risks are set forth in the Contract Documents. The Risk Allocation Matrix below serves only as a summary for the proponent's reference. It is not intended to be a comprehensive description or allocation of the Project's risks. For greater certainty, if there is a conflict between the Risk Allocation Matrix and the provisions of the Contract Documents, the latter shall govern.

Risk Allocation Matrix

Risk Category	Responsibility	
	Ministry	Design-Builder
Design/Engineering		
Project scope definition/design requirements criteria	X	
Errors/omissions/ changes in design		X
Geotechnical/Foundation investigation – as provided in the RFP subject to Design-Builder's confirmation timeframe	X	
Geotechnical/Foundation investigation – to complete the design		X
Changes in scope	X	
Environmental		
Fines, penalties and any costs associated with non-compliance with environmental legislation, regulations and permits		X
Corrective actions to address any non-compliance with environmental legislation, regulations, permits and approvals, any non-conformance with MTO Environmental Standards and Practices or environmental requirements in the Contract Documents		X
Compliance with existing environmental conditions and requirements for protection and mitigation		X
Unforeseen existing environmental conditions and subsequent requirements for protection and mitigation	X	
Changes to Environmental Approvals and permits triggered by Design-Builder's design changes		X
Obtain/advance environmental approvals/ permits required beyond what is provided in the RFP		X
Excess Materials Management		X

Risk Category	Responsibility	
	Ministry	Design-Builder
Property		
Establish property limits	X	
Property acquisition	X	
Property Access Based on Design-Builder's design		X
Third Party Relations		
Identification of initial third party impacts	X	
Establish mitigation measures to address third party impacts		X
Modifications to existing third party permits		X
First Nations and Metis Issues (beyond what is identified in the RFP)	X	
Unforeseen Delays by Third Party/Other	X	X
Public Relations/Communications during Design & Construction	X	X
Utilities		
Utility locates		X
Relocation of Utilities prior to contract	X	
Damage to Utilities during construction		X
Coordination of changes to Utility locations based on final design		X
Coordination with Utility relocation efforts during Contract		X
Railway		
Obtain initial agreement (Board Order) based on preliminary design	X	
Coordination with railway under agreement during design/construction and satisfy railway requirements of working on, over or below Railway Property		X
Construction		
Construction quality/ workmanship/ material quality		X
Schedule		X
Safety		X
Traffic Management/Control/Staging		X
Road Closures/Local Road Detours		X
Completion and Warranty		
Conformance to Performance Requirements during construction, at completion and during Warranty		X
Warranty Repairs		X

1.7 Roles and Responsibilities

1.7.1 Of the Ministry

The role of the Ministry in the execution of the Project shall be to monitor the Work for conformance to the Contract Documents and to ensure that the interests of the Ministry and the public are maintained. Deviations from the Contract Documents may result in a stoppage of the affected elements of the Work until the Design-Builder remedies such a deficiency or a change to the Contract is approved. There is no obligation on the Ministry to compensate for delay or impact costs.

1.7.2 Of the Design-Builder

Under the Contract the Design-Builder shall be solely responsible for, without limitation:

All engineering, design, construction, environmental protection, quality management, administration, commissioning and related services required to complete the Project according to the requirements of the Contract Documents;

All required consultation with all authorities having jurisdiction, unless noted otherwise in the Contract Documents; and,

Obtaining all permits and approvals required for the Project from authorities or agencies having jurisdiction, unless noted otherwise in the Contract Documents.

1.8 Enquiries

Each proponent shall review all RFP documents, and shall promptly report and request clarification of any discrepancy, deficiency, ambiguity, error, inconsistency or omission contained therein. All enquiries shall be directed in writing by using the RAQS/MERX website: www.raqs.merx.com. All enquiries shall be submitted to the Ministry by the date and time identified in the Summary of Key Information of this RFP. Enquiries received after this date and time may not be responded to.

Where an enquiry results in a change to the requirements of this RFP, the Ministry shall prepare and issue an Addendum to this RFP. The Ministry reserves the right to distribute copies of any or all questions and responses to all proponents. Unless addressed through an Addendum, all responses to enquiries shall not be incorporated as part of the Contract or in any way change the Contract.

Proponents shall not make verbal enquiries of Ministry personnel. Information given orally by Ministry personnel shall not be binding on the Ministry, nor shall it be construed as a factor in the evaluation of the proposals. Any attempt on the part of any proponent or any of its employees, agents, contractors or representatives to contact any member of the Ontario Public Service with respect to this RFP other than as described above in this section may lead to disqualification.

1.9 Addenda

The Ministry reserves the right to revise the RFP up to the RFP Closing. Any such revisions shall be included in an Addendum to the RFP that shall be posted on the Ministry's RAQS/MERX website under the contract number for this Project. All parties that obtained a copy of the RFP (plan takers), shall be notified electronically when an Addendum or change is entered on the system.

The RFP Closing set for submitting proposals may be changed by the Ministry if in its opinion more time is necessary to enable the proponents to prepare/revise their proposals. Any change to the RFP Closing shall be issued by an Addendum.

1.10 Ministry Supplied Information

This RFP may not contain all of the information that proponents might need in order to submit a proposal. Proponents shall be responsible for obtaining any additional information that may be required.

The Ministry supplied information listed in Appendix C of this RFP is provided solely for information purposes. The Ministry warrants that information provided can be relied upon for accuracy at the time and location that it was obtained but does not warrant any omissions, interpretations of data, opinions, or recommendations in the information provided.

Each proponent shall satisfy itself as to the sufficiency of the information presented and obtain any updated or additional information, and perform any studies, analysis or investigations the proponent deems necessary in order to deliver the requirements of this Project. Proponents shall inform the Ministry of any inaccurate information identified.

All requirements, designs, documentation, plans and information viewed or obtained by the proponent in connection with this RFP are the property of the Ministry and shall be treated as confidential and not used for any purpose other than replying to this RFP and the fulfillment of any resulting Contract. Upon request of the Ministry, all such designs, documents, plans and information shall be returned to the Ministry.

1.11 Site Access

1.11.1 Overview

The Ministry shall allow each proponent to have access to the site, for purposes of conducting additional surveying, testing or investigations prior to the RFP Closing. As access shall be approved by the Ministry, the proponents shall submit a request for site access in writing using the bid enquiry function on the RAQS/MERX website: www.raqs.merx.com. Proponents shall give the Ministry as much advanced notice as possible in order to secure requested access dates; notice shall be a minimum of 10 Business Days prior to the requested site visit date stating the purpose of the request. As part of the site access request, the proponents shall include an encroachment permit application and a plan illustrating the testing location, type of testing and purpose of

testing. Each proponent shall be given access to the site for a maximum one-week period. The Ministry shall control the schedule based on order the request is received (first come-first served basis) to ensure access to all proponents. Traffic control for all site investigations shall be completed according to Book 7 of the Ontario Traffic Manual. The proponent is responsible for Utility locates prior to site access.

Encroachment permit applications are available online at:
http://www.mto.gov.on.ca/english/engineering/management/corridor/encroach.shtml
Following completion of any testing, the proponent shall provide to the Ministry a listing of the tests completed and their locations (including GPS coordinates) certified by their geotechnical / foundations Engineers.

Proponents shall make their own arrangements with property owners prior to entering any portions of the site not owned or controlled by the Ministry. Copies of any releases obtained with property owners shall be provided to the Ministry. As a condition of entering any portion of the site, including without limitation as part of any briefing conducted pursuant to this RFP, the proponent irrevocably accepts full liability for any and all events arising from or in connection with any site access, and the proponent indemnifies the Province, including its servants, agents, representatives, and employees, for any loss or damages suffered by the proponent, the Ministry, including its servants, agents, representatives and employees, or any third party arising, either directly or indirectly, in contract or in tort, from or in connection with any acts or omissions of the proponent or its servants, employees, agents and representatives.

1.11.2 Licenses and Permits

The proponent assumes full responsibility for obtaining and holding any and all rights, permits, licences, consents, approvals and authorities issued by any governmental agency or authority or other person required to carry out its investigations regarding the Work.

1.11.3 Decommissioning of Pavement/Foundation Explorations Undertaken by Proponents

All aspects of implementation of geotechnical test holes (including, but not limited to, planning, licensing, construction, maintenance, abandonment, and reporting), shall be according to O. Reg. 903 and its Amendments (the water/ well regulation under the OWRA).

Explorations shall be constructed, maintained and abandoned, or otherwise restored, to ensure the safety and environmental integrity of the site. Test pits shall be backfilled with suitable material and re-vegetated or otherwise protected from erosion. Temporary open holes shall be adequately covered. Holes in roads shall be backfilled as required to prevent future settlement and acceptably patched where pavement surfaces have been damaged. If a problem occurs with the backfilled test holes following the investigation (i.e. subsidence resulting in a surface cavity), the proponent shall return to the site and repair the test hole to the Ministry’s satisfaction.

1.12 Changes to the Proponent Team

The Ministry is under no obligation to consider or accept any substitutions for the persons named in the proponent's DB-EOI Response . Proposed personnel substitutions by a proponent shall require written approval from the Ministry, prior to any such change. Updated Conflict of Interest - Certification Part 1 and Disclosure Part 2 forms (found in Appendix A) shall be provided to support any proposed personnel substitution.

During Procurement

If a proponent wishes to make any addition, deletion or other change to the key firms or key personnel or any other material change to information provided in their DB-EOI Response, the proponent shall notify the Ministry in writing, using the bid enquiry function on the RAQS/MERX website: www.raqs.merx.com, as to the proposed change. The proponent shall identify a substitution, and the reasons for the change and substitution. The proponent shall provide sufficient documentation to enable the Ministry to consider, evaluate and determine the implications of the proposed change and substitution pursuant to the terms of this RFP. The proponent shall demonstrate to the satisfaction of the Ministry that the proposed substitute meets the requirements identified by the Ministry. If the proponent fails to provide a change acceptable to the Ministry, the Ministry reserves the right to disqualify the proponent.

Changes, including substitutions, made to proponent key firms or key personnel without the consent of the Ministry, may result in disqualification of a proponent or a short-listed proponent.

Following Award

If the Design-Builder wishes to make any addition, deletion or other change to the key firms or key personnel or any other material change to information provided in their proposal after award, the Design-Builder shall notify the Ministry in writing as to the proposed change. The Design-Builder shall identify a substitution and the reasons for the change and substitution. The Design-Builder shall provide sufficient documentation to enable the Ministry to consider, evaluate and determine the implications of the proposed change and substitution pursuant to the terms of this RFP. The Design-Builder shall demonstrate to the satisfaction of the Ministry that the proposed substitute has equal or better qualifications, experience and ability when compared as a whole to the original named entity or person and is otherwise suitable for the particular position.

1.13 Restricted Parties

Any firm currently under direct contract with the Ministry for this Project is not eligible to advise any proponent, directly or indirectly, or participate in any way as an employee, advisor, consultant, member or otherwise in connection with any proponent in relation to the Project. The Ministry may, in its sole discretion, disqualify a proponent or impose such conditions on its continued participation in the RFP process as the Ministry may, in its sole discretion, consider to be in the public interest, consider to be required to satisfy

itself that any actual or potential conflict or the impact of any existing relationship has been appropriately managed, mitigated and minimized, or consider otherwise appropriate.

The following parties are restricted:

WSP Group Canada Limited

In addition, any firm under direct contract with the Design-Builder for this Project is restricted from providing Contract Administration services for this Project.

1.14 Proposal Submission Requirements

1.14.1 General

Proposals in response to this RFP shall contain two separate parts and shall be submitted according to the format and content outlined in Section 1.14 and the process and procedures in Sections 1.15 and 1.16.

Part 1:	Technical Proposal
Part 2:	Price Proposal

The proponent organization shall be a Rated Contractor according to the Ministry's Qualification Procedures for Contractors.

All Proponents must have a valid user ID and password to access the RAQS/MERX website and must have a Ministry approved CRF and a Ministry approved TRF for Qualified Contracts for the submission of a Proposal in respect of this RFP. Failure to obtain an approved TRF will disallow the Proponent from submitting a Proposal on the basis of failing to comply with the Instructions to Proponents without any consideration by the Ministry.

The Proponent’s TRF shall be received by the Ministry in accordance with the Summary of Key Information.

It is the proponent’s responsibility to ensure that it has the required Available Financial Rating and Maximum Workload Rating according to the Summary of Key Information. Proposals shall be accepted only from Rated Contractors with the Necessary Available Financial Rating and the Necessary Maximum Workload Rating at the time of Tender Registration Form submission for the RFP.

After award of the Contract, the Design-Builder shall be required to show “work on hand” from this Contract on any subsequent Ministry of Transportation pre-qualification application.

Instructions regarding the qualification process and associated forms are available through the RAQS/MERX website www.raqs.merx.com or by contacting:

Contract Management Office
Qualification Section
Ministry of Transportation
301 St. Paul Street
St. Catharines, Ontario
L2R 7R4
Tel: (905) 704-2144

1.14.2 Pre-Qualification Requirements – N/A

1.14.3 Joint Ventures and Joint Bids – N/A

1.14.4 Proposal Submission Procedures

Technical assistance with proposal submissions can be obtained by contacting the RAQS/MERX help desk: mailto:raqs@merx.com

1.14.4.1 Technical Proposal Submission

Technical proposals shall be received according to the RFP Closing identified on the Summary of Key Information. Any technical proposal not received in advance of the RFP Closing shall result in automatic disqualification of the proponent's proposal.

Proponents shall submit their technical proposal electronically as an attachment on the Summary Bid Submission Form on the RAQS/MERX website.

Proponents may submit a revised technical proposal up until RFP Closing. The Ministry shall consider only the last technical proposal received prior to RFP Closing

Each proponent shall examine all instructions, terms and conditions, forms and information in the RFP documents and the responses to enquiries; and in a clear, concise and legible manner, complete and submit all documentation and information required by this RFP. Incomplete submissions may result in disqualification of the proponent's proposal.

1.14.4.2 Price Proposal Submission (Electronic Submission)

Electronic price proposals shall be received by the Ministry according to the RFP Closing identified on the Summary of Key Information. Any price proposal not received in advance of the RFP Closing shall result in automatic disqualification of the proponent's proposal.

Note: In the Ministry's electronic bidding system on the RAQS/MERX website the terms "Tender Opening", "Tender Closing" shall have the same meaning as "RFP Closing" and "Proposal Due Date" which is the last date and time the Ministry shall accept bids and proposals. Similarly the terms "Tender", "Bid" and "Price Proposal" also have the same meaning and represent the Lump Sum price submitted electronically to the Ministry.

a) Each proponent shall submit an electronic bid by completing an on-line Summary Bid Submission Form on the RAQS/MERX website. Only a proponent with an approved

Tender Registration Form (TRF) for the advertised RFP is allowed to complete and submit a Summary Bid Submission Form to the Ministry. Each proponent shall also complete a detailed Itemized Bid and Evaluation Form (sample provided in Appendix A) and submit it as an attachment to the Summary Bid Submission Form in the RAQS/MERX website. The Itemized Bid and Evaluation Form is available for download in Microsoft Excel format on the RAQS/MERX website.

b) Proponents may submit a revised on-line Summary Bid Submission Form until RFP Closing. The Ministry shall consider only the last Summary Bid Submission Form received by the Ministry prior to RFP Closing.

c) Upon successfully submitting an on-line Summary Bid Submission Form, proponents shall receive an on-line notification for information purposes that the Ministry has received their Summary Bid Submission Form.

d) Proponents shall receive a notification from the Ministry, advising them that the price proposal opening has occurred. Summary Bids shall be published on the RAQS/MERX website once the contract has been conditionally awarded.

e) Within 24 hours of RFP Closing proponents shall be required to submit a detailed Itemized Bid and Evaluation Form (sample provided in Appendix A) electronically by email in a “read only” Adobe (PDF) format to contracttendering@ontario.ca. This form is required for contract administration and evaluation of value and unbalanced bidding and is available for download in Microsoft Excel format on the RAQS/MERX website.

f) Once the Itemized Bid and Evaluation Form is submitted, the proponents shall receive confirmation from the Ministry that the form has been received.

1.14.5 Computer System Failure

The Ministry shall only accept proposals submitted electronically through RAQS/MERX. Any proposal received through any other format shall not be considered and is deemed rejected without consideration.

The Ministry accepts no responsibility for any reason whatsoever, including computer system failures of either the Bidder or the Ministry Service Provider, if the proponent is unable to submit its proposal before RFP Closing and the proponent agrees that the Ministry shall have no liability, for delays caused by internet/network traffic, degraded operation or failure of any computer system element, including, but not limited to: any computer system, power supply, telephone or data connection or system or software or browser of any type whatsoever.

It is the sole responsibility of the proponent to ensure that it can access and exchange data with computer systems electronically and that it allows sufficient time to successfully access and share data with computer systems, having regard to the possibility of delays caused by internet/network traffic. Proponents are solely responsible to ensure that they plan their access to computer/servers, so that the proponents can reach the computers/servers before RFP Closing.

1.14.6 Unbalanced Price Proposal and Discrepancies

Proponents that submit an Itemized Bid and Evaluation Form that contains prices that appear to represent an unbalanced price proposal may be referred to the Ministry's Qualification Committee and any price proposals that are so unbalanced that they may adversely affect the interests of the Ministry may be rejected.

The Ministry shall not allow any proponent to adjust the total price proposal Lump Sum after RFP Closing.

In the event of a mathematical error or discrepancy in the Itemized Bid Evaluation Form, the Ministry may request the proponent to resubmit the Itemized Bid and Evaluation Form without changing the Lump Sum price

1.14.7 No Collusion

No proponent shall discuss or communicate with any other proponent or prime team member of any other proponent (or any employee, representative or agent thereof) about the preparation of the proposals. Each proponent's proposal shall be submitted without any connection, knowledge, comparison of information or arrangement with any other proponent or prime team member of any other proponent (or any employee, representative or agent thereof) and each proponent shall be responsible to ensure that its participation in this RFP process is conducted fairly and without collusion or fraud.

1.14.8 Ownership of Responses

All documents, including proposals, submitted in response to this RFP become the property of the Ministry. Documents shall be held in confidence by the Ministry, subject to any and all applicable laws, including the *Freedom of Information and Protection of Privacy Act*.

1.15 Technical Proposal Format

Each proponent shall submit a technical proposal according to the Summary of Key Information. The technical proposal shall be in the following format:

a) Technical proposal shall :

i. Include one document in a "read only" Adobe (PDF) format.

One copy of the file(s) used to prepare the technical proposal in the original file format (e.g. MS Word/Excel, AutoCAD drawing files, scheduling files, etc.) shall be provided to the Ministry upon request.

ii. Include a header or footer that includes the "Replacement of Welland River Bridges and Rehabilitation of Three Structural Culverts, 2018-2013 proponent's name". File names for electronic files shall also include the proponent's name, title of the document and contract number.

iii. Comply with the following page restrictions:

The maximum allowable number of pages in the technical proposal shall not exceed 20 pages (the Transmittal Letter, Conflict of Interest Forms, Form of Offer, and Commitments Report are NOT included in the page count). Any additional information or appendices provided by the proponent beyond the specified page limit shall not be reviewed or evaluated by the Ministry.

iv. Print clearly on “8.5 x 11” pages and with a font equivalent or greater in size than “Arial 12 point”. Margins shall be a minimum 1.5 cm.

v. Not include links to external information.

b) The price proposal shall be according to Section 1.14.4.2 Price Proposal Submission (Electronic Submission).

1.15.1 Statutory Bonds

If the Price Proposal is $500,000.00 or more the Contractor shall furnish the Ministry with the Statutory Bonds in the prescribed form that satisfies the requirements of the Construction Act, R.S.O. 1990, c.30, as amended. In this regard, the Contractor shall deliver and maintain a labour and material payment bond using Form 31 and a performance bond using Form 32 prescribed by the Construction Act from a surety company that is an insurer licensed under the Insurance Act to write surety and fidelity insurance. Such bonds shall name Her Majesty the Queen in right of the Province of Ontario as represented by the Minister of Transportation as an obligee. Each such bond shall have a coverage limit of at least 50 per cent of the tender price.

1.16 Technical Proposal Content

1.16.1 Overview

The proposal shall contain the following mandatory submission requirements and shall meet the Ministry’s pass/ fail evaluation to be considered as the Preferred Proponent. During the Ministry's evaluation, only the information provided in the proposal shall be considered to determine if it meets the Ministry's requirements. The proponent’s technical proposal shall focus on the key components in sufficient detail to enable the evaluation panel to assess the proponent’s understanding of the Work and ability to deliver the Project in conformance with the RFP documents.

Technical Proposal Requirements

Document	Mandatory Submission Requirements
Transmittal Letter	Each proponent shall submit a transmittal letter according to section 1.16.2.1
Conflict of Interest Forms	Each proponent shall submit completed Conflict of Interest Forms according to section 1.16.2.2.

Document	Mandatory Submission Requirements
Form of Offer	Each proponent shall submit a completed Form of Offer according to section 1.16.2.3.
Commitments Report	Each proponent shall submit a Commitments Report according to section 1.16.2.4.
Quality Management	The proponent shall submit a summary of its quality management plan that demonstrates understanding, commitment and ability to manage quality processes during the entire life of the contract and performance specifications requirements related to the design and construction of the Project. The summary shall provide an outline of the processes to be used to: a) document conformance with the requirements in the Contract Documents including conformances related to performance specification; b) inform the Ministry of Quality Control non-conformances; c) propose remedial action to the Ministry prior to implementation of the remedy associated with the QC non-conformances found; d) improve processes that led to the QC non-conformances; and e) address quality related checking, verifications, validations, inspections and testing activities to be conducted during all phases of the Project including design, construction and commissioning. f) Manage design changes during construction and any required amendments to Issued for Construction drawings The proponent is required to include a description explaining how its quality management processes shall ensure design and construction integration and continuity during all phases of the Work.
Environmental Management	Describe how environmental management issues or concerns shall be addressed in both the design and construction to meet the requirements of the RFP documents
Safety Management	Identify safety management measures that shall be taken to address the safety of workers and the travelling public and to meet the requirements of the RFP documents
Project Schedule	The proponent's proposed Project schedule shall at a minimum include the following key components and milestones: g) Start of field investigations for design h) Submission(s) of design drawings and plans i) Start of construction

Document	Mandatory Submission Requirements
	j) Traffic staging k) Significant on-site construction components/milestones l) Environmental Timing Restrictions m) The Final completion date for all Work (if the final completion date shown on the proponent's Project Schedule is not on or earlier than the Completion date set out in Section 2.1.3 of the RFP, the proponent's proposal shall be disqualified from further evaluation) A final detailed critical path schedule depicting the Construction Work, acceptable to the Ministry, shall be provided by the Design-Builder after design acceptance and prior to the initiation of construction. This schedule shall be submitted according to OPSS.PROV 100, November 2016, MTO General Conditions of Contract, GC 7.01.07.
Technical Plan	Describe in general terms the proposed design solution for the Project and key features of what the final Project shall look like. while adhering to the specific requirements outlined in chapter 2 Provide a General Arrangement (GA) Drawing for the Welland River Bridge (11 x17 page excluded from the page limit). Describe any construction staging and traffic management activities that may impact the traveling public during the performance of the Work, while adhering to the provided staging plans. Identify the standards and specifications that shall be used to design and construct the Project and any innovations that might apply.

1.16.2 Mandatory Submission Requirements

1.16.2.1 Transmittal Letter

Each proponent shall submit a transmittal letter identifying the complete name and address of the proponent which shall have responsibility for performing the Project as well as the name, title, telephone number, and email address of that Principal who shall serve as point of contact regarding this project.

1.16.2.2 Conflict of Interest Confirmations

Each proponent shall include in its proposal, confirmation that:

a) The proponent does not and shall not have any conflict of interest (actual or potential) in submitting its proposal or, if selected, with the contractual obligations of the proponent as Design-Builder under the Contract. Where applicable, the

proponent shall declare in its proposal any situation that may be a conflict of interest in submitting its proposal or if selected, with the contractual obligations of the proponent as Design-Builder under the Contract; and

b) The proponent neither has nor had access to any Confidential Information;

The form for the confirmation above is provided in Appendix A: Submission Forms, and titled "Conflict of Interest – Certification Part 1". The signed and completed form shall be submitted as part of the proponent's proposal.

In addition, each proposal shall include the following information:

a) A list of the names, addresses and telephone numbers of the persons who participated in the development of the proposal; and

b) A list of the names of any former employees of the Ontario Public Service, their job classifications and the particular ministries where these individuals were working immediately prior to their leaving the Crown

c) The proposal of any proponent may be disqualified where the proponent fails to provide confirmation of the foregoing or makes misrepresentations regarding any of the above. Further, the Minister shall have the right to rescind any Contract with the Preferred Proponent in the event that the Minister in his/her sole discretion determines that the Preferred Proponent has made a misrepresentation regarding any of the above, in addition to or in lieu of any other remedies that the Minister has in law or in equity.

The form for this information is provided in Appendix A: Submission Forms, and is titled "Conflict of Interest – Disclosure Part 2". This form shall be signed and completed and submitted as part of the proponent's proposal.

1.16.2.3 Form of Offer

Each technical proposal shall include a Form of Offer (Appendix A: Submission Forms) completed and signed by the proponent.

The Ministry, in addition to any other remedies it may have in law or in equity, shall have the right to rescind any Contract awarded to a proponent in the event that the Ministry determines that the proponent made a misrepresentation or submitted any inaccurate or incomplete information in the Form of Offer.

Other than inserting the information requested and signing the Form of Offer, a proponent may not make any changes to or qualify the Form of Offer in its technical proposal. A technical proposal that includes conditions, options, variations or contingent statements that are contrary to or inconsistent with the terms set out in the RFP may be disqualified. If a technical proposal is not disqualified despite such changes or qualifications, the provisions of the Form of Offer as set out in this RFP shall prevail over any such changes or qualifications in or to the Form of Offer provided in the technical proposal.

1.16.2.4 Commitments Report

In order for the Ministry to facilitate contract oversight by a third party, including supporting the Order of Precedence administration in Chapter 4, and to protect the integrity and confidentiality of the proposal, each proponent is required to submit a Commitments Report as an Appendix to their proposal. The Report shall document the proponent's:

a) Project personnel commitments according to the Project Management plan submitted for this RFP or submitted for the corresponding DB-EOI if applicable; and

b) Technical commitments that exceed or are in addition to the RFP requirements.

The proponent shall attest that the Commitments Report reflects all commitments made in their proposal.

The Commitments Report shall be provided to the Contract Administrator for the Project.

The Ministry in its sole discretion may provide summary extracts of the Design-Builder's proposal to a third party Contract Administrator.

The Commitments Report shall not count toward the overall page limit.

1.17 Proposal Evaluation and Award

1.17.1 Evaluation Approach

The technical proposal of the proponent with the lowest price proposal shall be evaluated to determine if it meets the mandatory submission requirements identified in Section 1.8.2 and the Ministry's pass/fail evaluation. The pass/fail evaluation shall consist of a review to ensure that the technical proposal is in conformance with the RFP and Project requirements, that the proponent has an experienced and qualified team assembled to complete the Work and that they shall have measures in place to manage issues around quality, safety and environmental management.

If the proponent with the lowest price proposal meets all proposal requirements outlined in Sections 1.14, 1.15 and 1.16, and the technical proposal passes the evaluation, that proponent shall be identified as the Preferred Proponent.

If the proponent with the lowest price proposal does not meet the proposal requirements and the Ministry's pass/fail evaluation, the proposal shall be disqualified and the technical proposal of the proponent with the second lowest price proposal shall be evaluated. This process shall be repeated until a Preferred Proponent is identified or the Ministry, in its sole discretion, determines a non-award of the contract.

1.17.2 Technical Proposal Evaluation

RFP responses shall be evaluated based on how well the technical proposals meet with

the Project requirements outlined in Chapter 2 of this RFP and how the proponent shall ensure the Work shall conform to the Specifications outlined in Chapter 3. The Ministry shall consider compliance as well as general feasibility when evaluating proposals.

1.17.3 Clarification

As part of the evaluation process, the Ministry may, in its sole discretion, request written clarifications from any proponent after the RFP Closing. Unless otherwise specified in the written request, any proponent requested to provide clarification shall have 24 hours to deliver the requested clarification electronically by e-mail, in “read only” Adobe (PDF) format, to contracttendering@ontario.ca.

The Ministry reserves the right to accept or reject any written clarification(s) submitted by a proponent. Altering the content of the original submission and/or Lump Sum price is not the purpose of clarification(s). The response received by the Ministry from a proponent shall, if accepted by the Ministry, form an integral part of that proponent's proposal.

In the event that the Ministry receives information at any stage of the evaluation process which results in earlier information provided by the proponent being deemed by the Ministry to be inaccurate, incomplete or misleading, the Ministry reserves the right to re-evaluate the proponent’s compliance with the rated requirements of the proposal.

The Ministry reserves the right to interview any or all proponents to obtain information about or clarification of their proposals.

1.17.4 Award

Final selection of the Preferred Proponent is subject to required Ministry approvals. It is anticipated that the acceptance of a proposal and the notification of award shall be made in writing within approximately 60 Days of the RFP Closing.

1.17.5 Execution of Contract

Upon conclusion of any clarifications, the Ministry shall provide the Preferred Proponent with two copies of the Agreement to be executed. Within seven Business Days of the Preferred Proponent's receipt of these documents, the Preferred Proponent shall return them to the Ministry fully executed, together with the required insurance policies and, if applicable, the signed Design-Build Guarantee.

In the case that a Contract is not successfully executed within seven Business Days of delivery of the executable form of the Agreement to the Preferred Proponent, the Ministry may at its sole discretion disqualify that proponent and offer award to the proponent with the next lowest price proposal and a compliant proposal.

1.17.6 Debriefing

Debriefings for Design-Build Minor RFP’s shall be provided by exception, typically for proponents who are new to the Design-Build model. A proponent may request a debriefing in writing by email to contracttendering@ontario.ca. Such requests for debriefings shall be made within 10 Days of Contract Award. Any requests for

debriefings received more than 10 Days after Contract Award shall not be considered.

1.18 Additional Terms and Conditions of the RFP

By submitting the proposal, the proponent acknowledges and agrees with the following terms and conditions:

a) The Ministry reserves the right, as it may determine in its sole and absolute discretion, to:
   i. reject any or all proposals;
   ii. accept any proposal;
   iii. if only one proposal is received in response to this RFP, elect to reject it;
   iv. withdraw this RFP at any time and for any reason;
   v. alter the schedule, proposal call process or procedures or objectives, or any other aspect of this RFP.

b) Proposals submitted are irrevocable and shall remain in effect and open for acceptance by the Ministry for a period of 60 days after the RFP Closing in the Summary of Key Information

c) The Ministry does not bind itself to accept any proposal and may proceed as, in its sole and absolute discretion, it determines, following receipt of the proposals. The Ministry reserves the right to amend or modify any term of this RFP or otherwise revise the RFP. The Ministry may invalidate the RFP and may issue a second RFP.

d) All costs and expenses incurred by proponents relating to their proposals shall be borne by the proponents. The Ministry is not liable to pay such costs and expenses or to reimburse or compensate proponents, or persons connected with the proponent, under any circumstances, including the rejection of any or all proposals, the cancellation of the RFP, or the failure to negotiate a contract with a proponent.

e) The Ministry shall not accept responsibility for any delays or cost associated with any reviews or approval processes.

f) The Ministry may, if deemed necessary, verify any information provided in any proposal.

g) It is clearly understood that if there is any evidence of misleading or false information having been given, the Ministry may, in its sole discretion, reject the proposal.

h) The acceptance of a proposal shall be made in writing. There shall not be a binding contract for the Work unless and until the Ministry and the Preferred Proponent have entered into the Contract contemplated in this RFP.

i) The Preferred Proponent shall be required to enter into and duly execute a written Contract with the Ministry substantially in the form titled *Agreement* attached here to in Appendix B. Only changes necessary to reflect the options or variables set out in this RFP shall be made to the Agreement. In the event that a Preferred Proponent fails or refuses to enter into and duly execute a written Contract acceptable to the

Ministry within the prescribed time, the Ministry reserves the right, at its sole discretion, to award the Contract to another proponent, not to accept any proposal, or to call for a new proposal, and the defaulting proponent shall be liable for all losses, damages, costs and expenses (including consequential losses and damages, and legal fees on a solicitor-and-his-own-client basis) suffered or incurred by the Ministry as a direct or indirect result thereof, including but not limited to any increase in the price of performance over the price submitted by the defaulting proponent in its proposal.

j) The Design-Builder shall be required to ensure that there is no change in effective control of the Design-Builder within the first 12 months of the Contract. If there is a change in effective control, the Ministry reserves the right, at its sole and absolute discretion to cancel the Contract and to issue a new Request for Proposal or approve the change in control or to approve the change in control subject to conditions imposed by the Ministry.

k) This RFP does not constitute an offer of any nature or kind whatsoever to the proponents, or persons connected with the proponent.

Chapter 2: Project Requirements

2.0 General Project Requirements

The scope of Work includes the provision of the full and complete design and all materials and performance of all Work necessary to construct the Project as provided in the Contract Documents. The design and construction shall not negatively impact future maintenance or future construction.

The project is located along the QEW from McLeod Road (Regional Road 49) to Sodom Road (Regional Road 116) within the City of Niagara Falls and the Region of Niagara.

The work on the Project includes:

- The replacement of the Welland River Twin Bridges on the QEW over CP Rail, The Welland River, The Baden Powell Trail and Oakwood Drive, meeting the clearance requirements outlined in Section 2.4.8;
- Rehabilitation of three structural culverts;
- No change to horizontal alignment is required;
- The Welland River Bridges and the structural culverts immediately north and south of the bridges may be constructed/rehabilitated within the same work zone and can be facilitated by median crossovers;
- The structural culvert furthest south (Usshers Creek Culvert) can be rehabilitated without long-term closures of the QEW;
- Profile raise and profile improvements at the Welland River Bridges and bridge approaches including grading, pavement reconstruction and embankment grading with settlement mitigation measures (i.e. lightweight fill, ground improvements) in select locations;
- Relocation of existing Road Weather Information Systems (RWIS) Station, protection of existing Fixed Automated Spray Technology (FAST) pump house and contents and provisions for future FAST installation.

The Design-Builder is required to meet the following requirements:

- The project shall be constructed within the existing MTO right-of-way (ROW) and avoid environmental impacts;
- Temporary illumination shall be in place for both the north and south temporary median cross overs for the duration of construction;
- The grade raise shall be achieved while maintaining a zero net increase load over the Grassy Brook Culvert and maximum settlement of 25 mm at the Welland River Bridge;
- The minimum clear zone requirements for Oakwood drive, CP Rail and navigable waters shall be respected throughout construction and under the final conditions;
- Remove and dispose of the existing bridge structures as per Ministry Standards;
- Satisfy Railway requirements of building a bridge structure over or on the CP’s Railway right of way; and,
- Minimize the time of closures of roads and ramps.

Refer to the PDR for additional details of the recommended plan. The recommended

plan will not require any permanent private property as it can be constructed entirely within the existing QEW ROW. Standard mitigation measures will be employed during implementation of the proposed bridge replacement and culvert rehabilitations to reduce or avoid environmental impacts (which are primarily focused on watercourse protection). Refer to the environmental reports, the Environmental Screening Document and the PDR for a description of the potential environmental impacts and corresponding mitigation measures. Adherence to the mitigation measures in these documents form a project requirement.

2.1 Project Management Requirements

2.1.1 Communications

The Design-Builder shall ensure exhaustive communication for any and all issues with appropriate stakeholders.

The Ministry shall be the sole point of contact for any media enquiries (i.e. newspaper, radio, TV). The Design-Builder is the first point of contact for all other communications. Recognizing that communications may be a shared responsibility, the Design-Builder and the Ministry shall work collaboratively to determine an appropriate and timely approach for addressing any issues.

The Design-Builder shall ensure that any temporary horizontal or vertical restrictions at bridge sites are reported to the Contract Administrator when and as specified Construction Administration and Inspection Task (CAITM). “Procedure for Reporting on Temporary Restrictions for Vehicular Traffic” for the Ontario Structure Clearance and Load Information System (OSCLIS). The two forms are provided in Appendix C.
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2.1.2 Meetings / Presentations

The Design-Builder shall schedule the following meetings/presentations:

a) Design Phase

i. Start-up Meeting
ii. Monthly Progress Meetings / Presentations
iii. Utility Coordination / Relocation Meeting(s)
iv. Railway Coordination / Approvals (to be combined with progress meetings)
v. Design Complete Meeting(s) [prior to submitting the Issued for Construction Drawings]
vi. Project Presentations – General;
The Design-Builder shall provide project presentations at key stages during the design of the project. Presentations shall include an update on the project’s progress, and shall provide background and recommendations to the Ministry on key decision items.
vii. Design Complete Presentation;

The Design-Builder shall provide a copy of the design complete presentation package to the Ministry's project manager no less than 15 Business Days prior to the presentation. The design complete presentation package shall incorporate all design submissions as per Section 2.2.2 Design Submissions.

The Design-Builder's quality auditor shall confirm in writing to the Ministry's Project Manager that the design complete presentation package sent to the Ministry has had the changes incorporated from the Design-Builder's internal design review(s) and if applicable, the comments by the Ministry's project team (includes the Ministry's Project Manager). Written documentation from the Design-Builder's internal design review(s) shall be provided to the Ministry at the time the design complete presentation package is submitted. Changes from the Design-Builder's internal design review(s) and from any comments received from the Ministry's project team shall be made before the documents are sent to the Ministry for the design complete presentation.

The agenda for the design complete presentation shall include;

- A compiled list of all changes to the design complete presentation package previously submitted to the Ministry, with a written explanation as to the reason for the change;
- A compiled list of all comments received from the Ministry's project team;
- A written response to each comment received from the Ministry's project team concerning the design complete presentation package;
- Correspondence from the Railway supporting the proposed structure over their right-of-way.
- Correspondence from the Hydro One supporting the proposed grade raise under their line.

For the design complete presentation, the design for the Project is required to be complete and all drawings, documentation, specifications and clearances in final form.

The Design Builder's key personnel identified in their Project Management plan submitted for this RFP or submitted for the corresponding DB-EOI response shall attend this presentation.

a) Construction Phase:

i. Start-up Meeting
ii. Monthly Progress Meetings

b) Any other meetings necessary to ensure the success of the Project.

For regular progress meetings, in addition to new items, the following shall be standard agenda items:

c) Project goals
d) Schedule
e) Testing
f) Quality management
g) Communications
h) Project costing and forecasts

Meetings during the design phase shall be held at the Ministry Central Regional Office at 159 Sir William Hearst Ave, Toronto. Meetings during the construction phase for construction related matters shall be held within 15 km of the Project site. All meetings shall be scheduled such that all issues are adequately covered and discussed between 8:30 a.m. and 4:30 p.m. The cost of the venue for all meetings shall be paid by the Design-Builder.

All meetings shall be arranged and chaired by the Design-Builder. All key personnel identified in the Project Management plan shall be present at all meetings and invitations shall be sent to each member of the Ministry's project team. An agenda and a copy of the documents and plans to be discussed shall be supplied to each invitee a minimum of five Business Days prior to the meeting. Minutes shall be prepared by the Design-Builder for all meetings within five Business Days and distributed by e-mail to all invitees. The Design-Builder shall make the appropriate changes, additions and deletions to the minutes as requested by the Ministry within five Business Days.

During the construction phase a key representative of the Design-Builder's design team shall participate in the construction start-up and all progress meetings.

During both the design and construction phases of the project, third parties (Emergency Services, OPP, MOL, etc.) shall be invited at the Ministry's discretion to the start-up and progress meetings.

2.1.3 Schedule

Time shall be the essence of this Contract.

The Design-Builder shall complete this Contract in its entirety by November 1, 2022 and to start bridge demolition no later than November 1, 2019.

If this time limit above specified is not sufficient to permit completion of the Work by the Design-Builder working a normal number of hours each Day or week on a single daylight/night shift basis, it is expected that additional and/or augmented daylight and night shifts shall be required throughout the life of the Contract to the extent deemed necessary by the Design-Builder to ensure that the Work shall be completed within the time limit specified. Any additional costs occasioned by compliance with these provisions shall be considered to be included in the prices bid for the various items of work and no additional compensation shall be allowed therefore.

Liquidated Damages

It is agreed by the parties to the Contract that in case all the Work called for under the Contract is not finished or completed within the date of completion specified aforementioned or as extended according to subsection GC3.06, Extension of Contract Time or Interim Completion Dates, of OPSS.PROV 100, November 2016, MTO General Conditions of Contract, a loss or damage shall be sustained by the Owner. Since it is and shall be impracticable and extremely difficult to ascertain and determine the actual loss or damage which the Owner shall suffer in the event of and by reason of such delay, the parties hereto agree that the Design-Builder shall pay to the Owner the sum of $2,000 as liquidated damages for each and every Day of delay in finishing the work beyond the date of completion prescribed. It is agreed that this amount is an estimate of the actual loss or damage to the Owner which shall accrue during the period in excess of the prescribed date of completion.

The Design-Builder shall incur interest on Liquidated Damages and pay such interest according to GC 7.19. For greater certainty, the Owner may also retain interest charges from monies owing to the Design-Builder under GC 8.02.04.11 (Owner's Set-Off).

2.1.4 Other Work in the Area

The Design-Builder shall coordinate the Work with other contractors working within and/or adjacent to the Project limits to ensure that they do not perform work in the same area at the same time, or adversely affect each other's work. The Design-Builder shall provide written confirmation that time and distance separation of contractors is maintained between the operations included in this Contract and work within and/or adjacent to this Project completed by others. The Design-Builder shall be required to place, cover, relocate, and remove their construction signing as required to prevent any overlap with the construction signing on adjacent Projects.

Ontario Power Generation (OPG) has channel work scheduled to start in April 2022, and which may impact the water levels and flow direction of the Welland River. The schedule includes site preparations and vegetation management on OPG lands near the bridge starting in April 2021. Any in water work or work within the flood plain of the Welland River shall be reviewed with OPG. All in-water work at Welland River to be completed by March 1, 2022.

CPR has the right to undertake work at any time within their right-of-way for emergency or maintenance work. Currently CPR has not identified any specific plans for extended construction work at this location (i.e. track upgrades, track additions).

2.2 Design Work

2.2.1 General

All design work shall be completed according to the most recent version of the following documents:

i) MTO Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017)

j) Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017)

k) MTO Roadside Design Manual

l) Canadian Highway Bridge Design Code (CHBDC) CSA-S6-14

m) MTO Structural Manual, including Ontario Exceptions to the Canadian Highway Bridge Design Code

n) MTO Structure Rehabilitation Manual

o) MTO RSS Design Guidelines

p) MTO Aesthetic Guidelines for Bridges

q) American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering

r) Guideline for Professional Engineers Providing Geotechnical Engineering Services (1993), published by Professional Engineers of Ontario (PEO)

s) Applicable Ministry Design Bulletins

t) Applicable CP Design Bulletin: Crash Wall Protection

u) Environmental Reference for Highway Design

v) OTM Book Suites

The Design-Builder shall:

- Validate or obtain all field data necessary for detailed design and perform any required investigations, studies, and tests required in addition to the Ministry supplied information provided in Appendix C to complete the Work as described in the Contract Documents. The Design-Builder shall have 90 Days from the issuance of PH-CC-700 Permission to Start Work to confirm the accuracy of information provided by the Ministry and identify any errors or omissions. The onus is on the Design-Builder to provide fact based evidence, in writing to the Contract Administrator, that any information provided by the Ministry is inaccurate for the proper performance of the Work. After this time period, the Ministry shall not consider any claims associated with inaccurate information provided by the Ministry**.** Traffic control for all field Work shall be completed according to Book 7 of the Ontario Traffic Manual.

- Perform all design required in Chapter 2: of the RFP according to the

Specifications defined in Chapter 3: Specifications and be solely responsible for design adequacy, accuracy, constructability, appropriateness regarding environmental requirements and conformance to all requirements of the Work;

- Perform all work required to secure any required approval(s) resulting from the Design-Builder's design where deviating from the preliminary design;

- Confirm locations of all Utilities and provide all required documents to the Contract Administrator for any required Utility relocations arising from the Design-Builder's design. The Design-Builder is responsible for managing all scheduling impacts arising from Utility relocations beyond those identified in preliminary design;

- Ensure that all final design, design reports, drawings and calculations are sealed and signed by an Engineer. Ensure that all final Structural or Foundations drawings, design reports and Working Drawings are sealed and signed by two Engineers. Ensure that all design work under the Contract is covered by appropriate Professional Liability insurance;

- Submit to the Ministry the final version of all relevant design submissions noted in Section 2.2.2 Design Submissions, a minimum of 10 Business Days, unless specified elsewhere in this RFP, prior to construction of that portion of the Work. The Ministry shall not be approving the design submissions.

  Under no circumstances shall construction start or continue in the absence of Issued for Construction drawings.

  If, in the sole opinion of the Ministry, design submissions are not in conformance, or contain significant errors, then the Design-Builder shall be required to correct the Work so that it conforms to the Contract Documents.

- Provide Record Drawings and documentation, as detailed in section 2.3.1, upon Contract Completion

2.2.2 Design Submissions

The following design submissions are based on the Project requirements and may include, but are not limited to, the following:

a) Issued for Construction Drawings
a) Complete listing of specifications to be used, including all OPSS, OPSD, SSD, MTOD, and Special Provisions
b) Special Provision Fill-Ins (the entire Special Provision shall be provided with the fill-in portion italicized)
c) Removals and new construction drawings
d) Highway and geometric design (including horizontal and vertical control sheets, profile drawings, typical section drawings, InRoads cross-sections of QEW in

AutoCAD, Adobe (PDF) or other Ministry approved viewing format

e) Structural drawings for bridges and structural culverts
f) Traffic Management Plan
g) Staging drawings including detours, road closures, pavement marking details
h) Staging plans around CPR's right-of-way
i) Staging at the Hydro One Line
j) Traffic Design Report
k) Construction access/egress locations and design
l) Electrical design drawings
m) All environmental protection/mitigation measures
n) Environmental Management Plan
o) Landscape design plans
p) Erosion and Sediment Control Plan
q) Cultural Heritage Resource Documentation Report
r) Final Construction Staging Consultation and Engagement Plan
s) Construction material mix designs and supporting data
t) Temporary sign plan drawings
u) Sign details for temporary construction signs
v) Permanent sign plan
w) Pavement marking plan
x) Culvert design
y) Roadside safety devices (permanent and temporary)
z) Material disposal locations/design within Highway right-of-way and outside of project limits
aa) Drainage/Stormwater design drawings
bb) Estimated quantities with sufficient details to enable contract administration and payment
cc) Geotechnical design
dd) Summary of changes to original design concept provided by the Ministry
ee) Any issues related to building around CPRs right-of-way
ff) Utility conflict plans and relocation drawings
gg) All design notes and computations
hh) Prepare and submit an updated Design Criteria Addendum to the Ministry for approval, if the Design-Builder's design deviates from the requirements in the Ministry provided and approved Design Criteria (or Design Criteria Addendum). The Design-Builder shall receive a copy of the Ministry approved Design Criteria Addendum prior to undertaking any proposed deviations from the Ministry provided and approved Design Criteria (or Design Criteria Addendum).
ii) Aesthetic Drawings for structures

The following final reports shall also be submitted:

a) Final Structural Design Report(s) (within ten (10) weeks of Contract award)
Final Pavement Design Report(s)
Final Foundation Investigation and Design Report(s)
Geotechnical / Foundation Instrumentation Monitoring Report(s)
Groundwater Assessment Report(s)

Final Drainage and Stormwater Management Report(s)
Roadside safety analysis report(s)

All design submissions to the Ministry shall be in the following format:

- Plans and Drawings

1. All digital drawings shall be prepared using AutoCAD (Ministry approved version)
2. Five (5) 11” x 17” hard copy sets appropriately scaled, titled, numbered, dated, and indexed
3. Digital copies in AutoCAD and Adobe (PDF) format on USB

1. Design Notes and Computations
    1. 8 ½” x 11” hard copy sheets appropriately titled, numbered, dated, and indexed
    2. Computer output forms and other oversized sheets shall be folded or legibly reduced to 8 ½" x 11" size
    3. Digital copies of the design notes/reports and computations in Adobe (PDF) format on USB

4. Reports
    1. Five (5) 8 ½” x 11” hard copy sets appropriately titled, numbered, dated, and indexed
    2. Digital copies in Adobe (PDF) format on USB

2.3 Construction Work

2.3.1 General

The Design-Builder shall:

a) Perform all construction work according to the Contract Documents, and be solely responsible for all requirements of the Work during construction and throughout the warranty period;

b) Coordinate required Utility relocations (temporary and permanent);

c) Appoint an individual who is an Engineer whose work shall be covered under appropriate Professional Liability insurance policies to confirm in a letter to be included as part of the Certificate of Completion Application:

d) completion of the Work according to the Contract

e) all government and agency authorizations and approvals have been applied for, obtained and/or complied with as may be required;

f) there are no outstanding infractions of laws and regulations; and,

g) all quality inspection and testing of the Work has been completed according to the Design-Builder's Quality Management Plan and the Contract Documents.

h) Upon request, the Design-Builder shall provide the Ministry access to the Work, and any associated production facilities, for any testing, investigation, audit and access to all inspection records, test results and testing facilities to enable the Ministry to audit the Design-Builder's adherence to the Contract Documents. By conducting testing, investigation, and/or audits the Ministry shall not thereby be considered to have waived compliance with any duties or obligations, or liability, of the Design-Builder under this Contract.

i) The Design-Builder shall stop construction of the Work that is not in conformance with the Contract Documents or any Work which may impede the correction of Work that is not in conformance with the Contract Documents, until such time as the Design-Builder corrects the Work so that it conforms to the Contract Documents at no cost to the Ministry.

j) The Design-Builder shall identify design changes during construction to the Contract Administrator and manage changes according to the Design-Builder's quality management plan and all other Contract requirements.

2.3.2 Record Drawings and Documentation

Upon Contract Completion, the Design-Builder shall prepare and submit to the Ministry one complete set of drawings and documents, including any changes from previous submissions. The preparation cost of such drawings and documents shall be included in the Lump Sum price. The information is also to be provided in digital format with drawings in AutoCAD ".DWG" format (Ministry approved version) and other documents in Adobe (PDF) format.

The Record Drawings and documents to be submitted shall include but not be limited to the following:

a) Drawings prepared to Ministry standards at a scale of 1:1000, with co-ordinate grids showing the alignment, profiles and all roadside appurtenances, drainage systems and other ground features;

b) Drawings for structural work including schematics of actual culvert concrete removals and patches;

c) All drainage/storm water related drawings (plans, profiles, cross sections), design calculations, analysis and modelling including detail drawings and calculations for stormwater ponds (inlet and outlet features) and enhanced swales; the Record Drawings shall show the size, type, inverts, etc. for all new and existing catch basins, manholes and ditch inlets within the Project limits;

d) Culvert design drawings and calculations; the Record Drawings shall show the size,

type, inverts, etc., for all new and existing pipes and culverts within the Project limits;

e) Structural design drawings, Working Drawings, mill certificates and design check notes and calculations;

f) Record drawings for structural work shall contain all modifications, substitutions and changes made during construction, with the drawing revisions clouded and annotated with the applicable Instruction Notice (INC) number or other directive but shall not include any other external references. All documentation not able to be detailed on the drawings shall be appended to the Record Drawings package and referenced in a clear, systematic manner;

g) As-built drawings that show all clearances at the CPR crossing;

h) As-built drawings that show all clearances at the Hydro One crossing;

i) Revised horizontal and vertical sheets showing MTM grid co-ordinates of all legal boundary and control survey monuments found and their post-construction status (existing, damaged/destroyed/replaced by licensed surveyor, etc.;

j) Pavement marking drawings;

k) All electrical drawings and calculations, including RWIS and FAST provisions installed on the Welland River Bridge;

l) Utility drawings; the Record Drawings shall show all above ground and underground Utilities within the Project limits. Underground utilities shall be mapped according to CSA S250-11, *Mapping of underground utility infrastructure*, to accuracy level 3 or better;

m) Design Reports; Typical sections; Monitoring Reports required by Environmental Permits or Authorizations including those required post-construction up to the final Warranty Release date (eg. for Fisheries Act Authorizations or Endangered Species Act permits etc.); and

n) Geotechnical / Foundation Instrumentation and Monitoring Report.

Drawing detail shall include, but is not limited to, existing and new construction features, all drainage information, bridge soffit clearances and all Utilities.

2.3.1.1 Record Drawing Deliverables

Digital Terrain Model (DTM)

The final deliverables do not require a DTM.

Plans – General

B & C Plans (plan & profile) shall be created and shall be to a horizontal scale of 1:1000 when plotted full size (22” x 34”).

B-Plans for Record Drawings

The Design-Builder shall provide B-Plans within the Project limits.

ETR plate(s) drawings (11x17) shall be created.

C-Plans for Record Drawings

The Design-Builder shall provide Record Drawings with profiles for all new exit/entrance ramps, Highway QEW (CL median, NBL, SBL).

All profiles shall show applicable drainage features (CB, MH, DI, Crossing Culverts, etc.) and new bridge structures.

Site Plans

The Design-Builder shall determine whether site plans are required for this Project.

2.3.1.2 Survey Deliverables

Survey Deliverables shall be submitted as Record Drawings and documentation as described in Section 2.3.1.1.

All submissions shall be in metric.

All projects shall be submitted on CD-ROM and a hard copy shall be supplied for all digital plans, profiles, reports and Horizontal and Vertical Control (H&V) spreadsheets.

All submissions shall be hand delivered or sent by courier to the Contract Administrator.

Submissions shall include, but are not limited to, the following:

a) Digital copy of XMLschema 1.2 alignment files for all newly constructed portions of the work;
a) XML or plain ASCII text file of horizontal and vertical control survey monument points with point number, coordinates, field code and description;
b) Digital copies of plan and profile drawings in AutoCAD “.DWG” format; and
c) A report detailing any problems or contentious issues encountered during the survey.

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2.4 Project Specific Requirements

2.4.1 Highway Engineering

The Design-Builder shall undertake detail design as outlined in the Design Criteria and the Preliminary Design Report for the replacement of the Welland River Bridges and associated profile improvement.

This includes but is not limited to completing the grade raise and associated grading, median barrier wall replacement, safety measures replacements with the use of slope flattening where property limits allow.

2.4.1.1 Horizontal Alignment

The horizontal alignments on the QEW has been established in the Preliminary Design Report and Design Criteria and shall be followed.

Horizontal Alignment Design Speed

Hwy/Road/Ramp	Design Speed
QEW	120 km/h
	As established in the Design Criteria
Oakwood Drive	N/A – existing horizontal alignment to be maintained

During staging 120km/hr design speed shall be met in all locations with the exception of the south transfer as per the PDR, it shall meet a design speed of a minimum of 100km/hr (which will include superelevation at the median cross over).

2.4.1.2 Vertical Alignment

A grade raise shall be required on the QEW at the Welland River Bridge and approaches to provide current and future widening CPR clearance as noted in Appendix C. The required grade raise would result in a QEW profile adjustment near the proposed structure.

The required vertical alignment shall meet the design speeds indicated below:

Vertical Alignment Design Speed

Hwy/Road/Ramp	Design Speed
QEW	100 km/h (crest curve only)
	As established in the Design Criteria
Oakwood Drive	N/A – existing vertical alignment to be maintained

The minimum vertical clearance over CP Rail right-of-way shall be 7.01 m above top of rail.

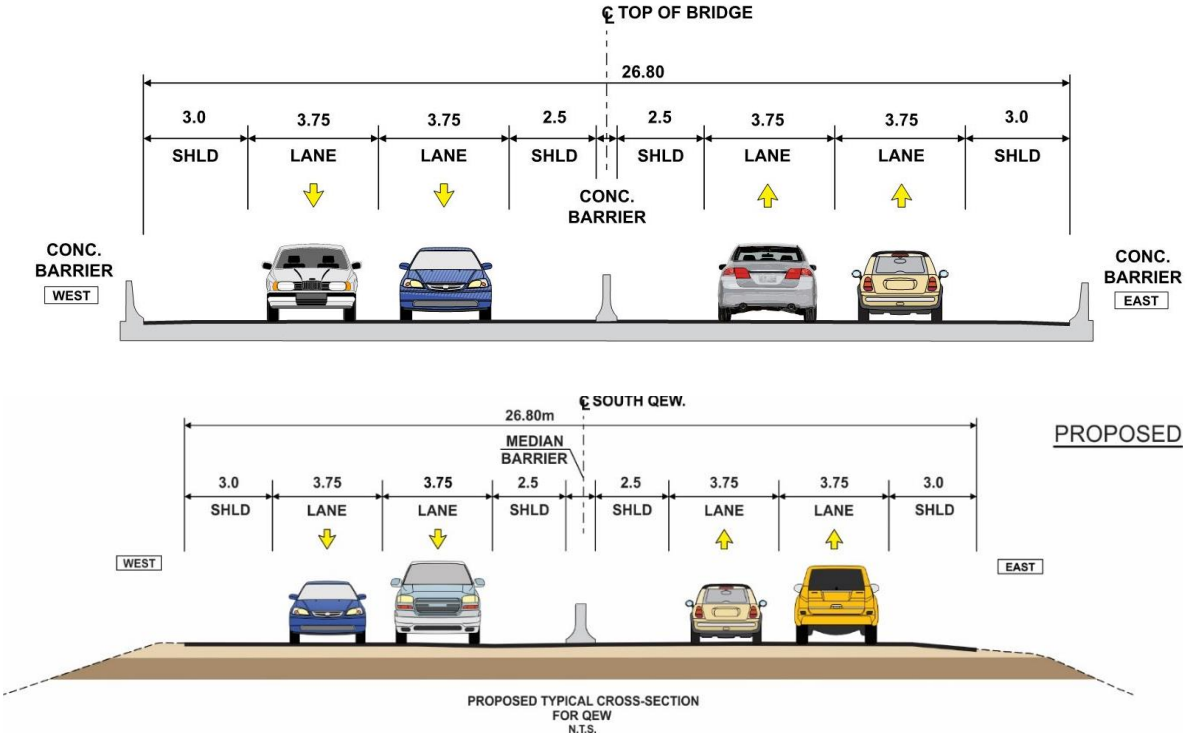
The minimum vertical clearance over Oakwood Drive is 5.0 m.

At the Hydro One Transmission lines, a maximum QEW grade raise of 1.0 m is allowed.

2.4.1.3 Cross Section

The required cross section for the QEW, and interim stages of construction, shall be designed and constructed according to the design criteria, provided in Appendix C, illustrated in the figures below, and to meet the requirements of the MTO Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017) and the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017) including vertical profile, cross-fall, super-elevation, shoulders, side slopes, back slopes, and ditches. While the proposed bridge is >50m in length, the exception for a reduction in the bridge sideclearances (shoulders) due to bridge length will not be allowed. The bridge cross section shall accommodate both directions of QEW traffic with four 3.75m lanes, 2.5m median shoulders, and 3m outside shoulders.

QEW Typical Sections



Improvements to the existing mainline cross-section include, but are not limited to:

- Revisions to the existing QEW shoulder widths required to meet current Ministry standards within grade raise and construction limits;
- The QEW cross-fall shall be restored to design standards within the grade raise

limits, including superelevation, superelevation transition and tangent runout on the structure as required;
- Embankments along QEW shall be constructed to be 4:1 or flatter unless protected by roadside safety measures;
- Steel beam guide rail and energy attenuators and other required safety systems;
- Ground mounted signage;
- Sight distance at QEW grade raise location;
- Pavement markings;
- Shouldering;
- Tall wall replacement;
- Minimum lane width during staging is 3.5 m, and shoulder widths of 0.5 m to 1.0 m (see Section 2.4.5.2).

Improvements will tie into existing highway cross-sections as appropriate.

2.4.1.4 Roadside Safety

The Design-Builder shall review all roadside hazard conditions throughout the Project and ensure adequate mitigation in conformity with current Ministry standards (MTO Roadside Design Manual). The review shall be documented in a Roadside Safety Analysis report.

2.4.2 Utilities

The Design-Builder is advised that there are no utility relocations anticipated for this Project. Should any conflicts with existing utilities and the Works be identified, the Design-Builder shall be responsible for coordinating utility relocations as per the following.

Utility relocation required due to the Design-Builder's design varying from the Ministry preliminary design, provided in Appendix C, shall be completed by the Design-Builder at the Design-Builder's cost. The Design-Builder shall be required to secure all necessary arrangements, with respect to Utility relocations, and account for the relocations in the Project schedule. The Design-Builder shall initiate Utility relocation procedures according to the "Ministry's Utility Relocation Guidelines January 28, 2010" document. This document has been prepared to provide a consistent approach in dealings between major Utility companies (i.e. Bell Canada, Ontario Hydro, Enbridge Gas and Union Gas), Ministry personnel and its Consultants. For other Utility owners, similar processes and procedures shall apply. Individual Utility companies shall be contacted by the Design-Builder to determine the time requirements associated with any relocation. Utility Company contacts shall be provided to the Design-Builder.

The Design-Builder shall identify existing Utility alignment and elevation during the design phase. The Design-Builder shall verify/obtain all existing and proposed Utility information from Utility owners, arrange for and complete test pits, and attend any on-site meetings with Utility companies as necessary to complete the Work.

The Design-Builder, in conjunction with the Utility owners, shall prepare a composite

plan illustrating all existing Utilities within the Project area based on information provided by the Utility owners and the results of field investigations. The Design-Builder shall develop Utility relocation plans in conjunction with the Utility owners and the Ministry. The Design-Builder shall submit to the Ministry the following information:

a) The composite plan (digital and hard copy);

b) The plan of proposed relocations (digital and hard copy)

c) A letter stating that the Design-Builder has reviewed the proposed relocation in conjunction with the detailed design, and that the proposal shall not conflict with the proposed construction; and

d) A written request for EA clearance for Utility relocation with the final Utility relocation plans attached.

The Design-Builder shall be responsible for:

e) Protecting, isolating and/or relocating Utilities as required to carry out the work, including coordinating the work with Utility owners;

f) Utility test pits are required when work is within 1m of an underground Utility;

g) Maintaining separation from primary power lines as specified by Utility owners;

h) Coordinating and scheduling the physical relocation of all Utilities.

The Design-Builder shall work closely with MTO Engineering Office personnel and follow the Central Region Utility Relocation Process. MTO Engineering and Operations Office personnel shall be invited to attend all meetings with the Utility companies and be copied on all correspondence and minutes of Utility meetings.

The relocation work shall not commence until the written request for EA clearance for Utility relocations has been issued by the Ministry. The relocation work shall be scheduled and carried out such that proper separation from the construction work is provided to avoid any Constructor issues.

The following constraints for the Hydro Corridor shall be adhered to by the Design-Builder:

- Maintain a clear working radius of 15 m around any hydro transmission structures;
- Access to the Hydro One transmission line and structures shall be maintained at all times.
- The Design-Builder shall not use the area 15 m on either side of the centreline line of the Hydro Transmission lines to store equipment, mounding of debris or earth etc.
- Provide plans and submit to Hydro One to confirm design of grade raise of 1m or

less under the transmission line.
- The maximum QEW grade raise that can be accommodated under the Hydro One transmission lines is 1 m.

The Design-Builder is advised that the existing 115 kV Hydro One Transmission line is currently electrified but is not loaded.

The Ministry shall be responsible for:

a) Preparing a modified Letter 4 to the Utility Companies identifying the Design-Builder for this Project.

b) Processing of the Moving of Utility order(s) and processing of payments to Utility owners for relocation work shall be the responsibility of the Ministry. Any payments required for Utility relocation required due to the Design-Builder's design varying from the Ministry preliminary design, provided in Appendix C, shall be deducted from the Design-Builder's payment certificate.

The Ministry project manager shall identify any Utilities that may impact the design and construction of the work. If Utility plans are available, they shall be included in Appendix C. Identification of existing Utilities is important to mitigate Utility risks.

2.4.3 Property

The Design-Builder is responsible for designing and constructing the Project to fit within the current property limits.

The Design-Builder will be responsible for obtaining any temporary limited interests.

2.4.4 Electrical

Order of Precedence:

The design and implementation of all Electrical work shall be in accordance with the criteria contained in this Section and the reference documents (most recent edition) identified below. If there is any conflict between the criteria contained in this Section and any of the reference documents below, the criteria in this Section shall take precedence. If there is any conflict between the reference documents, the following order of precedence shall apply:

a) The criteria contained in this Article;
b) Ontario Electrical Safety Code, Electrical Safety Authority;
c) MTO – Electrical Engineering Bulletins;
d) Electrical Engineering Manual, MTO;
e) Illumination Warrant Policies PLNG –B-05 & PLNG – B- 06;
f) Ontario MTO Provincial Highway Directives, MTO;
g) MTO accepted luminaire Photometric list;
h) Draft Policy for spill light beyond MTO Right-of-way and for Light Trespass onto the MTO Right- of-way dated September 2007;

i) MTO Drawings (MTOD)
j) OPSS;
k) Arc Flash Draft Policy – Provincial Engineering Memorandum dated October 2016;
l) Roadside Safety Manual, MTO;
m) DSM; and
n) NCHRP Report 498: Illumination Guidelines for Highway Nighttime Work.

General:

The Project includes electrical detail design and construction within the project limits. The electrical work includes power supplies, temporary illumination, Road Weather Information Systems (RWIS), protection and provisions for a Fixed Automated Spray Technology (FAST) system, electrical removals and all associated electrical work.

The Design-Builder shall undertake electrical detail design as outlined in the Preliminary Design Report and as follows:

a) Electrical embedded works in the structure for ducts for future Advanced Traffic Management System (ATMS), Electrical, Deck Illumination Pole Bases, RWIS and FAST shall be designed, supplied and installed accordingly;
c) The Design-Builder shall ensure existing field conditions are accurately documented in the drawings;
d) In the interest of energy conservation and reduced maintenance costs, LED luminaires, or Ministry approved equivalent, shall be used for all permanent illumination and is acceptable for temporary illumination use.
e) The Design-Builder shall arrange and conduct site meetings to assess site conditions, inventory existing electrical plants, investigate utility hook-ups requirements and identify conflicts. The Design-Builder shall also liaise and prepare agreements with all utility agencies (Hydro, Telephone, Cable TV, Gas, and Oil) regarding relocations and to resolve / avoid electrical conflicts, to obtain utility services, and to acquire utility crossing permits.
f) The Design-Builder shall arrange and conduct a 50% electrical design presentation meeting to present the final concept of the electrical design to the Ministry. Electrical design drawings complete with lighting calculation layout drawings, electrical design draft synopsis together with the Design-Builder's Electrical QC Check List shall be submitted to the Ministry a minimum of one week prior to the meeting.
g) The Design-Builder shall arrange and conduct a final electrical design (including RWIS and FAST) presentation meeting to present the final electrical design to the Ministry. Electrical design packages along with an electrical design synopsis and the Design-Builder's Electrical QC Check List shall be submitted to the Ministry a minimum of one week prior to the meeting.
h) The Design-Builder's electrical key staff shall attend all design team progress meetings with electrical items on the agenda.
i) All existing electrical systems that are not required to remain in service shall be

removed in their entirety.

j) Temporary illumination at the median cross overs north and south of the Welland River shall be provided for all stages of construction.
k) Existing lighting shall be maintained in full night-time operation on any roadway open to traffic.
l) The Design-Builder shall avoid mounting MTO equipment on utility poles. If mounting MTO equipment on utility poles is required, the Consultant shall comply with Electrical Safety Authority (ESA) Ontario Regulation 22/04 – Guideline for Third Party Attachments and obtain approval from the owner of the utility poles, prior to finalizing the electrical design.
m) All existing and new electrical and RWIS hand holes shall be marked with a 25 mm x 25 mm galvanized steel post installed to a minimum of 1.2 m above the hand hole lid. A 100 mm x 100 mm square yellow delineator shall be affixed to each post.

Power Supplies:

There is an existing power circuit for the RWIS site fed from within the existing FAST pump house. The Design-Builder shall relocate and reinstate the power connections to both the RWIS site and FAST pump house with a new power supply. New power supply shall include a new direct buried sectional steel pole and pole mounted power supply as per MTO standards. Where required, grading, granular base and culverts across ditches shall be installed to allow for adequate access to the new service for maintenance. The power supply is to service both the RWIS site and FAST pump house on separate circuits/breakers. The Design-Builder shall determine all loading requirements for RWIS and FAST. The Design-Builder shall coordinate with the local utility for locates of service cables, terminations and metering requirements. The new power supply shall be metered. Where required, the Design Builder shall relocate service conduits and cabling to accommodate the new power supply; with service connection/termination(s) by Niagara Peninsula Energy at the service pole and meter.

Power supplies shall be provided for the temporary illumination. The locations of the power supplies shall accommodate the temporary illumination as per MTO standards and shall also be metered. The power supplies shall be mounted on direct buried wood poles. The Design-Builder is responsible for all costs for trenching, duct work and wiring from the hydro pole to the temporary services.

The Design-Builder shall be responsible for all connection charges and power consumption charges to Niagara Peninsula Energy for the temporary illumination services.

The Design-Builder shall liaise with Niagara Peninsula Energy to develop an electrical service layout that feeds all the proposed power supplies that power the electrical components on the project. The Design-Builder shall schedule, coordinate and oversee any work required to be performed by Niagara Peninsula Energy to modify existing or provide new Niagara Peninsula Energy infrastructure associated with the electrical service layouts to meet the project schedule and to avoid any constructor issues. The

Ministry will only be responsible for the direct Niagara Peninsula Energy costs for the installation of transformers and will pay the Niagara Peninsula Energy invoice cost directly. All other costs associated with providing the electrical service layout and design work required to feed the proposed power supplies shall be the responsibility of the Design- Builder. No high voltage installations are permitted for MTO systems.

The Design-Builder shall provide arc flash study report and warning label for arc flash hazard for all power supply equipment. The study shall include but not be limited to the incident energy study and coordination study.

Illumination:
Existing illumination shall be maintained and remain in full nighttime operation during construction.

Temporary illumination shall be designed and installed at the north and south median cross overs for all stages of construction for traffic staging purposes in accordance with the OPSS 106 and MTO Electrical Engineering Manual. The north transition illumination coverage shall connect to the existing McLeod Road interchange illumination and extend to Station 20+600. The south transition illumination coverage shall connect to the existing Fort Erie Bound exist ramp partial illumination at the Lyons Creek Road interchange and extend to Station 10+800.

Ministry approved luminaries shall be used for all illumination and shall be selected from the most current MTO Accepted Photometric List. High Pressure Sodium (HPS) or LED luminaires are acceptable for the temporary illumination systems.

Roadway illumination Design Criteria shall meet the appropriate MTO standards for the roadway and shall comply with all Ministry Directives.

All lighting calculations shall be carried out using Ministry approved computer programs. Lighting calculation layout drawings generated by the lighting program shall show roadway lighting levels, uniformities and light trespass levels. The lighting design shall accommodate more than one luminaire manufacturer. Luminaires shall be from the manufacturers that are on the DSM list.

Permanent underground cable splices are not permitted. Disruption to existing electrical cables will require the installation of new continuous cable runs.

Traffic Counting Station:

There is an existing traffic counting station on the QEW approximately 1 km south of McLeod Road (~station 20+000). The Design-Builder shall ensure that the traffic counting station is protected for the duration of construction and should any damage to the traffic counting station occur as a result of the Design-Builder’s construction activities the Design-Builder shall restore the traffic counting station to working condition to MTO standards at their cost.

Road Weather Information System (RWIS):

There is one RWIS within the study area located on the west side of the QEW adjacent to the roadway approximately 15m north of the Welland River Structure. The RWIS consists of a tower site, various atmospheric sensors, CCTV camera, two pavement sensors and four subsurface probes. The site was upgraded in 2017 as part of a change order to Contract 2016-0342 and is operational. There is an existing power circuit feeding the RWIS site from the FAST pump house located under the QEW Fort Erie bound Structure (access from Oakwood Drive).

The Design-Builder shall relocate the existing RWIS in the same general location as the existing site, just at the newer elevation/location to suit the new roadway, grading and structures. Relocation includes, but is not limited to, tower, footing, all equipment mounted on the pole, roadway subsurface sensors and all cabling for power, communications and interconnection of sensors. It is anticipated there may be some downtime of the RWIS site during construction. The RWIS site can be down from May 15 to October 15 however must be operational for winter conditions. Where possible downtime should be kept to a minimum by maintaining the existing RWIS site operational until it becomes directly impacted by the construction works. Temporary (or relocated) in-road sensors may be required depending on the timing of works to accommodate an operational RWIS through winter conditions. The MTO has one approved vender/installer of RWIS sites. The Design-Builder shall retain the services of Complete Systems Installation (CSI), Arnprior for the supply and installation of the RWIS equipment. The Design-Builder shall coordinate with CSI as input to the design process, more specifically to take inventory, catalogue and identify if any existing RWIS infrastructure can be salvaged and/or needs to be upgraded as part of the works (i.e. in-road sensors, tower, on tower sensors, etc.).

There is an existing communications to the RWIS tower. The Design-Builder shall confirm if it is hard wired or wireless; regardless it shall be maintained, protected and relocated to accommodate the new RWIS location.

The existing power connection to the RWIS site is from the existing FAST pump house and it shall be relocated to a pole mounted power supply as noted above.

Surface mounted ducts and junction boxes are not permitted on the new structure and ducts and junction boxes shall be embedded within the barrier wall and structure where required.

The contractor shall test the electronics prior to the work and prepare a written plan for the removal of the existing equipment and installation of the new RWIS equipment including but not limited to: tower, pavement sensors/subprobes, electronics, hardware and the associated cables. The plan shall include an inventory list of all equipment and devices associated to RWIS and their approximate age, condition and indication of being salvaged or upgraded. The plan shall include the work schedule based on the construction schedule to identify timing of downtime, reinstatement and any temporary works to maintain operations. The plan shall include the data testing with results from all

devices. The written plan shall include the minimum requirements as well as the certified RWIS Technician's details and when the work will take place. The plan shall be submitted to the Ministry of Transportation for review a minimum of four (4) weeks prior to commencing the work. A final test report shall be prepared and submitted to the Ministry of Transportation within five (5) Business Days of completion of the installation of the new equipment.

All work shall be in accordance with the manufacturer's specifications. The installation, calibration and commissioning of the new equipment shall be performed by a certified RWIS Technician that has been accredited/trained by the RWIS manufacturer to perform work on their system. Details on the RWIS equipment, system and installation requirements can be obtained from:

Complete Systems Installation (CSI)
106 McGonigal St Unit D Arnprior, ON
K7S 1M4 613-622-0060
Attention: Nick Chupick

Fixed Automated Spray Technology (FAST):

The existing FAST System is currently not operational and the components on the existing bridge shall be removed by the Design-Builder. The existing FAST pump-house and all it's contents shall be retained and protected by the Design-Builder. The existing power connection to the pump house from the post mounted meter shall be relocated to a pole mounted power supply as noted above. The fence surrounding the pump house shall be maintained, protected and any damages restored accordingly, at the Design-Builders cost.

The Design-Builder shall confirm if there is an existing Telecommunications Service (i.e. BELL) circuit to the building (RWIS) and if present confirm with the MTO if is still required and if not, the Design-Builder shall coordinate with the applicable service provider to have it terminated; otherwise left as is.

The Design-Builder shall design, supply and install provisions for a FAST system to be installed on the new Welland River Bridge; Toronto bound and Fort Erie bound directions. To ensure the correct locations for FAST, spray disks, sensors, etc., an appropriate level of FAST design shall be performed with the new provisions being provided and future elements identified accordingly. The design is subject to adherence to the Ministry preferred FAST vendor (Boschung Group) design, at the cost of the proponent. The Fixed Automated Spray Technology FAST provisions shall include: buried conduits between the pump house and structures, embedded conduits and junction boxes in the structure and barrier walls for the future FAST hydraulic lines, accumulators, valve boxes, etc. Provisions for the spray disks and sensors shall include conduits from the embedded junction boxes to the roadway at appropriate locations to facilitate continuation in the future by others. The location (i.e. sealed conduit end points) of the provisions to the roadway shall be appropriately identified for future locating. Surface mounted ducts and junction boxes are not permitted on the new structure and FAST provisions shall be

embedded within the barrier wall and structure. The size, type and quantity of ducts and junction boxes shall be determined as part of the FAST design. As part of the FAST design, if any pole bases are required along the structure to accommodate a future pole (for sensors, etc.), the pole base(s) and embedded conduits shall be included as part of the works. The pole base and poles requirements shall be appropriately documented (if not already captured on drawings) in a report and handed over to the Ministry of Transportation for their records. Coordination of these design works with the structural team is essential to ensure embedded works and structural work accommodate one another to a successful delivery of FAST Provisions.

Embedded Works

A minimum of two 50mm embedded ducts shall be provided in the outside barrier walls of the Welland River Structure for future Advanced Traffic Management System (ATMS) (i.e. future fibre optic cable) and Electrical (i.e. future illumination).

Embedded work on the Welland River Structures shall include provisions for deck illumination pole bases per current Ministry standards. Design-Builder shall determine the spacing of the bases to meet the required illumination levels for the roadway classification and MTO design criteria.

2.4.5 Traffic Management

2.4.5.1 Order of Precedence

The design and implementation of all staging/traffic management shall be according to the criteria contained in this Section and the reference documents (most recent edition) identified below. If there is any conflict between the criteria contained in this Section and any of the reference documents below, the criteria in this Section shall take precedence. If there is any conflict between the reference documents, the following order of precedence shall apply:

1. Ontario Health and Safety Act

2. MTO Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017)

3. Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017)

4. Ontario Traffic Manual Book 7

5. MTO Roadside Design Manual

    a) Temporary Conditions Traffic Management Manual

    b) Ontario Traffic Manual Suite

c) Sign Support Manual

d) Traffic Management Guidelines for Structural Rehabilitation

2.4.5.2 Traffic Management Requirements

The design speed for QEW staging/detours shall be a minimum of 120 km/h. The only allowable exception to this is one of the reverse curves at the south of the Welland River Bridges shall meet a minimum design speed of 100 km/h which will include providing superelevation for the median cross over curve.

The Design-Builder shall be responsible for all construction vehicle access/egress to the work site. Design of access/egress points shall provide sufficient distance for construction vehicles to safely merge with Highway traffic. Construction vehicles shall not be permitted to cross the Highway without properly merging with traffic.

Specified access/egress locations are included in the preliminary staging plan, total number and general locations shall be limited as per this plan. Should the Design-Builder require additional access/egress locations and/or wish to significantly change the locations from what is specified in the preliminary staging plan the Design-Builder shall submit the proposed changes to the Ministry for approval.

The Design-Builder shall be responsible for determining any staging/detouring requirements throughout the Project.

If detours are required, the following information shall be supplied to the Contract Administrator prior to using the detour:

Detour route plans on 1:1000 scale drawings;

Written approval from the appropriate road authorities for the use of their roads if detours direct traffic onto or affect existing traffic on those roads and notification to appropriate emergency response organizations.

Prior to implementation, the Design-Builder shall design and submit to the Contract Administrator a construction staging plan that meets the following requirements:

a) Hwy/Road maximum closure durations as follows:

Highway/Roadway	Maximum Duration of Full Closure
QEW	Full closure shall not be permitted
Oakwood Drive	15 minutes (to be confirmed with City)
Montrose Drive	Full closure shall not be permitted

b) Maintain at least one lane in each direction on the QEW at all times

c) Temporary pavement markings shall be used

d) Minimum lane width shall be 3.5m

e) Minimum median shoulder width shall be 0.5m (1.0 m during winter shut-down)

f) Minimum outside shoulder width shall be 1.0m

g) Advance notification, warning, alternate route signing plan (TC-64 Signage Plan). Plan incorporated into construction staging plan.

h) All temporary traffic staging shall be designed to a minimum 120 km/h design speed, with exception of one of the reverse curves at the median cross over south of the Welland River, which shall be designed to a minimum 100 km/h design speed (per TAC (2017) guidelines).

i) Temporary concrete barrier and energy attenuating terminals shall be used to protect and delineate opposing temporary traffic flows on QEW

j) All temporary condition signing shall be according to OTM Book 7 requirements and Temporary Conditions Traffic Management Manual

k) All temporary pavement markings shall be according to OTM Book 11 requirements and QEW temporary pavement markings accepted practice

l) Traffic shall not be permitted to travel on or across rumble strips at any time

m) Rumble strips removed during staging shall be reinstated at end of construction

n) Anti-glare screen shall be used as required on delineating temporary concrete barrier to prevent headlight intrusion onto oncoming traffic (during temporary median crossover) according to OPSS 791

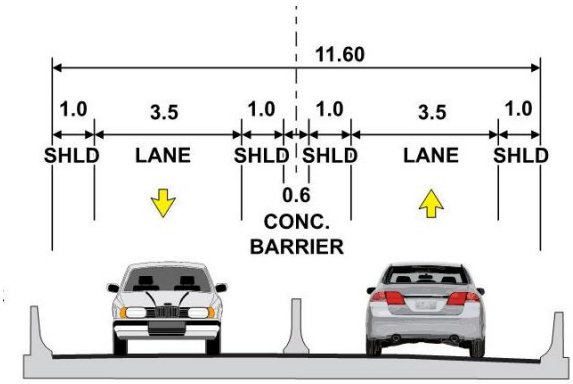
o) Temporary lane shifts, detours or roadside diversions shall require temporary pavement markings according to OTM Book 11 to provide adequate guidance and delineation

p) The Design-Builder shall ensure that an approved, automated queue end warning system is in place upstream of any queues as a result of a continuous single lane closure (greater than 24 hours) on the QEW in both directions. PVMS shall be located in advance of any queues related to the single lane closure. The Design-Builder shall be responsible for estimating the queue lengths and relocating the sign(s) as required by the queues. The Design-Builder shall be responsible for locally displaying messages on the PVMS. All systems, messages and/or messaging strategies must first be approved by the local Regional Traffic Office prior to deployment in the field. An alternate queue end warning messaging system may be utilized by the Design-Builder only through consultation and approval by the

Regional Traffic Office. The Design-Builder shall be responsible for performing all specified consequences for any non-conformance to the Performance Required as described in Table 3 of the Traffic and Mobility PROV PERF 1077, July 8, 2010. There will also be a $5,000 consequence per occurrence for proceeding with continuous single lane closure (greater than 24 hours) without the installation of an approved queue end warning system.

q) During winter shutdown, median cross-overs will be maintained to allow for year-round bridge construction

r) The minimum cross section to be maintained during winter shut-down, for roadway and the bridge is shown in the figure below



The alignment and cross sections of the staging shall be determined based on safety, effectiveness, and cost. The construction staging plan shall detail the proposed alignment(s), cross-section(s) and any impacts including property, utilities, environment, delay and disruption to traffic.

All staging options, including construction ingress/egress, shall comply with clear zone requirements at all times.

Traffic & Mobility Management PROV PERF 1077, July 8, 2010 is amended to exclude the mobility performance requirement MATT (Max Allowable Travel Time), 1077.05.01 MOBILITY, and any item associated to the MATT Performance Requirement within the Performance Specification.

QEW traffic shall not be permitted to travel on granular surfaces at any time during construction.

The Design Builder shall be responsible for all Traffic Management and shall conform to the Traffic & Mobility Management Performance Specification (Chapter 3) and the Operational Constraints below.

The Design-Builder shall be responsible for all traffic control devices and additional signing including: fabrication, installation, maintenance, and removals that are required for this Project.

The Design-Builder shall ensure that vehicle access is available to all entrances, including commercial and private entrances, at all times during construction.

The Design-Builder shall maintain safe access to the Baden Powell Trail at all times for pedestrian and truck access for park maintenance except during the winter closure period from the first Monday in November to April 30th.

Restrictions on Construction Operations

The use of construction accesses, shoulder closures and the loading and unloading of materials and construction equipment onto and from the traveled portion of the highway shall not be carried out on days identified under the section entitled “Holiday Restrictions”, or during the following periods:

Location	Monday or a Day Following a Holiday	Tuesday to Thursday Except on Days Following and Preceding Holidays	Friday or a Day Preceding a Holiday	Saturday	Sunday
QEW Fort Erie Bound – Lundy’s Lane to Beck Road	No Restrictions	No Restrictions	No Restrictions	No Restrictions	No Restrictions
QEW Toronto Bound - Beck Road to Lundy’s Lane	No Restrictions	No Restrictions	No Restrictions	No Restrictions	No Restrictions
QEW Fort Erie Bound – Beck Road to Sodom Road	No Restrictions	No Restrictions	12:00-23:00	07:00-23:00	07:00-23:00
QEW Toronto Bound – Sodom Road to Beck Road	No Restrictions	No Restrictions	12:00-23:00	07:00-23:00	07:00-23:00
Oakwood Drive	06:00-22:00	06:00-22:00	12:00-23:00	07:00-23:00	07:00-23:00
Montrose Road	06:00-22:00	06:00-22:00	12:00-23:00	07:00-23:00	07:00-23:00

Holiday Restrictions:

The use of construction accesses, shoulder closures, lane closures, ramp closures, and the loading and unloading of materials and construction equipment onto and from the traveled portion of the highway shall not be carried out on the following Canadian or U.S. Statutory/Civic Holidays; or when applicable, after noon on days immediately preceding a Holiday, as shown in the following table:

Name of Holiday	Date	After Noon on the Following Date Preceding the Holiday
Good Friday	April 19, 2019	April 18, 2019
Victoria Day	May 20, 2019	May 17, 2019
Canada Day	July 1, 2019	June 28, 2019
Civic Holiday	August 5, 2019	August 2, 2019
Labour Day	September 2, 2019	August 30, 2019
Thanksgiving Day	October 14, 2019	October 11, 2019
Remembrance Day*	November 11, 2019	November 11, 2019
Christmas Day	December 25, 2019	December 24, 2019
Boxing Day	December 26, 2019	N/A
New Year’s Day	January 1, 2020	December 31, 2019
Family Day	February 17, 2020	February 14, 2020
Good Friday	April 10, 2020	April 9, 2020
Easter Monday*	April 13, 2020	April 13, 2020
Victoria Day	May 18, 2020	May 15, 2020
Canada Day	July 1, 2020	June 30, 2020
Civic Holiday	August 3, 2020	July 31, 2020
Labour Day	September 7, 2020	September 4, 2020
Thanksgiving Day	October 12, 2020	October 9, 2020
Remembrance Day*	November 11, 2020	November 11, 2020
Christmas Day	December 25, 2020	December 24, 2020
Boxing Day	December 26, 2020	N/A
New Year’s Day	January 1, 2021	December 31, 2020
Family Day	February 15, 2021	February 12, 2021
Good Friday	April 2, 2021	April 1, 2021
Easter Monday*	April 5, 2021	April 5, 2021
Victoria Day	May 24, 2021	May 21, 2021
Canada Day	July 1, 2021	June 30, 2021
Civic Holiday	August 2, 2021	July 30, 2021
Labour Day	September 6, 2021	September 3, 2021
Thanksgiving Day	October 11, 2021	October 8, 2021
Remembrance Day*	November 11, 2021	November 11, 2021

Christmas Day	December 25, 2021	December 24, 2021
Boxing Day	December 26, 2021	N/A
New Year's Day	January 1, 2022	December 31, 2021
Family Day	February 21, 2022	February 18, 2022
Good Friday	April 15, 2022	April 14, 2022
Easter Monday*	April 18, 2022	April 18, 2022
Victoria Day	May 23, 2022	May 20, 2022
Canada Day	July 1, 2022	June 30, 2022
Civic Holiday	August 1, 2022	July 29, 2022
Labour Day	September 5, 2022	September 2, 2022

*Note: holiday is observed by CP Rail. Therefore, flagging will not be available.

Permitted Times for Lane and Ramp Closures

Lane closures and ramp closures for construction will only be allowed during the following times, subject to the additional restrictions covered under the section entitled "Holiday Restrictions":

Lane Closures:

Section Description: QEW Toronto Bound –Beck Road to Lundy's Lane

Closure	Monday or a Day Following a Holiday	Tuesday to Thursday Except on Days Following and Preceding Holidays	Friday or a Day Preceding a Holiday	Saturday	Sunday
One Lane	00:00 – 24:00	00:00 – 24:00	00:00 – 24:00	00:00 – 24:00	00:00 – 24:00
Two Lane or Full	Not Permitted	Not Permitted	Not Permitted	Not Permitted	Not Permitted

Section Description: QEW Toronto Bound –Sodom Road to Beck Road

Closure	Monday or a Day Following a Holiday	Tuesday to Thursday Except on Days Following and Preceding Holidays	Friday or a Day Preceding a Holiday	Saturday	Sunday
One Lane	00:00-24:00	00:00-24:00	00:00-12:00 23:00-24:00	00:00-07:00 23:00-24:00	00:00-07:00 23:00-24:00
Two Lane or Full	Not Permitted	Not Permitted	Not Permitted	Not Permitted	Not Permitted

Section Description: QEW Fort Erie Bound – Lundy's Lane to Beck Road

Closure	Monday or a Day Following a Holiday	Tuesday to Thursday Except on Days Following and Preceding Holidays	Friday or a Day Preceding a Holiday	Saturday	Sunday
One Lane	00:00-24:00	00:00-24:00	00:00-24:00	00:00-24:00	00:00-24:00
Two Lane or Full	Not Permitted	Not Permitted	Not Permitted	Not Permitted	Not Permitted

Section Description: QEW Fort Erie Bound – Beck Road to Sodom Road

Closure	Monday or a Day Following a Holiday	Tuesday to Thursday Except on Days Following and Preceding Holidays	Friday or a Day Preceding a Holiday	Saturday	Sunday
One Lane	00:00-24:00	00:00-24:00	00:00-12:00 23:00-24:00	00:00-07:00 23:00-24:00	00:00-07:00 23:00-24:00
Two Lane or Full	Not Permitted	Not Permitted	Not Permitted	Not Permitted	Not Permitted

Section Description: Oakwood Drive, Montrose Road and Lyons Creek Road

Closure	Monday or a Day Following a Holiday	Tuesday to Thursday Except on Days Following and Preceding Holidays	Friday or a Day Preceding a Holiday	Saturday	Sunday
One Lane	00:00-06:00 22:00-24:00	00:00-06:00 22:00-24:00	00:00-06:00 23:00-24:00	00:00-07:00 23:00-24:00	00:00-07:00 23:00-24:00
Two Lane or Full*	Not Permitted	Not Permitted	Not Permitted	Not Permitted	Not Permitted

* Full closure of Oakwood Drive, of maximum duration of 15 minutes, at QEW shall be permitted for bridge girder removal and placement as noted above and upon approval of the City of Niagara

Ramp Description: McLeod Road I/C – N-E/W, S-E/W Ramps

Closure	Monday or a Day Following a Holiday	Tuesday to Thursday Except on Days Following and Preceding Holidays	Friday or a Day Preceding a Holiday	Saturday	Sunday
One Lane	00:00-06:00 22:00-24:00	00:00-06:00 22:00-24:00	00:00-06:00	Not Permitted	23:00-24:00
Two Lane or Full	Not Permitted	Not Permitted	Not Permitted	Not Permitted	Not Permitted

Ramp Description: McLeod Road I/C – E-N, W-S, E-S, W-N Ramps
Lyons Creek Road I/C – N-E/W, S-E/W, E-N, W-S, E-S, W-N Ramps

Closure	Monday or a Day Following a Holiday	Tuesday to Thursday Except on Days Following and Preceding Holidays	Friday or a Day Preceding a Holiday	Saturday	Sunday
One Lane or Full	00:00-06:00 22:00-24:00	00:00-06:00 22:00-24:00	00:00-06:00	Not Permitted	23:00-24:00

No two consecutive on-ramps or off-ramps shall not be closed at the same time. Oakwood Drive, Montrose Drive and Lyons Creek Road shall not be closed at the same time.

The Design-Builder shall develop a comprehensive communication plan as part of the traffic management plan. The communication plan shall detail how the Ministry will be kept informed and shall also detail how:

- The Design-Builder shall ensure that the traveling public, emergency agencies and other stakeholders, including the local municipalities, residents and businesses are aware of the potential impact of construction and apply appropriate provisions to minimize the impacts and delays.
- The Design-Builder shall consult the Region of Niagara and City of Niagara to seek approval for any road closures, detours and/or construction access/egress requirements within their jurisdiction which affect the municipal road networks.
- The Design-Builder shall inform the Region of Niagara and City of Niagara at least two (2) weeks in advance of the start of construction works of each construction year.
- The Design-Builder shall notify and obtain approval for the automated queue end warning system from the local Regional Traffic Office at least two (2) weeks in advance of a continuous single lane closure (greater than 24 hours) on QEW in both directions.

2.4.5.3 Alternative Staging and Design Proposals

The MTO will allow alternative staging proposals post award which vary from those documented in the Design Criteria, Preliminary Design Report and Traffic Operations

Report, which meet and/or exceed the minimum requirements listed in the Traffic Management Section 2.4.5.2 of this document and which satisfy all other requirements of the RFP, and upon MTO approval and review of the revised traffic model to prove better operation then the current PDR design, which includes the review of changing of access/egress locations.

If the staging proposal requires variations of elements of the reference design in Appendix C, modifications shall be documented in the design submissions captured in section 2.2.1, and shall be addressed through a Design Criteria Addendum, should the proposed change warrant an Addendum.

All alternative staging, design and revised traffic model including the Design Criteria Addenda shall be submitted to the Ministry for review and approval. The MTO has sole discretion to reject all alternative staging and design including Design Criteria Addenda proposals submitted by the Design-Builder

2.4.6 Drainage

2.4.6.1 Order of Precedence

The design and implementation of all Drainage shall be according to the criteria contained in this Section and the reference documents (most recent edition) identified below. If there is any conflict between the criteria contained in this Section and any of the reference documents below, the criteria in this Section shall take precedence. If there is any conflict between the reference documents, the following order of precedence shall apply:

a) Highway Drainage Design Standards;

b) Drainage Management Manual;

c) MTO Gravity Pipe Design Guidelines;

d) MTO Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017);

e) Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017); and

f) MTO Roadside Design Manual.

2.4.6.2 Drainage Design and Construction

This Project includes the hydrological analysis and design of a drainage system to convey the flows for Welland River Bridge and Three Structural Culverts within the project limits. The new drainage system shall convey runoff and flows to the drainage system which currently exists along the QEW. The detail of these works can be found elsewhere in this document.

The drainage system shall incorporate open ditches, enclosed systems, curb and gutter and inlet structures as necessary to meet MTO drainage Standards. Curb and gutter shall be incorporated into the Work where needed for drainage, to protect slopes from erosion, and to provide positive guidance to motorists (delineation).

Final drainage and drawings (catchbasins, sewers, ditching etc.) including drainage and stormwater management during and post construction shall be implemented as required to ensure that all MTO Standards are met as per the MTO Drainage Design Standards and the Gravity Pipe Design Manual.

The drainage design shall also address water quality and quantity, and erosion targets identified within the Welland River Bridges area and the three structural culverts.

A Preliminary Drainage and Hydrology Report has been prepared and is provided in the Design-Build Ready Report included in Appendix C. The report assesses the existing drainage conditions and crossing culverts.

If a different opening size is selected to that presented in the above noted report, the Design-Builder shall be responsible for undertaking the hydraulic analysis for bridge and culverts, and completing the detailed design. Approval from MTO will be sought if a different opening size is selected to that presented in the above noted report, taking into consideration all factors including; but not limited to the hydraulic and fluvial geomorphology requirements.

Culverts (Structural (3)and Non-Structural (from Browns Rd to Lyons Creek Rd)) shall be cleaned out.

The Design-Builder shall provide complete drainage information, referenced by station and offset to a calculated alignment, within the survey limits in a digital report (in tabular format for elevation information) for the following features:

a) Top of grate elevations for all catch basins, ditch inlets catch basins and manhole elevations.

b) All above ground inlet/outlet structures and elevations.

c) All invert and pipe sizes for storm sewers, culverts, manholes and catch basins. Provide hard copy sketches of the features with the location of the features cross-referenced on the 2D Base Plans.

d) Sketch the drainage system including the direction of flow.

e) All existing and proposed drainage information shall be stored in a Land Development Desktop database and shall have a proper description. All CB’s, MH’s shall be coordinated at the centre of the structures, DI’s at both the top and bottom and the CSP’s at the centre/top of opening and concrete culverts shall be coordinated at the centre/top of openings.

f) All drainage features including shoulder drains within the contract limits shall be surveyed and the size and length of all CSP's or any other culverts shall be verified.

g) Positive drainage is to be maintained at all times during all stages of construction.

An appropriate Erosion and Sediment Control Plan shall be implemented during all phases of construction, including clean-up and restoration, to ensure that the construction runoff is treated prior to release to the downstream systems. Standard erosion and sediment control such as erosion blankets, straw bales, silt fences and temporary sediment basins should be considered in the above plan. All finished grading areas should be stabilized (seeded) to minimize sediment laden water from entering the downstream environment. Clean-up and restoration to existing conditions shall be completed prior to winter shutdown and at the completion of the project. All slope surfaces shall be seeded and mulched or seeded and erosion control blanket (depending on the slope) or sod covered on a minimum of 50 mm of top soil, and the slope of the embankment shall be designated to ensure vegetation can be established.

2.4.7 Pavement

2.4.7.1 Order of Precedence

The design and construction of Pavements shall be in accordance with the criteria contained in this Section and the following Reference Documents, and if there is any conflict between the criteria contained in this Section and any Reference Document(s), the following shall apply in descending order of precedence for design and construction of Pavements:

a. The criteria contained in this Section;

b. OPSS;

c. OPSD;

d. Designated Sources of Material (DSM) Index;

e. MTO Materials Information Report MI-183 "Adaptation and Verification of AASHTO Pavement Design Parameters for Ontario Conditions";

f. Procedures for Estimating Traffic Loads for Pavement Design, 1995, MTO;

g. 1993 AASHTO Guide for the Design of Pavement Structures;

h. Pavement Design and Rehabilitation Manual, Second Edition 2013 (MTO);

i. MTO Directive PHM-C-001 the Use of Surface Course Types on Provincial Highways;

j. American Society for Testing and Materials (ASTM) Standards;

k. MTO Laboratory Standards;

l. AASHTO Materials Specifications and Standards;

m. Pavement Design Report, Queen Elizabeth Way, Replacement of Welland River Bridges and Rehabilitation of Three Structural Culverts, G.W.P. #2430-15-00, dated September 28, 2018 by Thurber Engineering

2.4.7.2.1 General Requirements

(a) All products used on all roads shall meet applicable RFP requirements and, where specified shall be in accordance with the Designated Sources of Materials List. The use of products that are not on the Designated Sources of Materials List requires the prior written approval of the Ministry, in its sole discretion, and acceptance shall be subject to the Design-Builder demonstrating in its submission sufficient experience with the proposed product and acceptable performance for the proposed product under conditions and applications similar to those existing for this Project.

(b) Geotechnical information is available in the Pavement Design Report identified above as Reference Document. The Design-Builder shall be responsible for completing all supplemental detail design level subsurface field investigation activities necessary to meet the design and construction requirements of the project as described in this Section.

(c) Soils boreholes advanced by Project Co shall be in accordance with the requirements of the Ontario Water Resources Act (Ontario).

(d) The Design-Builder shall be responsible for the design of all pavement structures for the project. This includes the QEW, detours and temporary staging requirements. All pavement designs shall be in accordance with the “1993 AASHTO Guide for the Design of Pavement Structures”. AASHTO Pavement design parameters shall be selected as described in the MTO Materials Information Report MI-183 “Adaptation and Verification of AASHTO Pavement Design Parameters for Ontario Conditions”. Traffic load calculations shall be carried out as described in the Ministry of Transportation Report "Procedures for Estimating Traffic Loads for Pavement Design, 1995". The Design-Builder shall be responsible for developing forecasted traffic volumes for pavement design. All forecasted data and supporting methodology shall meet the contract requirements.

(e) The Design-Builder shall be responsible for designing all proposed slopes in cut and fill areas, including slope geometry, drainage treatments and erosion control measures for embankments and ditches.

(f) The Design-Builder shall be responsible for the removal of frost susceptible, organic or unsuitable material and ensuring the suitability of all earth material to be used within the project.

(g) The Design-Builder shall be responsible for effective subsurface drainage and frost protection, including the provision of subdrains or any other drainage treatments.

(h) If any Roads will be opened to public traffic prior to completing the surface course paving, the pavement design shall ensure that the unfinished pavement is designed to carry public and construction traffic until the surface course is placed. In instances where traffic is placed on non-surface course asphalt, the Design-Builder shall ensure adequate surface friction is provided.

(i) The Pavement surface course shall be in accordance with MTO's Directive PHM-C-001. Tack coat shall be applied to surfaces according to OPSS 308 prior to placing HMA.

(j) Pavement Design Report(s) shall be prepared and submitted as part of the Design Development Submittals according to this RFP.

(k) The Design-Builder shall resurface all locations of surface course asphalt where scarring of pavement occurs due to the removal of pavement markings. The resurfaced areas shall be a minimum full lane/shoulder in width and extend for the entire length of the damaged area.

2.4.7.2.2 Pavement Structures

Materials containing contaminants that may discharge into the environment and that could have an adverse effect on the natural environment (including air, land or water, and human plant or animal life) shall not be used. Granular Materials shall conform to the requirements of Ontario Provincial Standards Specifications OPSS 1010.

The minimum pavement designs for the QEW and shoulder detours shall be as described in the Pavement Design Report identified above as a Reference Document. The Design-Builder shall verify these minimum designs with updated traffic and subgrade information. Should the results of this analysis indicate a structurally greater design is required then that specified in the Pavement Design Report, then the structurally greater design shall be used. Notwithstanding this analysis, the thickness of hot mix asphalt for any pavement element shall not be less than that specified in the Pavement Design Report.

After reinstating final configuration mill 40 mm and pave with 40 mm of SP 12.5 FC2 for the full width of the roadway within the median cross over limits to eliminate the construction joints.

2.4.8 Structures

2.4.8.1 Order of Precedence

The design and construction of structures shall be according to the criteria contained in this Section and the reference documents (most recent edition) identified below. If there is any conflict between the criteria contained in this Section and any of the reference

documents below, the criteria in this Section shall take precedence. If there is any conflict between the reference documents, the following order of precedence shall apply:

a) MTO Bridge Office Policy Memos/Design Bulletins

b) Structural Manual including Exceptions to the Canadian Highway Bridge Design Code

c) Structure Rehabilitation Manual

d) MTO Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017)

e) Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017)

f) MTO Roadside Design Manual

g) Canadian Highway Bridge Design Code (CHBDC) CSA-S6-14

h) American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering

i) Drainage Management Manual

j) Other MTO manuals as listed in Appendix C

k) CP Protocol documents as listed in Appendix C

l) MTO Designated Sources of Material (DSM)

m) MTO reports and guidelines as listed in Appendix C

n) MTO Guidelines for Staged Construction of Bridges

2.4.8.2 Bridge Design and Construction

The Design-Builder shall complete detailed design and construction of the Welland River Bridge replacement (Site No. 34-65/1 & 2).

The Design-Builder shall verify and confirm the structure types and construction staging schemes recommended in the Preliminary Design Report or propose suitable alternatives as part of the detail design per the requirements set out in the RFP document.

The existing QEW Welland River twin bridges including all attachments and appurtenances shall be removed in their entirety and disposed of off site unless approved

otherwise by MTO.

The Design-Builder shall install Site Number and Date Figures. The Ministry shall supply Site Number and Date Figures.

The Welland River Bridge replacement shall meet the following requirements:

a) The bridge shall span over the Welland River, CP Rail, Oakwood Drive and Baden-Powell Trail;

b) The minimum vertical clearance over Oakwood Drive shall be 5.0 m;

c) The minimum vertical clearance over CP Rail right-of-way shall be 7.01 m above top of rail, and the minimum horizontal clearance is 19.8 m;

d) The minimum vertical clearance over Baden-Powell Trail shall be 2.5 m, and the minimum horizontal clearance is 5 m;

e) The depth of footing removal shall be to a minimum of 0.3 m below finished grade/river bed except for the piers located within the CPR ROW, where the footings shall be removed to a minimum depth of 1.2 m;

f) The bridge girder type will not require steel coating over the full girder length;

g) The design must accommodate the ability to expand the bridge to the outside in the future;

h) The clear span over the Welland River must span the water level (80m), no piers in the water;

i) To have a clear span over Oakwood Drive of from the North abutment to the first pier at the Welland Rivers North face, at a minimum of 59 m (to provide better sight distance for Oakwood Drive and provide room for future Active Transportation).

j) A minimum navigation clearance envelope of 6.0 m wide by 4.0 m high above normal water level shall be maintained on Welland River and be adequately marked by standard yellow warning lights during construction;

k) The bridge shall have a single-width deck cross-section carrying both the QEW northbound and southbound lanes, separated by a median concrete barrier;

l) Be responsible for all construction means, methods, techniques and provisions for all aspects of construction including, but not limited to, plant, equipment and materials required to undertake the work;

m) Ensure structural integrity and safety of the new and existing bridges during all stages of construction;

n) Staging shall be completed in accordance with the MTO Guidelines for Staged Construction of Bridges;

o) Perform all field investigations, testing, structural analysis and associated detail design required to complete the detail design of the structural replacement and demolition works;

p) The replacement bridge design shall be sympathetic to the identified heritage attributes and original bridge design, per the Heritage Impact Assessment. Consideration of the following will be made: arch cap pier design, I-beams, a low relief over the river and railway, four pier columns per pier and barrier wall outside façade to mimic the original steel and post barrier walls;

q) The bridge supports shall not be skewed;

r) The overall bridge cross section width provided on the Preliminary General Arrangement drawing in the Structural Design Report shall not be changed;

s) The deck and girders shall be designed as continuous construction;

t) Structural steel shall be atmospheric corrosion resistant steel Grade 350A or 350AT. Girder ends shall be coated in accordance with the current design standards;

u) The bridge shall have expansion joints at abutments according to Structural Standard Drawings SS113-10 – “Strip Seal Expansion Joint Assembly for Barrier Walls” and SS113-12 – “Strip Seal Expansion Joint Type “A” Details”;

v) Exterior barrier walls shall be according to Structural Standard Drawings for Type TL-5 barrier walls with premium reinforcing;

w) The median barrier on the structure shall be according to Structural Standard Drawing SS110-62 – “Reinforced Concrete Median Barrier Wall on Structure Type 1” (Option A);

x) Concrete barrier walls may need to be adjusted to accommodate embedded works;

y) Approach slabs are required;

z) The structure shall have a minimum Design Life of 75 years starting at the Substantial Completion Date of the project;

aa) Design the replacement in accordance with the most up-to-date version of CHBDC, MTO Structural Manuals applicable to structures of similar type and size. Concrete strength shall not be less than 30MPa at 28days with severe exposure and appropriate crack control requirements. Reinforcement used in the deck shall be high tensile steel reinforcing bars with tensile strength of 400MPa.

Other structural components chosen by the Design-Builder such as prestressing tendons, anchors, FRP bars and the like, shall be designed in accordance with appropriate CSA standards as modified by MTO OPSS and applicable manuals;

bb) All products used on the project shall be in accordance with any applicable Designated Sources of Materials List(s). The use of products that are not on the Designated Sources of Materials List(s) shall require the prior written approval of the ministry in its sole discretion, and acceptance shall be subject to the Design-Builder demonstrating in its submission sufficient experience with the proposed product, and acceptable performance for the proposed product under conditions and application similar to those existing for this Project;

cc) Deck drains are not permitted to discharge directly to the Welland River, Oakwood Drive, Baden Powell Trail or onto CP Rail right-of-way;

dd) All of the structural drawings shall be signed by two Professional Engineers, licensed to practice in Ontario, i.e. one who performs the design and one who checks that design;

ee) Preparation and review of all structural engineering related reports shall be completed by two Professional Engineers, licensed to practice in Ontario. All such reports shall be signed by two Professional Engineer (s) i.e. one who prepares the reports and one who reviews the reports.

A preliminary Design Report (PDR) is provided in Appendix C of the RFP document. The Design-Builder shall confirm recommendations made in the PDR and in accordance with the following requirements or propose alternatives.

The PDR includes Preliminary General Arrangement drawings which show a Reference Concept for replacement. The type of structure shown on the Preliminary General Arrangement drawing is for planning purposes only. The Ministry assumes no responsibility for the use of this information during detailed design.

Cost estimates, number of items, quantities and unit prices provided elsewhere in the PDR are for Ministry use only. The Ministry assumes no responsibility for the use of these cost estimates, number of items, quantities and/or unit prices during preparation of the Design-Builder’s proposal.

Any harmful material contained within the existing bridge, which may or may not include asbestos, shall be handled in accordance with MTO and Industry Standards and Protocols including, but not limited to the MTO Bridge Office Memo entitled “Bridge Office Design Bulletin Identification of Products and Materials Containing Asbestos in Bridge Components” dated October 20, 2010.

Opportunities for the use of Accelerated Bridge Construction (ABC) techniques shall be investigated.

2.4.8.3 Corrosion Protection

Reinforced concrete shall be designed using Premium Reinforcing where required according to section 12.1.3 of the MTO Structural Manual and shall assume an AADT of less than 50,000.

2.4.8.4 Culvert Rehabilitation

The Design-Builder shall also complete detail design and rehabilitation of the following structural concrete culverts under the QEW in accordance with the Structural Design Report appendix to the Preliminary Design Report for GWP 2430-15-00:

1. Culvert South of McLeod Rd (Warren Creek) (Site No. 34-312/C);
2. Grassy Brook culvert (Site No. 34-313/C);
3. Usshers Creek culvert (Site No. 34-315/C).

Design of the QEW profile improvement at Site No. 34-313/C will require partial replacement of existing fill with lightweight material to ensure the current total load carried by the culvert is not increased.

2.4.8.5 Aesthetics

The Welland River Bridge replacement shall be designed according to the Aesthetic Guidelines for Bridges using a “Level 2 – Medium” classification.

The design shall incorporate aesthetic enhancements that are described in the Preliminary Design Report for GWP 2430-15-00, and as per 2.4.8.2.(p).

2.4.8.6 OBMS Inspections

Ontario Bridge Management System (OBMS) inspections shall be carried out at the substantial completion of construction for the Welland River Bridge and all three culvert structures, sites 34-312/C, 34-313/C and 34-315/C. The MTO shall provide the Design-Builder access to the database and the Design Builder shall update all relevant inspection data and inspection photographs into the Ministry’s OBMS database. The Design-Builder shall also input the final structural drawings and final structural design reports into OBMS. The Design-Builder shall provide one (1) hard copy and one (1) electronic copy of the draft and final OBMS reports.

The OBMS inspections shall be carried out in accordance with the requirements of OSIM.

The Design-Builder’s personnel carrying out the OBMS inspections shall have demonstrated experience in OBMS inspections acceptable to MTO and must have

inspected at least twenty (20) MTO bridges in the past, including slab-on-steel girder and slab-on-concrete girder bridges.

OBMS inspections and reports shall be independent of and have no bearing on construction conformance inspection and construction deficiency inspection. The OBMS reports are intended for MTO use only.

2.4.9 Foundations Engineering

The Design-Builder shall undertake detailed Foundation investigation and design and construction for the replacement of the Welland River Bridges and the profile grade raise of QEW within the vicinity of the Welland River Bridges and other foundation engineering elements. The foundation design and construction shall consider the existing structure and new structure foundations. The effect of excavation and dewatering and the profile grade raise on adjacent structures, the CPR tracks and any infrastructure shall be assessed.

Foundation Investigation and Design Reports shall be submitted to the Ministry for information as specified in Section 2.2.1.

2.4.9.1 Order of Precedence

The design and construction of all Foundation work shall be according to the criteria contained in this Section and the reference documents (most recent edition) identified below. If there is any conflict between the criteria contained in this Section and any of the reference documents below, the criteria in this Section shall take precedence. If there is any conflict between the reference documents, the following order of precedence shall apply:

a) CHBDC, for Highway Applications;

a) MTO Laboratory Testing Manual;

b) MTO RSS Design Guidelines;

c) MTO Embankment Settlement Criteria for Design;

d) Designated Sources of Materials (DSM) List;

e) Canadian Foundation Engineering Manual (CFEM);

f) American Railway Engineering and Maintenance-of-Way Association (AREMA) Standards;

g) Guideline for Professional Engineers Providing Geotechnical Engineering Services, published by Professional Engineers of Ontario (PEO); and

h) ASTM Standards.

2.4.9.2 General Requirements

The Design-Builder shall be responsible for the detail design and construction of all foundations for this Project.

Available subsurface information at this site is provided in Appendix C. The Design-Builder shall undertake any additional foundation investigations in order to complete detail design and construction of all foundation elements for this Project.

The Design-Builder shall undertake sufficient additional foundation investigations in order to complete detail design and construction of all foundation elements, temporary protection systems and temporary dewatering systems for this Project. All Foundation-related aspects of the design shall be carefully reviewed to ensure that the Foundation requirements are adequately integrated into the detail design prior to construction.

2.4.9.3 Subsurface Investigations and Testing Prior to Construction

The Design-Builder is responsible for determining the extent of all foundation investigations required to supplement the existing subsurface factual information. The Design-Builder shall undertake additional investigations as required for detail design and construction of all foundations. Services include conducting additional site investigations of sufficient scope to augment existing information, to verify design assumptions and to provide adequate subsurface descriptions for design and construction of all foundation elements, temporary protection systems, temporary dewatering / groundwater control systems.

Sufficient factual information is required to determine the vertical and horizontal extent of subsurface materials, including both soil and rock, and their pertinent engineering properties. If groundwater is encountered, sufficient factual information is required to determine groundwater conditions, including groundwater levels perched or otherwise, the location of aquifers, the location and characteristics of any artesian groundwater, the quantity of flow and the presence or otherwise of natural gas or chemicals dissolved in groundwater or surface water which might prove harmful to structures and/or to personnel engaged in construction of the project.

Minimum requirements:

a) Additional explorations, sufficient in number to permit the design and construction of all structure foundations and related approach embankments and fills / cuts, shall also be located and advanced as needed. Existing boreholes available from previous investigations may be included.

b) Results of all subsurface investigations shall be provided to the Ministry for information purposes within the Foundation Investigation Reports required in Section 2.2.1, including a Geocres number for the MTO Foundations Database.

c) The locations and elevations of all boreholes, test pits and soundings shall be surveyed and referred to fixed reference points and data. The horizontal accuracy shall be within 0.5 m. The vertical accuracy of survey readings shall be within 0.1 m. Locations shall be identified by geographic (latitude/longitude) coordinates in degrees to a precision of five (5) decimal places. The coordinates must adhere to horizontal and vertical datum standards (The MTO Location Data Standards) as follows:
    - Horizontal Datum: MTM NAD83 (CSRS)
    - Vertical Datum: Canadian Geodetic Vertical Datum 1928 (CGVD28)

d) All aspects of implementation of geotechnical test holes (including, but not limited to, planning, licensing, construction, maintenance, abandonment, and reporting) shall be in accordance with Ontario Ministry of the Environment (MOE) Regulation 903 (Wells) and its amendments under the Ontario Water Resources Act.

2.4.9.4 Structure and Utility Protection

The Design-Builder shall be responsible for the protection of all structures and Utilities that may be affected by the Work and the repair of any structures and Utilities damaged by the Design-Builder's operations.

2.4.9.5 Foundation Design and Construction

For structures (bridges, retaining walls, and culverts), foundation engineering investigation and design for shallow and deep foundations shall be carried out according to the reference documents listed above.

Foundation design and construction shall consider existing Utilities, buildings and structures. Excessive settlement affecting the serviceability of existing Utilities, buildings and structures shall be prevented.

Design recommendations for bridge replacements shall include, where appropriate and applicable:

- Foundations Type Options
- Assessment of downdrag on pile
- Associated Axial, Bearing, Lateral (Subgrade Reaction Values and P-Y Model Curves), Sliding Resistances, Founding Elevations and approximate length of deep foundations

- Suitability for Integral or Semi-Integral Abutment Design
- Requirements for Pile Driving Shoes/Rock Points
- Lateral Earth Pressure Design including both static and seismic conditions
- Slope Stability Analysis and Recommendations for Slope Geometry
- Settlement Analysis, including Immediate, Long-term, Total and Differential Settlement
- Seismic Design Loading and Potential for Liquefaction
- Design and Recommendations for Preload/Surcharge, Soil Improvement, Wick Drains, Lightweight Fill, Geosynthetic Reinforcement, and Retained Soil System (RSS).

2.4.9.6 Permanent Retaining Walls / Structures

Retaining Structures shall be designed for durability and shall satisfy sliding, bearing resistance, overturning and global stability according to the reference documents listed above.

Reinforced soil slopes shall be considered as Retaining Walls according to the MTO RSS Design Guidelines.

Proprietary retaining systems, if used, shall be designed and constructed according to the MTO RSS Design Guidelines and applicable Special Provisions. Walls required to retain Bridge embankments adjacent to Bridge Foundations are considered abutment walls. RSS walls shall not be used as True Abutments, as defined in the MTO RSS Design Guidelines. The Performance and Appearance rating for the site is high.

Design of all permanent retaining structures and barriers shall allow for full-depth replacement of Pavements.

Design of all permanent retaining structures shall accommodate or eliminate pressures generated by frost action.

2.4.9.7 Permanent Cut and Fill Slopes

Permanent cut and fill slopes shall be designed to:

a) Provide global stability;

b) Be protected against surficial erosion and shallow surface failures;

c) Control discharge of surface water and subsurface seepage; and

d) Allow for regular maintenance of the slope surface.

The design slope configuration shall also be checked for short-term stability during construction.

According to the requirements of Chapter 3 and independent of stability analyses:

a) Fill slopes for embankment earth fills equal to or greater than eight metres in height shall incorporate horizontal benches for surficial stability at maximum eight metre intervals.

b) For rock fills equal to or greater than 10 m in height, rock fill slopes shall incorporate horizontal benches at maximum 10 m intervals. Slopes shall be constructed according to the requirements in Chapter 3.

c) Horizontal benches shall be provided for surficial stability for cut slopes deeper than six metres and shall be provided at maximum six metre intervals.

Permanent cut and fill slopes shall be designed and constructed to avoid tension cracks, toe bulging, slumping or sloughing of embankment or cut slopes.

2.4.9.8 Embankments

Measures to ensure stability of embankments adjacent to culverts, including protection against surficial erosion and shallow surface failures, shall be provided.

The Design-Builder shall comply with the maximum differential settlement criteria according to the MTO Embankment Settlement Criteria for Design between Substantial Completion and the end of the Warranty Period.
Embankments shall be designed to ensure that settlement at the existing and new Welland River Bridge does not exceed 25 mm during construction.

Embankments shall be design to ensure the current total load carried by the Grassy Brook culvert (Site No. 34-313/C) is not increased.

In the FIDR Expanded polystyrene lightweight fill was looked at as an alternative. The lightweight fill shall be designed / constructed in accordance with the requirements listed above and in accordance with the NSSP “Rigid Expanded Polystyrene Embankment Fill” referenced in Chapter 3.

2.4.9.9 Temporary Slopes and Retaining Structures

The performance of each Temporary Work shall be sufficient for its expected service life. All Temporary Works shall comply with the OHSA and the applicable construction projects regulation thereunder current at the time of construction excavation and the additional criteria identified below:

a) Temporary retaining structures shall be designed and constructed to meet OPSS 539 Construction Specification for Protection Systems and Section 2.4.8 Structures.

b) Where temporary retaining structures are required to retain the right-of-way or tracks of railways, temporary retaining structures shall be designed to meet the requirements of AREMA.

2.4.9.10 Earthworks

All Lightweight Fills shall be adequately protected from wheel load, groundwater, road salts, weather, fire, flotation under flood conditions and fuel spills.

2.4.9.11 Instrumentation and Monitoring

The Design-Builder shall develop and submit plans and procedures to the Ministry for instrumentation and monitoring at least three months prior to commencement of monitoring of completed Work.

Monitoring before, during and after construction is required to:

a) Check the safety of the Work;

b) Assess the effects of construction on the surrounding ground and existing facilities;

c) Identify likely causes and distribution of ground movements;

d) Monitoring of track movement when working close to CP's structure;

e) Evaluate design assumptions and refine estimates of future performance; and

f) Check compliance with performance specifications.

As needed, the monitoring shall address movements, vibrations, pressures, loads and strains in the ground, on adjacent facilities and structures, and on temporary and permanent works. The Design-Builder shall be responsible for designing and implementing the program, obtaining baseline survey data, organizing, evaluating and preserving the data, submitting it to the Ministry for information and undertaking corrective actions, if and as needed.

Stable benchmarks shall be established along the length of the alignment. Coordinates and elevations shall be established at least three months prior to monitoring with repeat baseline survey readings taken during this time. The number of reference benchmarks established shall be sufficient to provide adequate sight distances to permit monitoring as specified in this Chapter 2. Benchmark

coordinates and elevations shall thereafter be resurveyed annually. Data shall be submitted to the Ministry for information.

Measurements of differential settlements between abutments and abutment approaches shall be taken at months 3, 6, 12, 18 and 24 of the General Warranty period. Measurement data shall be provided to the Ministry.

Immediately following paving, elevations at the centre line of each lane shall be measured at all Bridge abutments and at distances of 20 m, 50 m, 75 m, 100 m and 200 m from the abutments.

2.4.9.12 Groundwater Control – Dewatering / Unwatering

Discharge of water extracted during dewatering or groundwater pressure control activities shall be completed in compliance with all applicable federal, provincial, and municipal requirements for water quality and flow rates. Extraction of groundwater for the purposes of construction dewatering is subject to the Ontario Water Resources Act and the Water Taking regulation. A Category 3 PTTW is currently being obtained and will be available for the Design-Builder upon award. It is the responsibility of the Design-Builder to finalize and submit the PTTW to the Ministry of Environment, Conservation, and Parks prior to the start of de-watering activities, and to adhere to the conditions of the PTTW. The Design-Builder assumes responsibility for any and all deviations from the dewatering scheme presented in the PTTW application / approval. Adherence to the terms and conditions attached to any permit/approval/authorization is a project requirement.

The Design-Builder shall address the impact of any deep cut section on the existing groundwater table, including the need for groundwater control (pumping) during construction and any long-term drainage requirements.

2.4.9.13 Milestone Submissions

a) Final Foundations Investigation and Design Reports
b) Geotechnical / Foundations Instrumentation Monitoring Reports

2.4.10 Signing and Pavement Markings

2.4.10.1 Permanent/Temporary Pavement Markings

2.4.10.1.1 Order of Precedence

The design and construction of all Permanent/Temporary Pavement Markings shall be according to the criteria contained in this Section and the reference documents (most recent edition) identified below. If there is any conflict between the criteria contained in this Section and any of the reference documents below, the criteria in this Section shall

take precedence. If there is any conflict between the reference documents, the following order of precedence shall apply:

1. Ontario Traffic Manual Book 11

1. Central Region Design Preferences for Pavement Markings Document

2.4.10.2 Signing

2.4.10.2.1 Order of Precedence

The design and implementation of all Permanent Signing shall be according to the criteria contained in this Section and the reference documents (most recent edition) identified below. If there is any conflict between the criteria contained in this Section and any of the reference documents below, the criteria in this Section shall take precedence. If there is any conflict between the reference documents, the following order of precedence shall apply:

1. Ontario Traffic Manual Book 1, 1A, 1B, 1C, 2, 5, 6, 8

2. Central Region Sign Preferences Document

The design and implementation of all Temporary Signing shall be according to the criteria contained in this Section and the reference documents (most recent edition) identified below. If there is any conflict between the criteria contained in this Section and any of the reference documents below, the criteria in this Section shall take precedence. If there is any conflict between the reference documents, the following order of precedence shall apply:

1. Ontario Traffic Manual Book 7

2. Temporary Conditions Traffic Management; Advance Notification; Advance Warning; and Alternate Route Signing for Ontario Highways

3. Central Region Sign Preferences Document

2.4.10.2.2 Temporary and Permanent Signing

The Design-Builder shall be fully responsible for the manufacture and installation of all temporary signing and shall secure approval of the Ministry for wording on all signs. All existing permanent signs shall be maintained in their current location or temporarily relocated to an effective location according to Ministry Standards.

The Design-Builder shall supply and place Contract identifications signs indicating the Design-Builder’s name and contact number.

The Design-Builder shall provide the manufacturing and message details for each TC-64 sign to the Contract Administrator a minimum of 2 weeks in advance of production of the sign. If any changes to message details are required during the construction period,

they shall be completed by the Design-Builder. All TC-64's shall conform to the guidelines specified. Guidelines for the standard of reflectorization, size and fonts can be obtained from the Contract Administrator.

The Design-Builder shall provide a detailed sign inventory of all existing signing within the Project limits. The Design-Builder shall contact the Contract Administrator to arrange a site meeting to review and identify which signs shall be replaced or which signs shall be salvaged and reinstalled based on their condition. The Design-Builder shall not rely solely on the existing inventory provided by the Contract Administrator but shall field confirm the information. The detailed sign information shall include, but is not limited to:

- Sign attributes (size, reference code)
- Location (chainage and offset)
- Message
- Condition of sign and support (appropriate for re-use)
- Support type with dimensions

Wording on both permanent and construction identification signing shall be Ministry approved. All proposed signing recommendations are to be submitted to the Regional Traffic Section for review.

The Design-Builder shall complete the following with respect to the proposed or recommended Highway improvements:

1. identify the impacts to all existing signs
2. identify the need and provide justification for additional permanent signing requirements
3. determine the signage for consistency (i.e. sign size, language, location, etc.)
4. determine compliance with the French Language Services Act (FLSA)
5. identify and determine impacts to Canadian Tourist-Oriented Directional Signs (TODS) / LOGO Signing
6. provide recommendations and rationale for all permanent signs throughout the Project limits.

The Design-Builder shall prepare and submit the following to the Ministry for review:

1. Recommended Preliminary Permanent Sign Layout

2. Detailed rationale for the Recommended Preliminary Permanent Sign Layout

3. Concept Plan of the approved Preliminary Permanent Sign Layout for the highway improvements.

The Design-Builder shall be responsible for identifying all permanent signing recommendations (including new, relocation, replacement and removals) and provide a summary in a Permanent Signing Table. The Ministry is responsible for the fabricating of the permanent signs. The Design-Builder shall be responsible for delivering the fabricated signs to the project site, and installing all recommended permanent signs (including the supply of all hardware and posts).

The Design-Builder shall contact the Canadian TODS representative, in writing, to ensure the affected stakeholders are informed of the change in alignment and any changes to access for the businesses.

Canadian Tourism Destination Signing Contact Information:

Canadian TODS Ltd.
120 Whitmore Rd.
Unit 8
Woodbridge, ON
L4L 6A3

Phone Toll Free:	1-888-263-9333
Phone in Toronto Area:	905-851-1322
Fax:	905-851-4724

The Design-Builder shall be responsible for the design, manufacturing and installation of the permanent sign supports and footings according to Ontario Sign Support Manual.

Major Contract Information Signs (MCIS) and aluminum extruded sign boards shall be designed, manufactured, and supplied by the Ministry. The Design-Builder shall be responsible for picking up the signs at the following location:

Provincial Sign Shop
1927 Kipling Avenue
Rexdale, Ontario

The MCIS shall be supplied by the Ministry and installed, maintained, and removed by the Design-Builder. The Design-Builder shall provide all materials required to install these signs.

In order for the MCIS signs to be fabricated, the Design-Builder shall determine the

appropriate number of MCIS required and the information to include on each MCIS according to the requirements of OPSS 706. The number of signs and the information shall be provided in writing to the Contract Administrator a minimum of three (3) weeks prior to the commencement of any construction activities. The Major Contract Information Signs shall be available for pickup by the Design-Builder at the location noted above by providing the Contract Administrator two (2) weeks advance notice of the need for the MCIS.

Example MCIS Information:
Highway Improvements
Next XX.XX km
Completion Fall 20XX

The MCIS remain the property of the Ministry. Upon Contract Completion, the MCIS shall be removed and delivered by the Design-Builder to the above address with 48 hours advance notice to the Contract Administrator.

2.4.11 Environmental Requirements

2.4.11.1 General

The Design-Builder shall meet all Environmental Assessment requirements of the Ontario *Environmental Assessment Act*, the *Canadian Environmental Assessment Act (2012)*, and MTO's *Class Environmental Assessment for Provincial Transportation Facilities* (as amended, July 14, 2000). In addition, the Design-Builder shall meet all requirements of applicable provincial and federal environmental legislation and regulations, permits, approvals and authorizations.

This project is classified as a Group C project under the 'Class Environmental Assessment for Provincial Transportation Facilities (2000)". The Design-Builder shall adhere to the commitments outlined in the Preliminary Design Report (PDR) and Environmental Screening Document (ESD) which include environmental protection and consultation strategies to be employed during design and construction.

If the Design-Builder chooses to make modifications that might change the Project classification, the Design-Builder shall comply with the process outlined in the Class EA for Provincial Transportation Facilities (2000), including a re-assessment of the Class EA classification for this Project. The Design-Builder assumes all risks associated with the process including but not limited to: cost increases, Project delays, Part II order (bump-up) requests, mitigation requirements and other challenges that may result from the amendments and the need to elevate the Project to a Group B project. If the amendment process is unsuccessful, then the Design-Builder shall adhere to the information and commitments made below. In addition to the environmental assessment process documentation, the Design-Builder shall complete any required environmental technical reports, as detailed in the MTO Environmental Standards and Practices, and Environmental Reference for Highway Design.

"Environmental Clearance – Construction Start" shall be issued by the Ministry before

construction can begin, when the Ministry is satisfied that the requirements of the Class EA has been met, and following receipt of a memo/letter from the Design-Builder indicating the Project is Eligible for “Environmental Clearance – Construction Start”. Any outstanding permits and approvals must be acquired prior to the issuance of “Environmental Clearance – Construction Start”.

2.4.11.2 Project Specific Environmental Information

Project Specific environmental information and commitments are provided below.

All environmental work will be conducted in accordance with the requirements of the MTO “Environmental Reference for Highway Design” (ERD), Oct 2006 (or as amended) and “PROV PERF 1072, Performance Specification for Environmental Management”. Where discrepancies occur between the ERD, PROV PERF 1072 and legislative requirements, legislation shall take precedence. Where the ERD requirements are in excess of requirements of factor specific protocols, the requirements of the ERD shall apply. Where inconsistencies are found to exist between the ERD and the project specific Terms of Reference, the Terms of Reference shall apply. The Design-Builder shall be responsible for making all requirements known to any sub-consultants hired by them.

The Design-Builder will complete an appropriate level of notification and consultation. A Preliminary Construction Staging Consultation and Engagement Plan has been developed to provide the Design-Builder with a framework for consultation efforts to be completed in the DB phase of the project. The Plan outlines a preliminary strategy to ensure the public, interested stakeholders, local municipalities, Emergency Medical Services and Indigenous communities are fully aware of the final construction staging plan, timing, and any construction updates following the completion of the Class EA Study and prior to and during construction. It also provides a detailed outline of the consultation and engagement methods that should be implemented prior to and during the construction period. The Preliminary Construction Staging Consultation and Engagement Plan shall be finalized by the Design-Builder and approved by MTO prior to implementation.

Notification / consultation requirements will include, but not be limited to:

- Maintaining and updating the current project website: www.qewwellandriverbridges.ca. The Design-Builder will maintain the website throughout the duration of the contract. The website shall be operational within 30 days after Contract Award and shall be maintained on an ongoing basis through to contract completion. The website will conform to Accessibility for Ontarians with Disabilities Act (AODA)(2015) Accessibility Standards and be transferable to MTO.
- A Notice of Construction Staging will be sent by the Design-Builder in the next phase of the project to external agencies, relevant provincial agencies, , the local MPP and MP, and other affected stakeholders. All adjacent property owners will be directly mailed a copy of the Notice of Construction Staging. A copy of the Notice of Construction Staging will also be sent sent to property owners within the vicinity of the study area through Canada Post unaddressed mail (i.e. bulk

mail).

- A Notice of Construction Ontario Government Notice (OGN), which is to be placed in the *Niagara Falls Review* and *Niagara This Week* in advance of the start of construction, and update local residents, businesses, and agencies of the final construction staging plan.
- Advance notification will be provided to inform emergency service providers, local municipalities, and motorists of construction and any lane, ramp and roadway closures.
- Through consultation with Hydro One it was noted that the preferred highway profile would not impact the hydro corridor.
- The Design-Builder is responsible for providing Niagara Region and the City of Niagara Falls the opportunity to review and comment on the preliminary Construction Staging Consultant Engagement Plan.
- The Design-Builder is responsible for providing Niagara Region and the City of Niagara Falls with project status updates at key project milestones.
- The Design-Builder is responsible for contacting Niagara Region and the City of Niagara Falls at the beginning of each construction year to determine if any concurrent construction is planned, in an effort to coordinate construction to minimize construction fatigue to property owners and businesses owners within the vicinity of the study area.
- The Ministry of Transportation (MTO) is responsible for direct Aboriginal consultation. All direct correspondence with Aboriginal Communities shall be drafted by the Design-Builder and submitted to MTO Environmental for review, signature and distribution at least five (5) weeks prior to the necessary mailing date. The list of Aboriginal Communities to be contacted will be the same as those contacted during the Preliminary Design phase.

Drafts of all public notices and environmental documentation will be provided to the MTO Environmental Planner for review, five (5) weeks prior to the event or 30-day public review period. Two (2) hard copies and digital copy (pdf) of all final documents as mentioned above must be provided to MTO Environmental Planner.

Regular environmental monitoring/inspection will be implemented throughout construction to ensure that environmental protection measures are implemented, maintained and repaired, and that remedial measures are initiated where warranted.

If the Design-Builder chooses to locate construction staging area(s) outside of the project limits as described in the PDR and ESD, the Design-Builder will be responsible for obtaining any temporary limited interests, the completion of any additional required Environmental Assessment documentation / permits, including but not limited to the environmental technical investigations outlined in this Section (such as archaeological investigations), in accordance with the MTO *Environmental Reference for Highway Design* (ERD), June 2013.

The Design-Builder is responsible for adhering to all recommended mitigation measures and commitments to future works outlined in the technical specialist reports, and within the ESD and PDR.

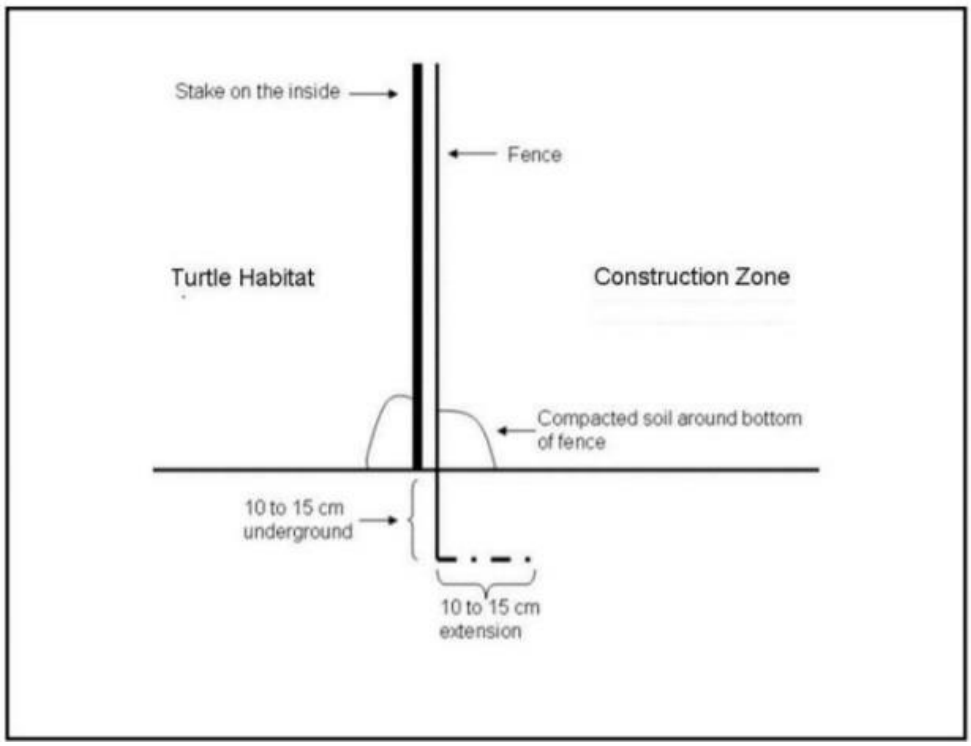
Prior to the start of the Project, the general contractor shall prepare and submit an Environmental Management Plan which will address aspects including:

- Erosion and Sediment Control;
- Dust Control;
- Mud Track-Out Control;
- Noise Mitigation;
- Construction Dewatering Discharge Monitoring and Mitigation;
- Management of hazardous materials, including but not limited to fuel storage and re-fueling, concrete and concrete wash-water, asphalt, on-Site vehicle and equipment maintenance, waste materials and litter;
- A Spills management and response plan;
- Tree and Wildlife Protection;
- Environmental Mitigation Measures;
- Public Safety; and
- Monitoring.

Natural Environment

- Environmentally sensitive natural heritage features have been identified in the area surrounding the Welland River Bridges, Culvert 34-312/C, and Culver 34-315/C, including the following provincially significant wetlands: the Welland River East Wetland Complex, Warren's Creek Wetland Complex, Lower Grassy Brook Wetland Complex, and the Willoughby Marsh Wetland Complex. Environmentally sensitive areas (ESAs) shall be delineated in the field using properly installed protective silt fencing, and storage of materials, temporary work spaces and construction areas shall not be located in ESAs.
- Consultation with the Department of Fisheries and Oceans Canada (DFO) at the preliminary design stage has confirmed the requirement for a SARA Permit at the Welland River Bridges and Site 34-312/C, due to the potential presence of Mapleleaf and Eastern Pondmussel at these locations. A Request for Review Application Form was prepared and submitted for the preliminary proposed works and potential to impact federally listed aquatic Species at Risk. Approval can take the form of a SARA Permit, and/or a Fisheries Act Authorization that contains conditions for the protection of aquatic SAR (DFO, 2018a). The Design-Builder shall implement the required mitigation measures.
- A Barn Swallow nest was confirmed at Culvert 34-315/C. The works have been registered with the Ontario Regulation Reg. 242/08 (Threats to health and safety: not imminent) of the Endangered Species Act, 2007 for Threat to Human Health or Safety – Activities to protect against non-imminent threats (s.23.18). Under this permit no mitigation is required, however, activities shall follow requirements of the MBCA including: Removal of nesting habitat shall take place outside the breeding bird period (March 25 to August 31); and, Nest habitat removed for the proposed works shall be made available prior to the commencement of the nesting season. The Design-Builder will be responsible for implementing bird preventative measures at Culvert 34-315/C if works fall within the bird breeding window.

- The Design-Builder shall identify vegetation removals, and potential trees within the right-of-way (ROW). Vegetation removals shall be minimized as much as possible within the ROW, especially adjacent to ESAs. Impacts to vegetation beyond the existing highway ROW shall be avoided. Vegetation removals shall be completed outside the breeding bird timing window (March 25 to August 31).
- Any removal of trees must be completed outside the bat species' active season (i.e., April 1 to September 30).
- If work is scheduled during the turtle nesting season (June 1 to September 30), heavy duty geotextile fencing shall be installed at the perimeter of the work zone in the property limits the existing Welland River Bridges and Usshers Creek culvert prior to April 1 of any year to exclude nesting turtles. Creation of turtle nesting habitat as part of post-construction site restoration shall be installed to mitigate impacts on turtles.
    - Turtle Fencing at the Welland River Bridges:
        - Fencing shall be installed by April 1st and remain in place until the end of construction to prevent turtles from accessing the construction area.
        - Silt fencing installed after April 1st shall be monitored twice daily for evidence of turtles laying, exposed eggs or emerging turtle hatchlings. Monitoring shall take place from April 1st to October 31st.
        - Heavy-duty geotextile of a thick felt-like fabric ('double row' or 'trenched' fencing) with a minimum density of 270R or equivalent woven geotextile fabric shall be used.
        - Geotextile fencing with nylon mesh lining shall not be used.
        - The geotextile shall be supported using a woven wire fence (14 Ga Wire Mesh 2"x4").
        - Fencing shall extend along the water's edge at right angles away from the culvert.
        - Fencing installation shall include:
            - Fabric shall be secured to wood or metal stakes
            - Stakes shall be driven into the ground on the inside of the construction area and placed no more than 2 meters apart
            - The fabric shall be pulled tight when staking to reduce sag
            - The bottom of the fabric shall be buried at least 10 cm below ground surface with an additional 10 cm fencing lip extending horizontally at 90 degrees in the direction of construction. The height of the fence shall be a minimum of 60 cm.
            - The trench shall be backfilled, and soil compacted on both sides to secure buried lip from becoming exposed
            - In areas where the substrate does not permit fence burial, weighing down the fence with heavy items (e.g. sandbags) or backfilling may be acceptable.
        - Inspections of the fence shall occur daily to look for breaches in the fencing where turtles or other reptiles may be able to pass through. Any breaches shall be repaired immediately.



  - Turtle Fencing at Usshers Creek Culvert will include all of the measures noted above for the Welland River Bridges, as well as:
    - Fencing shall be tied-in to the creek isolation measure.
    - Exclusion fencing shall be placed on both sides of the QEW.
- To protect for overwintering turtles, no in-water work shall occur between September 1 and April 1.
- A monitoring program should be implemented to note where turtles are nesting (and where they are not nesting) and collect as much information about these sites as possible. It is recommended that soil samples are collected and analyzed for moisture content, texture (water potential) and other properties. For nest sites, nest temperature, moisture, hatchling success and predation rate should be monitored.
- The Design-Builder is responsible for completing migratory bird protection at all structures, per Central Region NSSP ENV00031, to ensure compliance with the Migratory Birds Convention Act.
- An Emergency Response Plan shall be developed and be implemented immediately in the event of a sediment release or a spill of a deleterious substance. It shall include keeping an emergency spill kit on site when working in or near water.
- The limit of any area to be disturbed will be clearly marked prior to the commencement of the work and will be maintained for the duration of work until the area is stabilized.
- Flow must be maintained in the watercourses during construction works. Temporary isolation measures shall not completely restrict flow.
- If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, appropriately-sized, clean rock shall be used in accordance with OPSS 206. Rock shall be installed at a similar slope to maintain a uniform

bank/shoreline and natural stream/shoreline alignment. Any additional rock reinforcement/armouring that was not identified during the Preliminary Design must be screened under the MTO/DFO/MNRF Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings – Version 3, 2016 (or most recent version).
- Common Reed management shall occur in accordance with NSP ENVR0011.
- Regular environmental monitoring/inspection shall be implemented throughout construction to ensure that environmental protection measures are implemented, maintained and repaired, and that remedial measures are initiated where warranted.

Fish and Fish Habitat

- A warmwater thermal classification has been identified by MNRF for the Welland River and the watercourses associated with the three culvert crossings. Associated with this thermal regime is the establishment of a permissible construction timing window between July 1st and February 28/29th of any given year (i.e., no in-water works between March 1st and June 30th of any given year) as outlined in SSP 101F23 and OPSS 182. In addition, to avoid impacting overwintering turtles that may be present in the mud at the riverbank or riverbed, in-water works shall take place between July 1 - August 31 at the Welland River of any year.
- Consultation with DFO at the preliminary design stage has confirmed the requirement for a SARA Permit at the Welland River Bridges and Site 34-312/C, due to the potential presence of Mapleleaf and Eastern Pondmussel at these locations. A Request for Review Application Form was prepared and submitted for the preliminary proposed works and potential to impact federally listed aquatic Species at Risk. Approval can take the form of a SARA Permit, and/or a Fisheries Act Authorization that contains conditions for the protection of aquatic SAR (DFO, 2018a). The Design-Builder shall implement the required mitigation measures.
- Any pipes/hoses conveying water in any watercourse during construction will be screened to prevent entrainment of fish.
- All in-water activities shall be undertaken in isolation to avoid introducing deleterious substances into the watercourses.
- If dewatering is required, sediment laden discharge water will be pumped into a vegetated area > 30 m from a watercourse or into a settling basin (or similar measure) to prevent the entry of deleterious substances from re-entering the watercourse.
- In-stream sediment controls and containment measures (i.e. cofferdams) will constructed using clean materials free of particulate matter, and installed and removed according to OPSS 805, unless otherwise specified.
- Dismantling and removal of the existing bridge structure will be completed in accordance with OPSS 510.
- The Design-Builder’s team will include a RAQS qualified Fisheries Contracts Specialist experienced in working around watercourses, who will be responsible for ensuring the erosion and sediment control measures are functioning effectively, being maintained and that all of the other general mitigation measures are being implemented as intended. The Fisheries Contracts Specialist will also ensure all environmental mitigation and design measures are properly installed/constructed

and maintained. Appropriate contingency and response plans will be in place and implemented if required. If a SARA Permit and/or a Fisheries Act Authorization is required, the RAQS qualified Fisheries Contracts Specialist will provide oversight and monitoring during construction, in accordance with SSP 101F23 and OPSS 182.

- All fish and mussels stranded within the containment measures (i.e., behind sheet piles or cofferdams) will be removed and relocated to suitable habitat downstream of the construction areas prior to in-water works. Fish salvage will be conducted under a License to Collect Fish for Scientific Purposes, as outlined in OPSS 182.
- A debris containment system (i.e. barges, shrouding) should be considered during the dismantling of the existing Welland River Bridges, to prevent construction debris from entering the Welland River. If a barge is required, the work must be conducted from the shore or piers only and shall not anchor to the streambed. Any material that is inadvertently dropped into the river should be immediately retrieved, with minimal disturbance to the river, and reported to DFO through the Duty to Notify process.
- All localized re-grading works associated with the bridge replacement and culvert rehabilitations (i.e. installation of streambed material for scour protection as per OPSS 1005) to transition the areas of new rock protection with adjacent channel sections should be designed and constructed to be stable and carefully inspected prior to transfer of flow to ensure they transition smoothly with the adjacent channel sections. The transition areas should then be specifically inspected again following transfer of flow, to ensure they remain stable and smooth, and no erosion points are developing.
- The Design-Builder should investigate using the existing rock protection at Site 34-312/C for scour protection required around the culvert ends. The existing rock is currently acting as a barrier to fish movement through the crossing during low flow periods, and re-distributing this rock has the potential to address this barrier concern, as well as minimize the overall footprint impacts on the channel.
- The Design-Builder shall remove the in-water piers at the Welland River Bridges to 300 mm below the channel bed to re-establish some lost fish habitat, and open up the channel cross-sectional area to improve hydraulic and fluvial geomorphological functions of the channel that would also result in enhanced fish habitat.
- MNRF and DFO may also require site specific mitigation measures to address concerns related to aquatic SAR within the four watercourses. This will need to be confirmed by the Design-Builder in association with the need for a SARA permit or Letter of Advice for each location.
- If the Design-Builder wishes to alter any of the mitigation measures/plans as outlined in the DB Package and RFP, then the associated approval agency will need to be made aware of and approve the changes prior to construction.
- The Design-Builder will submit an MTO Project Notification Form upon confirmation of the final design, outlining that the Sites 34-315/C and 34-313/C culvert works will not result in serious harm to fish and will not require review from DFO under the Fisheries Act.

Noise

- Some evening work is required for the rehabilitation works, to reduce traffic impacts. MTO is exempt from the City of Niagara Falls noise by-law, however, the Design-Builder shall provide a courtesy notice to the City of Niagara Falls two

(2) weeks prior to the start of any night work.

Landscape

- The Design-Builder is required to implement the Landscape Plan developed during Preliminary Design. Should the Design-Builders plan include additional impacted/disturbed areas from the Preliminary plan the Design-Builder shall update the Landscape Plan to include any additional disturbed areas.
- Re-stabilize and re-vegetate all exposed surfaces as soon as possible using seeding with MTO Standard Old Field, Lowland, and Roadside Pollinator seed mixture as specified in the Landscape Plan.
- Maintenance shall be provided from the time of planting to the end of the warranty period. Maintenance shall include watering and fertilizing, control of weeds and grasses in all mulched areas, application of rodent protection and pesticides as required, repairs to stakes, ties, wire and hose, tree guards, and the wrapping and unwrapping of all coniferous trees 1.25 m or greater for winter protection.
- All plant material will be regularly inspected by the Contract Administrator until the end of the maintenance and warranty period. Inspections shall include all original and replacement material. The Contractor shall be notified in writing by the Ministry of all plant material requiring replacement.

Erosion and Sediment Control

- An Erosion and Sediment Control Overview Risk Assessment Report (ESCORA) completed during Preliminary Design determined that existing natural environments surrounding the work areas along the QEW have higher sensitivity to any potential impacts related to erosion and / or sedimentation. The environmental risk posed by this work program can be reduced to moderate (Welland River crossing) and lower (all other work areas) through the use of appropriate erosion and sediment control (ESC) best management practices, as per the ESCORA. The Design-Builder will be responsible for developing and implementing an Erosion and Sediment Control Plan (ESCP), in accordance to Approach 2 of the Ontario Ministry of Transportation's Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects (MTO, 2015).
- The ESCP shall be submitted to the MTO Contract Services Administrator seven (7) business days prior to commencement of construction activities. Permission to start Work shall only be provided after submission of the ESCP. A copy of the current ESCP shall be available on-site at all times beginning prior to commencement of the Work. The performance of the ESCP shall be monitored and amendments made as required.
- Recommended best management practices (BMPs) will be included in the ESCP. The Design-Builder must comply with the ESCP, including BMPs, however may propose suitable alternatives through the change order process as desired. The Design-Builder must ensure that their ESCP meets all applicable requirements.
- ESC measures shall be installed around all watercourses prior to the initiation of construction works to prevent encroachment and the transfer of deleterious substances (e.g. sediment from exposed soils) into the aquatic habitat.

- The surface to be seeded shall be prepared not more than seven days before the seeding operation in accordance with OPSS 804.
- The Design-Builder will implement the erosion and sediment control measures identified in the contract, which shall meet or exceed the requirements stipulated in OPSS Prov. 180, OPSS Prov. 182, OPSS Prov. 517, OPSS 801, OPSS Prov. 804, OPSS 805, SSP 101F23, SSP 199F12, and SSP 199F31and all associated contract drawings.
- Sediment and erosion control measures will be used as necessary to ensure that the turbidity of river / creek water within, or downstream of the work area, is not increased by more than the permitted amount as per the Environmental Monitoring and Mitigation Plan of the draft PTTW.
- The Environmental Monitoring and Mitigation Plan, including water monitoring requirements, in the draft PTTW shall be carried out throughout the duration of construction. This includes:
    - Twice-daily monitoring of turbidity in watercourses upstream and downstream of the work area;
    - Supplementary weekly water samples collected for analysis of Total Suspended Solids (TSS); and
    - Supplementary water samples collected for more comprehensive analyses, with water quality results reviewed by a qualified Professional Geoscientist, Professional Engineer, or Certified Technologist, as per the Environmental Monitoring and Mitigation Plan.

Groundwater

- A groundwater assessment completed during Preliminary Design identified sensitive groundwater areas present in the project area. These include wetlands, which are potentially groundwater-fed. The Design-Builder will be responsible for managing surface water and groundwater as per conditions specified in the draft Permit to Take Water obtained for the project.
- A draft Category 3 Permit-to-take-Water (PTTW) was submitted during Preliminary Design. It is the responsibility of the Design-Builder to finalize and submit the PTTW to the Ministry of Environment, Conservation, and Parks prior to the start of de-watering activities, and to adhere to the conditions of the PTTW.
- The Design-Builder will be required to provide advanced notice to well owners residing along King Street and Reixinger Road about any upcoming construction activities.
- A contingency response plan shall be prepared in case water quality impairment reportedly occurs in wells during or following construction.
- Any construction dewatering discharge will be managed according to applicable regulatory criteria, including the Permit-to-Take-Water (PTTW), and all supporting documents.
- Construction dewatering discharge that is clear is to be discharged back to the Welland River or Grassy Brook, or may be re-infiltrated back into the ground.

Heritage/Archaeology

- The existing Welland River Bridges were identified to have local/regional cultural heritage significance and is an Ontario Bridge List Candidate.
- The Welland River Bridges has been designated as a culturally significant bridge. The design for the replacement bridge shall be sympathetic (as outlined for a minimum in section 2.4.8.2 (P)) to the current design, as outlined in the Heritage Impact Assessment Report (WSP, 2018), Preliminary Design Report, Environmental Screening Document and Structural Design Report (SDR).
- The existing Welland River Bridges shall be photo documented by means of a Cultural Heritage Resource Documentation to provide an archival record of the bridges in their existing condition, prior to demolition.
- A Stage 1-2 Archaeological Assessment was completed for the study area. All lands required for the project are previously disturbed and no further assessment is recommended for the defined project area. If areas required for the works are outside the area assessed, the Design-Builder shall be responsible for an additional Stage 1 & 2 Archaeological Assessment of any areas not previously assessed prior to construction. Any additional work outside cleared project limits relating to Stages 3 and 4 Archaeological Assessment will be addressed as extra work.

Contamination

- Excess Materials may be encountered during construction and require proper management and disposal. All excess earth materials and topsoil shall be managed and disposed of on-site within the ROW as specified in the Contract. Proposed disposal area(s) are subject to Ministry approval.
- The Designated Substance Survey (DSS) identified the potential for designated substances to be present, and the potential for contaminated excess earth. The Design-Builder is responsible for ensuring works are carried out in accordance with the recommendations within the DSS, *Occupational Health and Safety Act*, R.S.O. 1990, c. 0.1, Ontario Environmental Protection Act, and in accordance with applicable regulations and MTO standards.
- Arsenic was confirmed from samples obtained from guiderail posts at 34-65/2 on the north side. If future construction activities affect the integrity of materials containing arsenic, standard demolition dust control measures shall be implemented where practical to ensure airborne dusts are controlled as per O. Reg. 490/09, as amended.
- Materials that were not sampled as part of the DSS completed during Preliminary Design which support the suspicion of asbestos containing materials (ACM) encountered during bridge rehabilitation shall be sampled at that time to confirm the presence or absence of Designated Substances and determine appropriate abatement and/or management options.
- Lead was confirmed from paint samples taken from the girders from 34-65/1 (northbound), and the girder and abutment walls beneath 34-65/2 (southbound). In general, the following procedures are recommended if/when removing lead-containing materials, coatings and paint applications:
    - Follow Type 1 – if the coating is to be removed with a chemical gel or paste;
    - Follow Type 2a – if the coating is to be removed by scraping or sanding using non-powered hand tools, or manual demolition of lead-painted building

components by striking with sledgehammer or similar tool;
    - Follow Type 3a – if the coating is to be removed using power tools; or,
    - Follow Type 3b – if the coating is to be removed by abrasive blasting.
    - If lead-containing paint applications and surface coatings are not removed prior to demolition, ensure that demolition waste complies with the requirements of General – Waste Management Regulation, R.R.O. 1990, Regulation 347.
    - If future construction activities affect the integrity of materials containing lead, standard demolition dust control measures should be implemented where practical to ensure airborne dusts are controlled as per the MOL's Guideline for Lead on Construction Project.
- Silica is assumed to be present in concrete and mortar. Standard dust control measures should be implemented where practical to ensure airborne dusts are controlled during construction activities as per the Guideline for Silica on Construction Projects (MOL, September 2004, as amended).

Reference / Background Documents

The following reference documents are available for the Replacement of the Welland River Bridges, and Rehabilitation of Three Structural Culverts:

- Terrestrial Ecosystem Impact Assessment Report (WSP, 2018)
- Fish and Fish Habitat Impact Assessment Report (WSP, 2018)
- Groundwater Assessment Report (WSP, 2018)
- Construction Noise Report (WSP, 2018)
- Draft Category 3 Permit-to-take-Water (WSP, 2018)
- Erosion and Sediment Control Plan Overview (WSP, 2018)
- Cultural Heritage Evaluation Report - Welland River Bridges (WSP, 2018)
- Heritage Impact Assessment (WSP, 2018)
- Stage 1 & 2 Archaeological Assessment (WSP, 2018)
- Excess Materials Management Plan Memo (WSP, 2018)
- Designated Substance & Hazardous Material Survey (WSP, 2018)
- Landscape Plan (WSP, 2018)
- Environmental Screening Document (WSP, 2018)
- Preliminary Construction Staging Consultation and Engagement Plan (WSP, 2018)

2.4.11.3 Existing Permits, Approvals and Commitments

Consultation with DFO at the preliminary design stage has confirmed the requirement for a SARA Permit at the Welland River Bridges and Site 34-312/C, due to the potential presence of Mapleleaf and Eastern Pondmussel at these locations. A Request for Review Application Form was prepared and submitted for the preliminary proposed works and potential to impact federally listed aquatic Species at Risk. Approval can take the form of a SARA Permit, and/or a Fisheries Act Authorization that contains conditions for the protection of aquatic SAR (DFO, 2018a). The Design-Builder shall implement the

required mitigation measures.

Barn Swallow nests were confirmed at Culvert 34-315/C. The works have been registered with the *Ontario Regulation Reg. 242/08* (Threats to health and safety: not imminent) under the *Endangered Species Act*, 2007. The Design-Builder shall implement the required mitigation measures.

A draft Category 3 Permit-to-take-Water (PTTW) was submitted during Preliminary Design. Preparing the draft PTTW during Preliminary Design will reduce the risk of claims from the Design-Builder; however, the PTTW must be finalized by the Design-Builder. It is the responsibility of the Design-Builder to finalize and submit the PTTW to the Ministry of Environment, Conservation, and Parks prior to the start of de-watering activities, and to adhere to the conditions of the PTTW.

Where applicable, the Design -Builder is responsible for obtaining any additional permits or approvals associated with the required works.

2.4.12 Surveying and Plan Preparation

2.4.12.1 General Project Requirements

The TPM Service Provider shall verify content of the available Engineering Survey information, prepared for the detail design purpose by WSP in 2018 as a part of Design-Built-Ready package (Assignment 2016-E-0086), and conduct required additional ground survey if requested by the designers.

The survey information prepared by WSP is available for all short-listed proponents prior to the deadline of submission of the proposal.

The Design-Builder is responsible for acquiring and adhering to the standards as set out in the documents below:

a) Engineering Survey Manual – Most recent version (2016)
b) AutoCAD Standards Guide, Version 2004

The above two references are available for download from the MTO Library online catalogue:
http://www.mto.gov.on.ca/english/publications/mto-research-library-online-catalogue.shtml

- The AutoCAD/Civil 3D standard template and related files and guideline

The Ministry's customized Civil3D and other CAD standard templates, files and guides can be downloaded from the MTO file application download website:
http://www.xfer.mto.gov.on.ca/PTASapps/index.htm

Ministry Instructions

The survey is to reflect the existing physical (field) conditions at the time of the survey. The Design-Builder shall ensure the field data capture is of sufficient accuracy and density to comply with the Engineering Survey Manual.

2.4.12.2 Project Specific Requirements

Alignment

The Design-Builder shall supply coordinated alignments for all newly constructed portions of the Work.

All new alignments shall be provided in XML text file format (ver 1.2) and shall conform to Ministry standards and naming conventions.

Project Control

The Design-Builder may be required to reset Project control for control points that have been destroyed during construction. Shall additional engineering survey data be required beyond the scope of the original supplied Engineering Survey, the Design-Builder may be required to set additional Project control to properly tie in the new data.

2.4.12.3 Reference Documents

Data Provided by MTO:

The following information shall be provided to the short-listed proponents upon request
:
Note: Existing information is accurate at the date of the survey.

a) Engineering Survey data prepared as a part of Design-Build Ready package by WSP in 2018 (Includes :H&V Control raw data, adjustment and Control Report, Engineering Survey Report, Civil 3D files, InRoads DTM files. The surveyed area is shown on the map below)
b) Ortho-photo mosaics, old photogrammetric mapping and alignments if required.



2.4.13 Canadian Pacific Railway

2.4.13.1 CP's Montrose Subdivision

This project is located at mile 5.90 on Canadian Pacific Railway's Montrose Subdivision which passes below the project bridge. This line is CP's secondary mainline which moves traffic 24 hours a day and 7 days a week in and out of the Niagara Region. This line is critical to CP's business interests and therefore, rail operations on this line must be maintained without interruption, throughout construction, unless specific exception(s) are permitted. Any such exception(s) shall be at the sole discretion of CP.

At present this line has 2-4 trains a week that run in and out of Niagara Falls. These numbers are provided as a guide and it must be noted that the number and frequency of

trains can change at any time depending on service demands.

Railway Safety

The Design-Builder shall review all Railway hazards conditions throughout the Project and ensure that adequate mitigation in conformity with CP standards as contained in Appendix C.

Co-ordination

The Contractor is hereby advised that co-ordination of services to be provided by CPR needs to be a high priority as the availability of CPR resources may impact the Contractor's schedule.
The requirements for staging of the various removals and installations will require liaison through the Contract Administrator with CPR's representative.

The Contractor shall have no basis for additional costs or claims for these requirements.

Fibre optic cable and other utilities that run along the CP right of way will need to be protected at all times. The following should be used by the contractor to provide locates.

Utilities

Utilities on CP property must be protected at all times. The Contractor shall contact the CP's "Call Before You Dig" number (1-888-248-4410) for all utility locates prior to undertaking any work on CP property. (identify location as Mile 5.90 Montrose Subdivision)

CP's Working Constraints

The Contractor shall not enter onto CP's right of way or perform work above the operating tracks except under the guidance of a CP flagman unless otherwise agreed to by CP. All work undertaken by the Contractor within or above the CP right of way shall conform to CP's Requirements as spelt out in the following documents included in Appendix C:

- CP's Flagging Protection Protocol dated Mississauga 2013;
- Minimum Safety Requirements for Contractors Working on CP Property in Canada, issued by CP dated September 15, 2010;
- Operational Constraint For Work On, Above Or Below Railway Right Of Way" issued By C.P. Rail Dated May 1, 2009;
- Clearance Diagram; CP Proposed Overhead Structures Clearances for New Construction Dated January 5, 2015.

The contractor before being allowed onto CP property will need to have initialed and returned a copy of the Minimum Safety Requirements for Contractors to CP.

CP Flagging

A CP flagperson is required when working on, above or below CP's right of way as identified by CP's Operational Constraints document contained in Appendix "C".

When working within the defined envelope, the Design-Builder has the opportunity to provide a physical barrier to ensure complete separation of work operations from impacting CP's rail operations. If the Design-Builder wishes to get an exception of having a flagperson on site a written proposal will need to be made to CP containing details of the work isolation schemes and must obtain written consent from the CP prior to working within CPR ROW without a flag person present. The final decision which may be rejection of the proposal or approval with or without conditions will be at the sole discretion of CP.

The Ministry of Transportation (MTO) shall be responsible for the cost of flagging provided by Canadian Pacific Railway (CP) for the duration of the contract. The Contractor shall arrange with the Contract Administrator for rail flagging service and flagperson's to be provided by CP.

The MTO has arranged with CPR to pay for flagging for an undefined number of working days per year for a total number of days over the contract period not to exceed two hundred and eighty (280) days. The Contractor shall schedule their operations to ensure all work that requires flagging is completed within the total time frame. Any flagging costs beyond 280 days will be at the Contractor's expense at a minimum charge of $3,000.00 per day plus H.S.T. The MTO will process a credit through a Change Order for any additional flagging costs.

The Contractor shall schedule construction to optimize the flagging service and the need and supply of flagperson's. The Contractor shall be required to submit a schedule of when flagging services are anticipated. This schedule will be reviewed by CP and the Contract Administrator, and if accepted, will be used as a 'baseline' to schedule flagging services. The Contractor, in conjunction with the approved schedule, will need to request of CP, at least two (2) weeks in advance, that flagperson's are not to be supplied for a period of activity for which CP protection is not required. Should the Contractor schedule flagging, and not utilize the service, the Contractor shall reimburse the MTO for the cost of any unused service.

CP flagperson's are unionized employees that bid on flagging positions with qualifications and seniority. Bulletins for flagging positions go out at the beginning of the month and close near the end of the month with award of positions. It is therefore important that the lead time of 60 days for flagging be understood and respected. When awarded the individuals are assigned to the work until cancelled with ten (10) working days' notice. The assignments must last at least forty five consecutive (45) working day. For most extensive construction projects two flagperson's are generally assigned under this format. The past practice has been to assign two flagperson's per day working overlapping shifts so that the contractor has approximately 12 hours of protection per day working five days (Monday – Friday) per week. Recently CP has moved to having two flagperson's working alternate weeks working eleven and a quarter (11.25) hours per day Sunday- Saturday. These flagging schedules are shown

below.

Flagging Shift	Daily Hours (subject to travel)	Daily Flat Rate (plus overtime if
Monday – Friday (5 days on, 2 days off)	8 hours	$1,500
Sunday –Saturday* (7 days on, 7 days	11.25 hours	$2,345

*Two flagging position required for continuous track protection.
**Only available for long-term flagging positions.

Daily flat rate: $1500/day (up to an 8 hour shift or $2,345/day for 11.25 hour shift). It is noted that the shift duration includes travel time to site and breaks.

Note that the shift includes booking in time at the Flagman's headquarters and travel time to and from the job site. The actual hours on site will vary by location. In addition, the flagman's presence on site does not guarantee working time – The company will make every effort to accommodate the planned work but safe unhindered railway operations are paramount and available working hours will vary.

Minimum charge:

a. Shift includes travel time to and from site to their headquarter location.

The daily flat rate includes:

a. Flagman labour for regular shift hours
b. Overhead charges
c. Standard vehicle/transportation (includes vehicle rental and gas if necessary)
d. Crew Radios
e. Flagman expenses including when necessary: Lodging, Fringe Benefits and expenses

What the flat rate fee does NOT include:

a. Overtime hours worked – overtime rate is: $225/hr
b. Flagging on weekends (unless schedule is specified as 7 on, 7 off)
c. Statutory Holiday hours worked
d. Specialty vehicles (ie: High Rail Bus, or non-standard vehicle)
e. Specialty Equipment (Remote control flags etc)

Flagging shall commence on a date mutually agreed to by CP, the Contract Administrator and the Contractor and will continue without interruption until the Contractor, Contract Administrator and CPR mutually agree that flagging is not required. During periods of interruption in the flagging service, CP or the Contract Administrator will monitor the Contractor's activities. The Contractor will be ordered to stop work or a flagperson's will be reinstated should CP or the Contract Administrator identify operations by the Contractor for which a flagperson is required.

The Contractor shall provide the required notice to the Contract Administrator for the

requirements of a flagperson. The Contract Administrator shall liaise with CP.

The Contractor shall assume that Railway flagging will be typically available on site approximately 6-7 hours maximum per flagman, per day Monday thru Friday. CP will endeavour to supply two flagmen to this project working a split shift or 7:7 11.25 hour shift; however there may be occasions when only one flagman is available.

The MTO or their representatives will neither be responsible for delays or extra costs nor entertain an extension of time beyond the contract completion date due to a shortage of flagperson's.

Track Closures

Except for a Major Track Closure, all work executed within the CP right of way by the Contractor shall be carried out insuring the continued safe movement of rail traffic. The Contractor can undertake approved work within CP operating corridor by obtaining Minor Track Closures throughout the work shift from the CP flagman and will need to plan their work so as not to interfere with train operations. The Contractor shall be liable for the cost of train delays and for the cost of repairs to the track as a result of damage caused by their operation.
If a Major Track Closure is required, the Contractor through the Contract Administrator will need to submit a written request to CP four (4) weeks in advance of the date. The contractor will need to provide a detailed explanation of what the outage is for, a work plan and details of how they expect to complete the work and return the track to service at the end of the track outage. The request will then be negotiated with CP to obtain the track block that fits CP's operating requirements and the work schedule of the Contractor. The Contractor shall note that track closures may be scheduled on holidays, weekends, and during nighttime's.
If agreed to the Contractor will be required to submit a detailed plan describing construction sequence that has as many intermediate steps (describing all activities planned in one-hour interval) to permit the work to be completed. Where applicable the plan should contain schematic diagrams, equipment details, labour resources, lift design, bracings and temporary works.
Equipment details include, but are not limited to:

- Number of equipment on site;
- Equipment descriptions;
- Location of equipment with respect to the bridge and the CP track;
- Detailed description of methods and equipment to be used in handling materials;
- Standby equipment;
- Current calibration certificates for all equipment and standby equipment;
- Labour resources include, but are not limited to:
- Type of crews present to perform the work;
- Length of each shift, number of shifts per crew and crew leaders;
- Work cycle;
- Number of workers in each crew and number of crews;
- Name of the leader of each crew and his experience in bridge work;

- The Contractor shall also develop and submit a contingency plan that deals with actions that the Contractor will take to secure the work site for safe train movement at the end of the track block if for some unforeseen reason the work cannot be accomplished as planned.
- All submissions shall be stamped and signed by an Engineer licensed to practice in the Province of Ontario submitted to the Project Manager for his review and CP's a minimum of 15 days prior to commencing of the planned work.
- Once the extended track block(s) is agreed to by CP, then at least three (3) days prior to the commencement of extended track closure the Contractor shall call upon all key personnel executing the work to attend an organized meeting with the Contract Administrator and CP to review:
- All activities to be executed during that specific track closure;
- Methodology and equipment to be used, including backup plans;
- Conduct an audit to verify that all materials at the storage site are on hand and discuss loading and unloading procedures;
- Discuss with all participants the expected progress;
- Review all safety compliance procedures.

At least twenty-four (24) hours prior to the scheduled track closures, the Contractor shall have all resources and equipment in place to carry out the work for that particular block.

Crossing CP Tracks

The Contractor will not be permitted to cross tracks of the Railway Company with scrapers, bulldozers, trucks, barrows or other mechanical equipment at-grade except on:

- a CPR approved temporary construction crossing, or;
- under the supervision of a Railway Flagman.

Should the Contractor require a temporary construction crossing, then they will be required to complete an application to CPR and enter into a Temporary Construction Crossing Agreement.

If the contractor runs into problems such that it affects the safely of railway operations and there is no flagperson on site there is an emergency number that can be used to contact CP.

Emergency Contact Numbers

CP Police Communication Centre: (800) 716-9132 (identify location as Mile 5.90 Montrose Subdivision).

Definitions:

A. CPR or CP shall mean Canadian Pacific Railway.

The contact person on behalf of CP is:

Peter V. Johnson, P.Eng.
Senior Public Works Consultant –Transportation Rail
AECOM
5080 Commerce Blvd.
Mississauga, Ontario, L4W 4P2
Cell Phone: (905) 301-4105
Telephone: (905) 238-0007
Fax: (905) 238-0038

Track Monitoring Requirements:

The Design-Builder shall submit a written proposal to CP containing details of the proposed track monitoring for approval.

Monitoring Program

The monitoring program must include both the horizontal and vertical monitoring of the mainline track whenever there is excavation or installation work in the vicinity of railway right of way that may result in track movement. This will include monitoring on both tracks for a sufficient length to ensure adequate monitoring.

Where there is excavation that requires special shoring for track protection extra monitoring may be required and will need to be submitted by the contractor for approval.

Vertical Monitoring

The monitoring program will consist of establishing stations on the rail head of both rails (directly opposite) at intervals of three (3) metres or ten nominal feet. The stations are to be marked on the web of the rail with paint or chalk.

Temporary benchmarks are to be established at convenient locations to accommodate the survey. The allowable limits for vertical movement shall be 10 mm.

Horizontal Monitoring

The horizontal monitoring would consist of reading the inner face of one rail of each track at the same station intervals as established for vertical monitoring. The allowable limits for horizontal movement shall be 10 mm.

Recording and Reporting

The monitoring and data retrieval will be performed daily during the excavation and/or installation to make sure there is no movement of the mainline track. The monitoring frequency will be based on the results of the monitoring and will be adjusted to suit the observed trend and by agreement of interested parties.

If there is an excavation adjacent to the track to allow for construction of the new bridge

or removal of the existing structure monitoring is to be the length of the excavation plus extending about twelve (12) metres beyond the limits of excavation. The monitoring and data retrieval will be performed on a daily weekday basis during the excavation and for a period following backfilling. The monitoring frequency following backfilling of the excavation will be based on the results of continuing monitoring and will be adjusted to suit the observed trend and by agreement of interested parties. If it is seen that no movement is taking place after the backfilling is completed for a period of time then monitoring can be stopped.

Readings will be reported to site superintendent. A log of the readings will be maintained by the Contractor and submitted to the Contract Administrator to establish any monitor patterns and trends. If an observation of concern is found at the time of monitoring, it would be reported on site immediately and to CP Rail's representative.

All survey data will be reviewed by the Contractor and the Contract Administrator. Any elevated reading levels will be reported and documented to the Contract Administrator, through the contractor immediately. If there is a movement trend in excess of 5mm the Contract Administrator will be alerted. If the observed movement is approaching or exceeding the movement limits, the Contract Administrator and CP Rail's representative will be advised and work shall be stopped until further review is complete.

A summary report will be prepared on a weekly basis and sent to CP Rail's representative reflecting the daily/weekly readings taken.

Chapter 3: Specifications

3.0 Scope

This chapter addresses specifications and general modifications for Design-Build contracts.

Contents

i. Design-Build General Specification
ii. Performance Specifications
iii. Design-Build Special Provisions
iv. Special Provisions (Regional and Head Office)
v. Excluded Special Provisions (currently utilized Special Provisions not applicable to this Contract)

3.1 Design-Build General Specification

The Design-Builder shall use Ontario Provincial Standard Specifications (OPSS), Ontario Provincial Standard Drawings (OPSD), MTO Drawings (MTOD), Structural Standard Drawings (SSD) and MTO Special Provisions currently utilized by the ministry, according to the designer notes and warrant. Where designer notes make reference to tender items, it shall be understood to refer to the OPSS(s) most closely associated to the work.

All Ontario Provincial Standard Specifications, related MTO Special Provisions and Design-Build Special Provisions included in the Design-Build agreement are subject to the following exceptions and modifications:

h) When the Specification refers to “Measurement for Payment” or to “Basis of Payment” such clauses and language do not apply.

i) When the Specification refers to “Unit Prices” such language does not apply.

j) When the Specification refers to any bonus, penalty or price adjustment such language does not apply unless and only if addressed directly in a Performance Specification or a Design-Build Special Provision.

k) Any reference to “approval by Contract Administrator” shall mean approval by the Design-Builder’s Engineer, and requires that documentation of such approval be provided within two Business Days to the Contract Administrator, unless indicated otherwise in a Design-Build Special Provision. The above does not apply to repair or remedial action proposals for non-conforming or deficient work or materials, Change Proposals (submitted by the Design-Builder), or anything associated with regulatory obligations/approvals of the Owner. In these situations, the Design-Builder shall obtain approval from the Contract Administrator.

l) All reports, test data, submissions and other such documents required by a Specification or Special Provision shall be submitted to the Contract Administrator

within two Business Days unless otherwise specified. Any non-conforming or rejectable material shall be removed and replaced.

m) Any reference to an Engineer, unless specifically noted as an Owner's Engineer, shall mean an Engineer retained by the Design-Builder.

n) The Ministry shall not make any payments for surplus crushed granular materials.

o) All Quality Assurance samples (QA) shall be delivered according to SP 199F57 (dated February 2017). The designated QA lab shall normally be located within 150 km of the contract.

3.2 Performance Specifications

The following Performance Specifications shall be used for this Contract and are included at the end of Chapter 3.

PERF #	Title	Date
PERF 1072	*Performance Requirements for Environmental Management*	01 13
PERF1075	Performance Requirements for Information Management	06 11
PERF 1077	Performance Requirements for Traffic and Mobility Management	07 10
PERF 2272 (modified)	Performance Requirements for Design and Construction of Flexible Pavement Structure with a Warranty	02 15
PERF 2273	Performance Requirements for Design and Construction of Pavement Markings	04 10
PERF 3273	Performance Specification for Design and Construction of Deck Joint Assemblies, Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds and Waterstops	04 10

3.3 Design-Build Special Provisions

The following Design-Build Special Provisions that modify standard OPSSs and/or Special Provisions shall be used for this Contract and are included at the end of Chapter 3 and are also available in CPS under the section Non-standard Special Provisions (NSP) where Region = Head Office and Category = Design Build.

SP DB #	Title	Date
DBSP 0539	Amendment to OPSS 539, November 2014	07 15

DBSP 0902	Amendment to OPSS 902, November 2010	03 13
DBSP 0903	Amendment to OPSS 903, April 2016	08 17
DBSP 0904	Amendment to OPSS 904, November 2014	07 15
DBSP 0906	Amendment to OPSS 906, November 2012	08 17
DBSP1350	Amendment to OPSS 1350, November 2016	08 17

3.4 MTO Special Provisions

In addition to Standard Special Provisions, the following Special Provisions shall be used for this Contract and are included at the end of Chapter 3 and are also available in CPS under the section Non-standard Special Provisions (NSP) where Region = Region or Head Office and Category = Capital.

Region/Head Office/ Included	SP #	Title	Date
Head Office	*100F21*	Indemnification and Insurance Requirements Concerning the Canadian Pacific Railway Company	*08 18*
Head Office	*100S59*	*Approvals and Permits and Water Taking*	*11 16*
Head Office	*101F21*	*Occupational Health and Safety Act Compliance*	*11 14*
Head Office	*101F23*	*Timing of In-Water Works, Oversight Requirements, and Measures to Avoid Harm to Fish*	*04 17*
Head Office	*107S05*	*Freeway Paving Operations*	*04 17*
Head Office	*199F03*	*Placing Hot Mix Asphalt Before Seasonal Shutdown*	*05 16*
Head Office	*199F12*	*Environmentally Sensitive Areas*	*04 17*
Head Office	*199F31*	*Environmental Exemptions and Permits*	*04 16*
Head Office	*199F33*	*Construction Noise Contraints*	06 13
Head Office	CMO 0001	*Amendment To MTO General Conditions Of Contract*	01 18
Head Office	CMOB 0007	*Notice to Contractor*	04 18
Head Office	CMOB 0008M	*Amendment To MTO General Conditions Of Contract*	06 18
Central	ENV00020	Control of Asian Long Horned Beetle Infestation and Management of Host Trees	
Central	*ENV00031*	*Migratory Bird Protection*	*03 10*
Head Office	*ENVR0001*	*Management of Excess Earth with Salt Impacts*	*01 17*
Central	*ENVR0007*	*Protection of Species at Risk*	09 17
Central	*RDDRAIN*	*Operational Constraint – Roadway Drainage*	

Central	*NSPEPS*	*NSSP for Rigid Expanded Polystyrene Embankment Fill*	

3.5 Excluded MTO Special Provisions

The following currently utilized Standard Special Provisions do not apply to this Contract.

SP #	Title
100F08	*Protection of Public Traffic*
199S19	*Portable Lane Control Signals Not Recommended*
199F61	*Available Digital Information During Advertising and Construction*
199F63	*Navigable Waters Protection*

PERFORMANCE REQUIREMENTS FOR ENVIRONMENTAL MANAGEMENT

1072.01 SCOPE

This performance specification identifies the responsibilities and the obligations for environmental management associated with the delivery of all the Work.

1072.02 REFERENCES

This Work requires the mandatory use of the following documents:

- MTO's Class Environmental Assessment for Provincial Transportation Facilities, 2000
- MTO Environmental Standards and Practices http://www.mto.gov.on.ca/english/engineering/envirostandards.
- MTO Environmental Reference for Design
- Statement of Environmental Values - Ministry of Transportation
- MTO/DFO/OMNR Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings - User Field Guide
- MTO/MOE Memorandum of Understanding on Permit-To-Take-Water Approval Process
- MTO/MOE Memorandum of Understanding on Management of Excess Materials in Road Construction and Maintenance
- OPSS 180 General Specification for The Management of Excess Materials
- DFO Operational Statements
- NSSP ENVR0001 Management of Excess Earth with Salt Impacts

1072.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Detect, Detected or Detection means observed, should have been observed or has been informed.

Environmental Management Plan means a project or site-specific plan developed and implemented to ensure that all necessary measures are identified and implemented in order to meet all environmental protection, regulatory and legislative requirements, contract requirements and Ministry obligations including adherence to the Design-Builder’s Environmental Management System policy, programs and procedures.

Environmental Management System means the part of a Design-Builder’s management system used to develop and implement its environmental policy, manage its environmental impacts and

to ensure compliance with all environmental legal requirements. It is a set of interrelated elements (organizational structure, planning activities, responsibilities, practices, procedures, and resources) used to establish and achieve environmental objectives.

Immediate or Immediately means the initiation of an activity as soon as possible after Detection and no later than 2 hours from the time of Detection.

1072.04 DESIGN-BUILDER'S RESPONSIBILITIES AND OBLIGATIONS

The Design-Builder is responsible for undertaking the Work in a manner that protects the environment to meet the Contract requirements.

1072.04.01 Environmental Management

The Design-Builder has responsibility to meet all obligations for environmental protection during the Work and shall ensure that performance of all Work is carried out in compliance with all Environmental Laws, MTO Environmental Standards and Practices and the requirements for the Environmental Management System (EMS).

1072.04.01.01 Environmental Management System

The Design-Builder shall be responsible for the complete environmental management of and environmental protection planning for the Work and shall have a functioning Environmental Management System(EMS) in accordance with the requirements of this Section and generally consistent with CAN/CSA-ISO 14001:04 (ISO 14001:2004). The Design-Builder's EMS shall ensure that all Work undertaken during the term of the contract shall consistently meet all environmental protection, regulatory and legislative requirements and Ministry obligations.

1072.04.01.02 Environmental Management System Requirements

The Design-Builder shall develop an Environmental Management System (EMS) with sufficient detail, outlining its understanding and approach to the key EMS activities described below. The Design-Builder's Environmental Manager will be responsible for the coordination of all issues related to the EMS.

- Develop a documented process to ensure environmental legislative, environmental assessment commitments and other environmental requirements in relation to the Work are undertaken and monitored throughout the duration of the Work. The process shall also explain the intended method of reporting and communicating identified changes in these requirements to the Design-Builder personnel, subcontractors, consultants and suppliers.

- Document how approvals / permits and bylaw exemptions will be obtained, how requirements and commitments in environmental assessment documentation will be addressed, where applicable to contract activities, and how verification will take place that the requirements and commitments will be and have been met.

- Document and demonstrate how environmental protection / mitigation / compensation measures will be implemented during design and construction of the work and confirm that the environmental protection / mitigation / compensation measures have been implemented during design and construction of the Work.

- Documented procedures and processes to monitor and measure, on a regular basis, the Design-Builder's activities that can have significant environmental impacts and ensure appropriate corrective or preventative measures are taken to correct any actual or potential deficiencies revealed by monitoring activities.

- Documented procedures for environmental emergency preparedness and response to ensure that corrective action is taken to address environmental incidences. The Design-Builder shall be in strict compliance with the requirements of legislation regarding Environmental Incidents under the control of the Design-Builder or that are a result of the Design-Builder's operations during the Work.

- Ensure all employees, subcontractors and, as applicable, other involved parties working for or on behalf of the Design-Builder, have the appropriate competence, training and awareness in regard to the potential environmental impact of their activities, the Design-Builder's Environmental Management System, environmental protection / mitigation / compensation measures, contract responsibilities and obligations, environmental protection, regulatory and legislative requirements and requirements of permits and approvals and any other environmental requirements.

1072.04.02 Environmental Information Management

The Design-Builder is responsible for all information management requirements identified in this performance specification or elsewhere in the Contract documents. The associated performance requirements and consequences for non-conformance related to information management are documented in the Information Management PERF included in the Contract.

1072.04.02.01 Environmental Management System Records

The Design-Builder shall create and maintain records to provide evidence of compliance with Environmental Laws; Contract environmental requirements; and the Environmental Management System. The Design-Builder shall provide the Ministry access to environmental Records, upon request within 24 hours.

1072.04.02.02 Permits and Approvals

The Design-Builder must provide copies to the MTO Contract Administrator of all draft and final environmental permits, approvals, bylaw exemptions and authorizations and documentation, including Design and Construction Report (DCR) and technical reports, prior to starting construction on the related element of the Work.

1072.04.02.03 External Consultation

A minimum of five weeks prior to any external consultations taking place, the Design-Builder shall submit a consultation plan and schedule for completing the appropriate level of consultation to meet the requirements of the MTO Class EA, including any commitments made during preliminary design as described in the TESR and Class EA study, as may have been amended by the Design-Builder during detail design. Any changes to the consultation plan or schedule shall be submitted immediately to the MTO Contract Administrator.

Drafts of all public notices, letters, Public Information Centre (PIC) materials and environmental assessment process documentation (including but not limited to the DCR, technical reports, project mailing list, responses to stakeholders, permit applications etc.) will be provided to the MTO Contract Administrator for review, at least five weeks prior to completion, distribution, event or 30-day public review period. No draft documents shall be made available for public review.

The Design-Builder must notify the MTO Contract Administrator of any public notifications at least 2 weeks prior to when the public notification is to occur. PIC notification is to be provided to the public 2 weeks prior to the PIC date. Copies of all written submissions are to be provided to MTO within 3 working days of their receipt. A PIC summary report is to be provided to the MTO Contract Administrator within 10 working days after the deadline for written submission.

1072.04.02.04 During Design

During the design phase of the Work, the Design-Builder shall submit the following documentation to the MTO Contract Administrator:

a) Description of changes to the Work compared to Work as described in the environmental assessment process documentation or any changes to permits, approvals, bylaw exemptions or authorizations previously obtained during design, submitted prior to further advancing design on the related element of the Work. The submission will include a detailed assessment of "significance" of the change per the Class EA principles and, if applicable, a detailed description and schedule for any required amendments to the original EA.

b) Any additional or revised permits, approvals, bylaw exemptions and authorizations that were obtained submitted upon receipt.

c) Any continual improvement initiatives made to the EMS, or any revisions made to the Environmental Management Plan, submitted prior to implementation of change.

1072.04.02.05 Prior to Construction

Prior to start of construction, the Design-Builder must submit to the MTO Contract Administrator a letter of confirmation, signed by the Environmental Manager, that assures that all Class Environmental Assessment commitments and requirements of permits and approvals have been met and that the project is eligible for Environmental Clearance-Construction Start, as per the MTO Class EA for Provincial Transportation Facilities (2000).

1072.04.02.06 During Construction

During construction, the Design-Builder shall submit the following documentation to the MTO Contract Administrator:

a) Description of changes to the Work compared to work as described in the Environmental Assessment Process Documentation or any changes to permits, approvals, bylaw exemptions or authorizations previously obtained during design, submitted prior to starting construction on the related element of the Work.

b) Any additional or revised permits, approvals, bylaw exemptions and authorizations that were obtained submitted upon receipt.

c) Any complaints, warnings, directions, orders or charges received from regulatory agencies during the Work submitted upon receipt.

d) Immediate notification to MTO of any Environmental Incidents and any contacts with regulatory agencies and resulting actions.

e) Update on Environmental Incidents reported, including a summary of actions taken and actions scheduled, submitted monthly.

f) Drafts and final copies of Monitoring Reports required by Environmental Permits or authorizations (e.g.: for Fisheries Act Authorizations or Endangered Species Act Permits, etc.) submitted as required by the applicable Permit or authorization.

g) Update report on items identified in monitoring requiring corrective/preventative action (e.g. non-conformances), including resolution status of each, submitted monthly.

h) Any continual improvement initiatives made to the EMS, or any revisions made to the Environmental Management Plan, submitted prior to implementation of change.

1072.04.02.07 Completion of Work

Upon completion of the Work, the Design-Builder shall submit to the MTO Contract Administrator a letter of confirmation, signed by the Environmental Manager, that assures that all Class Environmental Assessment commitments, Contract requirements and obligations, environmental protection, regulatory, legislative requirements and requirements of permits and approvals and any other environmental requirements have been met during the course of the Work.

1072.05 PERFORMANCE REQUIREMENTS

1072.05.01 Performance Requirements

The Design-Builder shall ensure that Performance Requirements identified in Table 1 are met or

exceeded.

Table 1

Feature	Performance Requirement
Environmental Management	
Protection of the environment during Work as required by the Contract within the Contract Area.	Work meets all requirements of environmental legislation and Contract requirements100% of the time.
Immediate corrective action of a non-conformance	Design-Builder undertakes required notifications and corrective actions for non-conformance Immediately upon identification through monitoring, or upon Detection 100% of the time.

1072.05.03 Performance Indicators

The Ministry, at its discretion, may collect performance indicators. The collection may consist of up to 100% of the contract area and the exact location will be at the Ministry's discretion. A more thorough data collection may be carried out if there is evidence of non-conformance. The additional data collection may include a review of the Design-Builder's records, plans and actions taken.

The performance indicators that the Ministry collects will be shared with the Design-Builder and will be the only indicators used by the Ministry to apply consequences for non-conformance.

1072.05.04 Conformance to the Performance Requirements

Upon completion of the collection of performance indicators, the Ministry will make an assessment of conformance or non-conformance to the performance requirements.

The Ministry will have the complete discretion in the choice of performance indicators to use in determining conformance. The assessment however, will include consideration of events that are beyond the care and control of the Design-Builder. The Ministry will examine all relevant factors involved with the situation including the Design-Builder's rationale as to why the situation occurred.

If, after completing the collection of performance indicators, assessing all the relevant data, including data provided by the Design-Builder, a non-conformance is determined, a notice of non-conformance may be issued to the Design-Builder for features that do not conform to the performance requirements.

1072.05.05 Consequences for Non-Conformance to the Performance Requirements

The Design-Builder shall be responsible for performing all specified consequences for any non-conformance to the performance requirements.

1072.05.04.01 Consequence Tables

The consequences for non-conformance to the performance requirements are described in Table 2:

Table 2

Feature	Consequences for Non-Conformance	
	Initial	**Subsequent**
Environmental Management		
Protection of the environment during Work as required by the Contract.	$5,000for each instance where there has been a violation of environmental legislation or Contract requirements.	$1,000 for each 12 hour period or part thereof beyond the first 12 hour period after Detection that the violation remains uncorrected.
Immediate corrective action of a non-conformance.	$5,000 for each instance where notifications or corrective actions were not undertaken Immediately upon Detection.	$1,000 for each 12 hour period or part thereof beyond the first 12 hour period after Detection that the notification or corrective action are not undertaken.

PERFORMANCE REQUIREMENTS FOR INFORMATION MANAGEMENT

1075.01 SCOPE

This performance specification covers the responsibilities and obligations for information management associated with all of the Design-Builder's activities required to complete the Work in accordance with the Contract.

1075.02 REFERENCES - Not Used

1075.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Accurate means the information provided is a true representation of an actual situation, accomplishment or occurrence

Complete means that all required and relevant information has been provided

Contentious means an issue, complaint or inquiry which has the potential to create media attention, result in legal action against the Government, Ministry or Design-Builder or may position the Government or Ministry as less informed than the public.

Reasonable means a sound judgement or action that is not excessive or extreme nor insufficient

Timely means that all required information is provided within the prescribed or Reasonable timeframe

1075.04 DESIGN-BUILDER'S RESPONSIBILITIES AND OBLIGATIONS

1075.04.01 General

As the owner, the Ministry requires access to Timely, Accurate and Complete information to employ sound asset management and to defend itself against potential litigation. For Design-Build contracts, the amount of information required to be submitted by the Design-Builder is less than in conventional contracts, however, the Ministry may request additional information at anytime during the contract or warranty period. The Design-Builder shall maintain effective information management practices throughout the duration of the contract and warranty period.

1075.04.02 Public Notifications

The Design-Builder shall be responsible for notifying the Contract Administrator of any operations that might require public notification based on their potential impact on the travelling

public or local residents. The Contract Administrator will determine the appropriate course of action for notifying the public and will advise the Design-Builder of any required action. Notification to the Contract Administrator shall be provided at least one (1) week in advance of the planned operation unless otherwise specified in the Contract. Some examples of operations that may require public notification include lane and ramp closures, detours, night work and operations with high noise volumes. Failure to provide notification to the Contract Administrator will result in the Design-Builder being subject to consequences for non-conformance as outlined in Table 2.

1075.04.03 Contract Information Management Requirements

There are several contract information management requirements contained within the Specifications, Project Requirements and General Conditions of the Contract. The general performance requirements and consequences for non-conformance specified for contract information management requirements specified in Tables 1 and 2 of this performance specification shall also apply to the information management and submission requirements outlined in all other specifications and elsewhere in the Contract. A few key information management requirements are highlighted below:

Design Submissions - The Design-Builder shall submit all relevant design submissions as outlined in the Contract prior to starting construction of that element of the work. Submissions that are deemed to be late, incomplete or inaccurate in accordance with the Contract will be subject to consequences for non-conformance as outlined in Table 2.

Record Drawings - The Design-Builder shall submit Record Drawings of the as-constructed completed Project as outlined in Section 2 Project Requirements of the Contract within twenty (20) days of issuance of the certificate of completion as identified in Section 3: GC 8.02.05.07. Submissions that are deemed to be late, incomplete or inaccurate in accordance with the Contract will be subject to consequences for non-conformance as outlined in Table 2.

Certifications and Confirmations - The Design-Builder shall submit all relevant certifications and confirmations according to the Contract. Certifications and confirmations that are deemed to be late, incomplete or inaccurate will be subject to consequences for non-conformance as outlined in Table 2.

1075.04.04 Information Requests

The Design-Builder shall respond to requests with information that is Accurate, Timely and Complete. The Design-Builder will typically receive information requests from the Ministry, however, they may also receive requests from the public. Ministry-initiated requests will typically involve information related to work accomplishments, asset conditions or information that is not readily available to the Ministry through other means. Timelines for providing the information are dependant on the nature of the request and therefore can not be determined in advance. The Ministry will make every effort to set timelines that are Reasonable for the Design-Builder to respond to.

Public-initiated complaints/inquiries will be in the form of direct contact with the public (e.g.

property owners, other Ministries, municipalities, EMS, travelling public, etc.) by telephone or written correspondence. The Design-Builder shall document and record all complaints/inquiries and actions taken and submitted to the Ministry throughout the duration of the contract or upon request. The Ministry shall be notified immediately of any Contentious issues. Public-initiated complaints/inquires will typically include information on specific work activities and impact to the travelling public. The Design-Builder shall notify the Contract Administrator of any public information requests, and the Contract Administrator will determine if the information requested is appropriate to be provided by the Design-Builder.

Information that is deemed to be late, incomplete or inaccurate in accordance with the Contract will be subject to Consequences for non-conformance as outlined in Table 2.

1075.05 PERFORMANCE REQUIREMENTS

1075.05.01 Performance Requirements

The Design-Builder shall ensure that all performance requirements described in Table 1 are met or exceeded.

Table 1
Information Management Performance Requirements

Feature	Performance Requirements
Public Notifications	• 100% of requirements of Public Notifications identified in section 1075.04.02 met.
Information Requests	• 100% of information provided within the specified timeframe for the request. • 100% of information is Complete and Accurate. • 100% of public complaints/ inquiries responded to within 48 hours. • Complaint logs submitted to Ministry.
Contract Information Requirements	• 100% of information provided within the specified timeframe in the Contract. • 100% of information is Complete and Accurate. • 100% of design submissions submitted to the Ministry prior to beginning construction of that element of the work. • Record Drawings submitted within 20 days after issuance of Certificate of Completion. • 100% of the required certifications and confirmations submitted as specified in the Contract.

1075.05.03 Performance Indicators

The Ministry, at its discretion, may collect Performance Indicators. The collection may consist of up to 100% of the contract area and the exact location will be at the Ministry's discretion. A more thorough data collection may be carried out if there is evidence of non-conformance. The additional data collection may include a review of the Design-Builder's records, plans and

actions taken.

The Performance Indicators that the Ministry collects will be shared with the Design-Builder and will be the only indicators used by the Ministry to apply consequences for non-conformance.

1075.05.04 Conformance to the Performance Requirements

Upon completion of the collection of performance indicators the Ministry will make an assessment of conformance or non-Conformance to the performance requirements.

The Ministry will have the complete discretion in the choice of performance indicators to use in determining conformance. The assessment however, will include consideration of events that are beyond the care and control of the Design-Builder. The Ministry will examine all relevant factors involved with the situation including the Design-Builder's rationale as to why the situation occurred.

If, after completing the collection of performance indicators, assessing all the relevant data, including data provided by the Design-Builder, a non-conformance is determined, a Notice of Non-Conformance may be issued to the Design-Builder for features that do not conform to the performance requirements.

1075.05.05 Consequences for Non-conformance to the Performance Requirements

The Design-Builder shall be responsible for performing all specified consequences for any non-conformance to the performance requirements.

1075.05.05.01 Consequence Tables

The consequences for non-conformance to the performance requirements are described in Table 2:

Table 2
Consequences for non-conformance to the Performance Requirements

Feature	Consequences for Non-conformance to the Performance Requirements
Public Notifications	• Construction delayed or ceased if Contract Administrator is not notified of operations requiring public notifications as required by section 1075.04.02. • $5,000 per occurrence for proceeding with an operation where public notification was required.
Information Requests	• $1,000 per occurrence of information not submitted within the Ministry specified time and $1,000 per additional day until received. • $1,000 per occurrence of the information not being Complete or Accurate.
Contract Information Requirements	• $1,000 per occurrence of information not provided within the specified timeframe in the Contract. • $1,000 per occurrence of the information not being Complete or Accurate. • Construction delayed or ceased if applicable design submission not submitted to the ministry or if submission is incomplete or not in accordance with mandatory design standards. • The Contract Completion Certificate will not be issued until all certifications and confirmations fully comply with the Contract.

PERFORMANCE REQUIREMENTS FOR TRAFFIC AND MOBILITY MANAGEMENT

1077.01 SCOPE

This performance specification covers the responsibilities and obligations of the Design-Builder for Traffic and Mobility Management through all Highway Sections impacted by the Work performed under this Contract, as described elsewhere in the Contract Documents.

1077.02 REFERENCES

This Work requires the mandatory use of the following documents:

- Ontario Traffic Manual (Publications Ontario)
  - Book 1A, 1B and 1C (July 2001) (Publications Ontario)
  - Book 2 (March 2005) (Publications Ontario)
  - Book 5 (March 2000) (Publications Ontario)
  - Book 6 (July 2001) (Publications Ontario)
  - Book 7 (March 2001) (Publications Ontario)
  - Book 8 (January 2014) (Publications Ontario)
  - Book 11 (March 2000) (Publications Ontario) and
  - Book 12 (November 2007) (Publications Ontario)
- MTO Traffic Signal Timing Policy
- MTO Policy on Use of Portable Temporary Traffic Signals
- Highway Traffic Act and Regulations (Publications Ontario)
- French Language Services Act (Publications Ontario)

1077.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Actual Travel Time means the time required for a road user to travel from one end of a Highway Section to the other end of the same Highway Section without exceeding the posted speed limit, as measured in the field.

Baseline Travel Time means the time to travel from one end of a Highway Section to the other end of the same Highway Section, as given in Table 1.

Delay means the difference in time between the Baseline Travel Time for a Highway Section and the Maximum Allowable Travel Time for the same Highway Section.

Highway Section means a portion of the highway network affected by the Work performed

under this Contract, as given in Table 1.

Incident Report means a report created by the Design-Builder when a Traffic Incident or any other event occurs near or within the limits of the work zone, which results in Maximum Allowable Travel Time being exceeded, to record details of the event as described elsewhere in the Contract Documents.

Maximum Allowable Travel Time (MATT) means the longest Actual Travel Time permitted under the Contract as given in Table 1, unless authorized elsewhere in the Contract Documents.

Mobility means the ease with which traffic can travel from one end to the other end of a Highway Section.

Traffic Incident means an unplanned event impacting the Actual Travel Time, such as a collision or vehicle breakdown.

Traffic Management means a planned course of action intended to control traffic and to influence driver behaviour to allow drivers to safely manoeuvre through a work zone.

Traffic Management Plan means a document produced by the Design-Builder that outlines the overall traffic management strategy for the Work performed under the Contract.

1077.04 DESIGN-BUILDER'S RESPONSIBILITIES AND OBLIGATIONS

1077.04.01 General

The Design-Builder is responsible for meeting the Maximum Allowable Travel Time and Traffic Management performance requirements and other contract requirements, unless stated elsewhere in the Contract.

1077.04.02 Traffic Management Plan

The safety of all road users is paramount to the Ministry. The Design-Builder is responsible for planning and implementing traffic operations that meet all legal requirements and protect the safety of workers and road users while meeting Maximum Allowable Travel Time performance requirements.

The Design-Builder is required to develop a Traffic Management Plan for all stages of the Work. Upon request, this plan must be available within 24 hours. The Traffic Management Plan may be requested by the Ministry of Labour and must be kept on site when workers are present.

The Design-Builder's Traffic Management Plan shall describe how the Design-Builder intends to address the following non-exhaustive list of items, as applicable to the Work, to meet the performance requirements:

a) Identify how emergency service vehicles will be guaranteed undelayed passage through the work area or identify how the Design-Builder will communicate with local emergency

response services to identify alternative routes that will not unduly delay them.

b) Staging sequences.

c) Detours.

d) Work vehicle access to and egress from work zones.

e) Selection and planned implementation of typical layouts for traffic control, including temporary condition signs, variable message signs and delineation devices.

f) Use of temporary regulatory speed reductions, including information on where and when the reductions will be used.

g) Use of temporary traffic signals.

h) Use of temporary barriers.

i) Removal of old pavement markings.

j) Use of temporary pavement markings.

1077.04.03 Traffic-Related Communications

1. The Design-Builder is responsible for providing Ministry traveller information systems with requisite traffic impact information to meet the performance requirements. The Design-Builder shall provide information to the Ministry's Central Region Road Work Scheduling and Coordination Unit (RWSCU) by web (www.mtorss.ca) The Design-Builder should log on to www.mtorss.ca at the start of the contract to obtain a valid User ID set-up the contract information. A User ID and contract information are required before any web notifications can be submitted. All Closure & Right-of-Way usage notifications must be submitted at least two full business days prior to the start date of the closure of ministry highways. Please refer to the Central Region Closure and Right-of-Way Protocol version 2.0 for more details.

2. Notify the Roadwork Scheduling and Coordination Unit (RWSCU) of any closure that is being cancelled.

3. Notify the MTO Compass Operations Centre by phone (416 235-4600) immediately prior to the set-up of any closure stating the Closure Notification Number and details of the closure.

4. Notify the MTO Compass Operations Centre immediately of any changes to the closure or anticipated problems that may delay the opening time, stating the Closure Notification Number and details of the changes to and/or problems with the closure.

5. Notify the MTO Compass Operations Centre immediately upon removing the closure stating the Closure Notification Number and details of the closure.

The Design-Builder is responsible for providing Ministry traveller information systems with requisite traffic impact information to meet the performance requirements. The Design-Builder shall provide information to the Ministry's Radio Room/Communications Centres and MTO Info in accordance with MTO corporate and regional protocols regarding any planned lane closures or other expected events at least 2 Business Days in advance of the event. Local emergency services shall also be alerted to the expected event.

The Design-Builder is responsible for providing immediate verbal notification to the Ministry upon becoming aware of any planned or unplanned event that result in the Maximum Allowable Travel Time being exceeded. The verbal notification shall include the description of the incident, the time the incident occurred, any personal injury or fatality information, the damage that has occurred, any impacts to Mobility at the site and the agencies notified or to be notified.

Preliminary written summary must be submitted to the Ministry within one hour of a request being made. The preliminary written summary shall document the information provided in the verbal notification.

The Design-Builder shall provide the Ministry with a follow-up written Incident Report for each verbal notification within 2 Business Days following the occurrence. The Incident Report shall include a description of the incident, the date and time of the incident, vehicles involved, any personal injury or fatality information, state of traffic control and signing at the time of the incident, the damage that occurred, impact on Actual Travel Time at the site, the agencies notified or to be notified and a list of all remediation actions taken at the site, and any outstanding matters including anticipated dates for the completion of the outstanding matters. The Incident Report shall include photographic documentation appropriate to supplement the report and the photographic documentation shall be in a format suitable for use as evidence in a court of law.

1077.04.04 Emergency Services

The Design-Builder is responsible for maintaining safe, unimpeded passage for all emergency service vehicles, including police, fire and ambulance service. The Design-Builder is responsible for effective communication with the emergency services that may be impacted by the Work.

1077.04.05 Temporary Traffic Signals

If the Design-Builder intends to use temporary traffic signals during performance of the Work, the Design-Builder shall:

a) Be responsible for obtaining, from the Ministry, traffic volume data and turning movement counts, as applicable.

b) Be responsible for the design, installation, operation and maintenance of any temporary traffic signals to be used by the Design-Builder to control traffic through the work zone.

c) Design the signal layout and positioning of signal heads and related electrical design according to design standards in accordance with the Highway Traffic Act and Regulations, and the Ontario Traffic Manual.

d) Develop signal timing using OTM Books and Ministry policies with respect to signal timing, while meeting the Maximum Allowable Travel Time performance requirements.

e) Prepare a PHM-125 signal layout drawing for each set of temporary traffic signals in preparation for Ministry approval.

f) Submit 6 copies of the new PHM-125, with the Design-Builder's signature in the "Recommend for Approval" box, to the Ministry for approval prior to start of construction. (see note below).

g) Shall construct temporary traffic signals as per approved PHM-125 drawings.

h) Notify the Ministry after installation but prior to turning on the signals.

i) Turn over completed timing sheets to the Ministry.

Note: The Ministry will return the approved PHM-125 signal layout drawings or will provide details of why the Ministry will not approve the design within 15 Business Days of receiving them from the Design-Builder.

1077.04.06 Traffic Control, Signing and Operations

The Design-Builder shall:

a) Be responsible for obtaining, installing, maintaining and removing all temporary condition signs, variable message signs and delineation devices required to control traffic in advance of and through the work zone as per Ontario Traffic Manual Book 7.

b) Install Contract Identification Signs (BuildON) a minimum of 5 Business Days and a maximum of 10 Business Days prior to start of construction.

c) Install any Temporary Advance Information Signs (TC-64's) a minimum of 5 Business Days and a maximum of 10 Business Days prior to any lane reductions or closures.

d) Maintain a daily sign diary of the traffic control and signing measures that are in place during each stage of the Work and throughout the term of the Contract, including schematics and time of daily sign inspections. These records are essential in providing defence in case of litigation, and therefore it is important that the diary is accurate and complete. The Design-Builder shall submit the diary to the Ministry at a minimum prior to contract completion, and within 24 hours after a request is made in writing.

e) Ensure that any missing or damaged signs are replaced within 24 hours of the Design-Builder being made aware.

f) Ensure that any temporary signing meets the requirements of the French Language Services Act if the work zone is within a French Language Services Designated Area.

The Design-Builder shall also:

a) Schedule the Work so that there is no open excavation adjacent to a lane carrying traffic overnight and on non-working days except where a traffic barrier designed to restrain errant vehicles is located between the traffic and the excavation.

b) Ensure that any excavation within 4 m of lanes carrying traffic is backfilled with appropriate material up to profile grade and compacted prior to closing down operations each day.

c) Ensure that no equipment is stored within 4 m of the travelled portion of any roadway.

d) Ensure that no material is stored within 4 m of the travelled portion of any roadway except in the medians where the minimum clearance required is 2.5 m.

e) Ensure that any vehicle, equipment or material which, in the opinion of the Contract Administrator, constitutes a traffic hazard or obstruction to maintenance operations, is removed immediately at the Design-Builder's expense.

f) Provide access to and from the highway right-of-way only on ramps at the interchanges unless otherwise provided for in the Contract.

g) Ensure that median cross-overs are not used except where single axle vehicles are entering a passing lane that is closed to traffic.

If the Design-Builder intends to use temporary regulatory speed reductions during performance of the Work, the Design-Builder shall:

a) Not impose a temporary regulatory speed reduction without the approval of the Ministry.

b) Not impose a temporary regulatory speed reduction where the existing regulatory speed limit is 60 km/h or lower.

c) Make a formal request to the Ministry for the approval of a temporary regulatory speed reduction at least 4 weeks.

d) Use temporary regulatory speed signs provided by the Ministry and paid for by the Design-Builder (Note: If the use of regulatory speed signs is approved by the Ministry, $200 per sign board will be deducted from payment).

e) Ensure that all temporary regulatory speed signs are oversized by 50%.

f) Install temporary regulatory speed signs at their own cost.

g) Ensure that all temporary regulatory speed signs are in conformance with the requirements of Ontario Traffic Manual Book 5 and Book 7.

h) Notify the Ministry after temporary regulatory speed signs have been installed and prior to uncovering the signs.

i) Carry out any removal, covering, temporary placement or replacement of existing regulatory speed signs that is necessary due to use of the temporary regulatory speed reduction.

j) Return existing regulatory speed signs to their original condition and location upon ceasing construction activities (i.e., at shutdown of daily operations, or completion of staging or detours, or completion of the contract).

1077.04.07 Traffic Counting Loops/Equipment

The Design-Builder is responsible for replacement of any counting loops or any other traffic counting equipment negatively impacted or damaged by the Work.

1077.04.08 Mobility

The Design-Builder is responsible for performing or causing to perform the Work to meet the Maximum Allowable Travel Time performance requirement.

1077.04.08.01 Special Cases

For extraordinary maintenance or construction work that the Design-Builder knows will result in the Maximum Allowable Travel Time being exceeded, such as rock blasting, bridge/structure component replacement or delivery of major components, the Design-Builder shall submit a supplemental Traffic Management Plan to the Ministry for consideration at least 2 Business Days prior to performing the Work. The supplemental Traffic Management Plan must detail the duration of the Work, impact on Maximum Allowable Travel Time, and how vehicles will be safely controlled/queued.

1077.04.08.02 Operational Constraints

See Section 2, subsection 2.4.5 Traffic Management.

1077.05 PERFORMANCE REQUIREMENTS

1077.05.01 Mobility – N/A

Table 1 – N/A

1077.05.02 Traffic Management

The Design-Builder shall ensure that all performance requirements described in Table 2 are met.

Table 2
Traffic Management Performance Requirements

Feature	Performance Requirements
Each set of temporary traffic signals	• Submit 6 signed copies of PHM-125 signal layout drawings prior to start of construction for Ministry approval. • Notify the Ministry after installation and prior to turning on the signals. • As built signals conform to approved PHM-125 drawings.
Replacement of missing or damaged temporary signs	• Within 24 hours of becoming aware.
Temporary regulatory speed reduction zones	• N/A
Installation of Temporary Advance Information Signs (TC-64s)	• A minimum of 5 Business Days and a maximum of 10 Business Days prior to any lane reductions or closures.
Installation of Contract Identification Signs (BuildON)	• A minimum of 5 Business Days and a maximum of 10 Business Days prior to start of construction.
Temporary signing meets the requirements of the French Language Services Act if the work zone is within a French Language Services Designated Area	• At all times.

1077.05.03 Performance Indicators

The Ministry, at its discretion, may collect performance indicators. The collection may consist of up to 100% of the contract area and may include any or all of the Highway Sections defined in Table 1. The exact location will be at the Ministry's discretion. More thorough data collection may be carried out if there is evidence of non-conformance. The additional data collection may include a review of the Design-Builder's records, plans and actions taken.

The performance indicators that the Ministry collects will be shared with the Design-Builder and will be the only indicators used by the Ministry to apply consequences for non-conformance.

1077.05.04 Conformance to the Performance Requirements

Upon completion of the collection of performance indicators, the Ministry will make an assessment of conformance or non-conformance to the performance requirements.

The Ministry will have the complete discretion in the choice of performance indicators to use in determining conformance. The assessment, however, will include consideration of events that are beyond the care and control of the Design-Builder. The Ministry will examine all relevant factors involved with the situation including the Design-Builder's rationale as to why the situation occurred.

If, after completing the collection of performance indicators, assessing all the relevant data including data provided by the Design-Builder, a non-conformance is determined, a Notice of Non-Conformance will be issued to the Design-Builder for features that do not conform to the performance requirements.

1077.05.05 Consequences for Non-Conformance to the Performance Requirements

The Design-Builder shall be responsible for performing all specified consequences for any non-conformance to the Performance Requirements as described in Table 3.

Table 3
Consequences for Non-conformance

Feature	Consequences
Maximum Allowable Travel Time (MATT) on any Highway Section on a 400 Series Highway/Freeway	• N/A
Temporary Traffic Signals	• $10,000 per occurrence of starting construction without Ministry-approved PHM-125 drawings. • $10,000 per occurrence of turning on signals without notifying the Ministry. • $10,000 per occurrence of as built signals not in conformance with approved PHM-125 drawings.
Replacement of Missing or Damaged Temporary Signs	• $1,000 per occurrence of missing or damaged temporary signs not replaced within 24 hrs of the Design-Builder becoming aware.
Temporary Regulatory Speed Reduction Zones	• N/A
Installation of Temporary Advance Information Signs (TC-64s)	• $5,000 per occurrence for proceeding with lane reductions or closures without the installation of TC-64s.
Installation of Contract Identification Signs (BuildON)	• $5,000 per occurrence for proceeding with start of construction without the installation of BuildON.

Feature	Consequences
Temporary Signing Meets the Requirements of the French Language Services Act if the work Zone is Within a French Language Services Designated Area	• $5,000 per occurrence of temporary signing not in conformance with the French Language Services Act requirements.
Excavations	• $5,000 per occurrence of an open excavation adjacent to a lane carrying traffic overnight or on a non-working day without a traffic barrier. • $5,000 per occurrence for failure to backfill as required.
Storage of Material and Equipment	• $5,000 per occurrence for storing material or equipment within 4 m of the travelled portion of any roadway. • $5,000 per occurrence for failure to immediately remove vehicles, equipment or material as directed by the Contract Administrator.
Freeway Access	• $5,000 per occurrence for providing access to and from the highway right-of-way at locations other than interchange ramps.
Median Cross-Overs	• $5,000 per occurrence of misuse of cross-overs.

1077.06 CONSTRUCTION ZONE (REGULATORY) SPEED REDUCTION – N/A

PERFORMANCE REQUIREMENTS FOR DESIGN AND CONSTRUCTION OF FLEXIBLE PAVEMENT STRUCTURE WITH A WARRANTY

2272.01 SCOPE

This performance specification covers the requirements for the design and construction of rehabilitated, new, and reconstructed flexible pavement structure and associated work, including drainage of the pavement structure, with a seven year warranty on the performance of the pavement.

The work shall include the routing and sealing or cleaning and sealing cracks in the new hot mix surface course, five years after placement.

2272.02 REFERENCES

This specification refers to the following standards, specifications or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 301 Restoring Unpaved Roadway Surfaces

Ontario Provincial Standard Specifications, Material

OPSS 1010 Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

Ontario Ministry of Transportation Publications

Designated Sources for Materials (DSM):
DSM #3.05.25 Aggregates: Surface Friction Courses

MTO Forms:
PH-CC-820 Certification of Grade/Crossfall
PH-CC-822PCC Post Construction Certification
PH-D-10 Aggregate Sample Data Sheet

MTO Laboratory Testing Manual:
LS-282 Method of Test for Quantitative Extraction of Asphalt Cement and Analysis of Extracted Aggregate from Bituminous Paving Mixtures
LS-309 Practice for Superpave Mix Design
LS-317 Method of Test for Determination of the Severity of a Segregated Asphalt Pavement Surface
LS-601 Method of Test for Materials Finer Than 75 µm Sieve in Mineral Aggregates by Washing

LS-602 Sieve Analysis of Aggregates
LS-604 Method of Test for Relative Density and Absorption of Coarse Aggregate
LS-606 Method of Test for Soundness of Aggregate by Use of Magnesium Sulphate
LS-609 Petrographic Analysis of Coarse Aggregate
LS-613 Method of Test for Determination of Insoluble Residue of Carbonate Aggregates
LS-614 Freezing and Thawing of Coarse Aggregate
LS-616 Procedure for the Petrographic Analysis of Fine Aggregate
LS-618 Resistance of Coarse Aggregate to Abrasion in the Micro-Deval Apparatus
LS-619 Resistance of Fine Aggregate to Abrasion in the Micro-Deval Apparatus
LS-621 Method of Test for Determination of Amount of Asphalt-Coated Particles in Coarse Aggregate
LS-625 Guidelines for Sampling of Granular Materials
LS-630 Method of Test for Determination of Amount of Contamination of Coarse Aggregate
LS-702 Method of Test for Determination of Particle Size Analysis of Soils
SP-024 MTO Manual for Condition Rating of Flexible Pavements

ASTM International

E 950-98 Standard Test Method for Measuring the Longitudinal Profile of Travelled Surfaces with an Accelerometer Established Inertial Profiling Reference
E 1703-10 Standard Test Method for Measuring Rut-Depth of Pavement Surfaces Using a Straightedge

American Association of State Highway and Transportation Officials (AASHTO)

GDPS-4-M AASHTO Guide for Design of Pavement Structures
MEPDG-1 Mechanistic-Empirical Pavement Design Guide, Interim Edition: A Manual of Practice

2272.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Acceptance Criteria means objective values (numerical or descriptive) that are compared to performance measurements to assess conformance with performance requirements.

Aggregate means natural mineral materials such as sand, gravel, and crushed bedrock. Reclaimed materials may substitute for aggregates when specified.

Average Annual Daily Traffic (AADT) means the estimated current number of vehicles passing through the highway section during 24 hours, on average for the period from January 1st to December 31st.

Air-Cooled Blast Furnace Slag and **Iron Blast Furnace Slag** mean the material resulting from the solidification of molten blast-furnace slag under atmospheric conditions. Subsequent cooling may be accelerated by application of water to the solidified surface.

Alligator Cracking means an interconnected series of cracks forming a polygon block network.

Anti-Stripping Additive means additive(s) used to minimize or eliminate stripping of asphalt cement from aggregates in HMA and CMA.

Asphalt Cement means an asphalt binder that is produced from petroleum residue, either with or without the addition of particulate modifiers.

Automatic Road Analyzer (ARAN) means an instrumented, calibrated vehicle that measures the severity and extent of pavement wheel track rutting, cracking, alligator cracking, roughness, and other indicators of pavement performance.

Beneficiating HMA means an HMA designed such that the final hot in-place recycled mix meets the performance requirements.

Break Point means a location in the cross-section where the cross-fall changes.

Binder Course means a HMA or CMA course between a surface course and either a granular Base course or stabilized Base course, an existing pavement, or another HMA or CMA binder course.

Bullnose means the location where the edge of the Highway and the edge of the ramp meet each other.

Ceramic means porcelain, china, and whiteware, e.g. sinks, toilets, and bidets made from clay and silica fired at a high temperature, excluding clay brick and tile, free of organic materials, metal, and plastic.

Chip Product means an aggregate co-product from the crushing operation with 100% passing the 9.5 mm sieve, predominantly passing the 4.75 mm sieve and retained on the 2.36 mm sieve.

Coarse Aggregate means that portion of an aggregate material retained on the 4.75 mm sieve when tested according to LS-602.

Coarse Aggregate Loss means the loss of materials, both coarse and fine, from the pavement surface.

Cold Mix Asphalt (CMA) means cold mixed, cold laid, cold in-place recycled, open or dense graded bituminous material consisting of a combination of aggregate and emulsified or expanded asphalt cement.

Consequences for Non-conformance means the repairs required such that acceptance criteria are met or exceeded, or the payment due where permitted in lieu of repair.

Copper Slag means the non-metallic co-product resulting from the production of copper.

Crack means a break in the pavement surface, a separation of the pavement or aggregates at the

surface of the pavement, and separation of pavement joints, and includes breaks and separations previously repaired by sealing.

Cross-fall means the average grade between edges of a cross-section element.

Cross-Section means the transverse profile of the Roadway.

Crumb Rubber (CR) means scrap tire rubber that is reduced in size for use in asphalt paving materials such as hot mix asphalt or asphalt cement or both.

Differential Frost Heave means the seasonal non-uniform rise in pavement elevation resulting from the formation of ice and ice lenses below the pavement surface.

Duplicate Samples means two samples taken at the same time and location, one to be used for quality assurance testing and the other for referee testing.

Emulsified Asphalt means asphalt cement mixed with water to increase the flow qualities of the asphalt cement.

Equivalent Single Axle Load (ESAL) means equating the damage to the pavement structure caused by the passage of a non-standard load to a standard 80 kN axle load.

Expanded Asphalt means heated asphalt cement expanded from its normal volume by the addition of water.

Fat Spot means an area of pavement substantially blacker than the surrounding pavement.

Fine Aggregate means that portion of aggregate material passing the 4.75 mm sieve when tested according to LS-602.

Flexible Pavement Structure means a layered structure of selected materials placed on a Subgrade and designed to resist movement, damage, and surficial wear, support traffic loading, and provide drainage.

Flushing means the blackening of a pavement surface from the migration of or excess asphalt cement.

Frost Heave means the seasonal rise in pavement elevation resulting from the formation of ice and ice lenses below the pavement surface.

Full Depth Reclamation (FDR) means the in-place processing of bituminous pavement and mixing with a portion of the underlying granular Base.

Glass means processed glass obtained from the recycling stream that is free of organic materials, metal, and plastic.

Gore Area means the area between edge of highway, edge of ramp, and bullnose.

Grade Raise means a uniform increase in the existing pavement or design elevation over the cross-section width.

Hot In-Place Recycled Mix (HIR) means the mixture of hot milled material containing one or more of the following components: rejuvenating agent and beneficiating HMA.

Hot Mix Asphalt (HMA) means hot mixed and hot laid asphaltic concrete which also includes mix produced using Warm Mix Asphalt technologies, beneficiating HMA, HIR, and SMA. The terms are used interchangeably. HMA may include recycled mixes or specialty mixes.

Inert Fill means earth or rock fill or material of a similar nature that contains no material liable to become putrid, or soluble or decomposable chemical substance.

Insulation means a material with a thermal resistance (the ratio of the temperature difference across the material and the heat flux) of 0.35 $K.m^2/W$ or greater for a 25.4 mm thick sample.

International Roughness Index (IRI) means a profile index that evaluates the pavement riding quality in terms of roughness.

Job Mix Formula (JMF) means the percentage passing on each designated sieve of the total mass of aggregate and the amount of asphalt cement as a percentage by mass of the mixture.

Joint means a vertical contact between a new bituminous pavement course and any pavement or any rigid object that exists at the time the new bituminous course is laid.

Joint Separation means the fracture or partition of a joint in the pavement surface.

Mean Roughness Index (MRI) means the number calculated by averaging the IRI values from two wheel path profiles.

Miscellaneous Pavement Surface means the top of the paved portion of the road shoulder, gore area, designated truck pull-off area, residential and commercial entrances, median crossover, snowplough turnaround, and other areas outside of the designated lanes for vehicular travel.

Mix Design means the design of the proportions of aggregates, asphalt cement, and additives, that when uniformly mixed, results in a product acceptable for the engineering purpose.

Mix Properties means the per cent passing the DLS, 4.75 mm sieve, 600 μm sieve, and 75 μm sieve; the asphalt cement content; and the voids.

Modifiers means additives and processes used to change the engineering properties of asphalt cement.

Nickel Slag means the non-metallic co-product resulting from the production of nickel.

Non-Conformance means that performance measurements do not meet acceptance criteria.

North American Datum (NAD83) means the horizontal geodetic datum for geo-referencing in Ontario and North America.

Pavement Design means specifying the excavation, treatment, material, methods, and process controls necessary to construct a pavement structure that will perform over the required service life.

Physical Property means an inherent attribute or feature of an aggregate material. Tests are carried out to determine an aggregate's resistance to weathering and/or degradation.

Poor Performing Pavement means an area of pavement that has performed uncharacteristically worse than the adjoining pavement areas.

Pothole means a void in the pavement surface resulting from the loss of pavement materials.

Quality Assurance (QA) means a system or series of activities carried out by the Owner to ensure that
Materials received from the Design-Builder meet the requirements specified in the Contract Documents.

Quarried Rock means the material which has been or is being removed from an open excavation made in a solid mass of rock, which, prior to removal, was integral with the parent mass.

Reclaimed Asphalt Pavement (RAP) means the processed HMA that is recovered by partial or full depth removal.

Reclaimed Concrete Material (RCM) means removed or processed old hydraulic cement concrete, free of embedded materials that are not normal constituents of concrete mix.

Rejuvenating Agent means a product added to the hot milled material such that the final hot in-place recycled mix meets the performance requirements.

Service Life means the length of time that a product is expected to satisfactorily perform its basic functions, until rehabilitation is required.

Roof Shingle Tabs (RST) means ground roof shingle scrap generated when new shingles are trimmed during production.

Routine, Minor Maintenance means the performance of crack sealing, pothole repair, spray patching, minor (less than 5% of surface area) hot mix patching, and drainage cleanout.

Segregation means a condition of the pavement characterized by areas with comparatively coarser or finer texture than that of the surrounding pavement, with severity levels:

a) Slight Segregation - a pavement matrix is in place between the coarse aggregate particles;

however, there are slightly more coarse aggregate particles in comparison with the surrounding acceptable mix.

b) Medium Segregation - the pavement has significantly more coarse aggregate particles than the surrounding acceptable mat and usually exhibits some lack of surface matrix.

c) Severe Segregation - the pavement appears very coarse, with coarse aggregate particle against coarse aggregate particle and the pavement has little or no matrix.

Steel Slag means the non-metallic co-product resulting from the production of steel in a basic oxygen furnace or an electric arc furnace.

Stone Mastic Asphalt (SMA) means HMA consisting of two parts, a coarse aggregate skeleton and an asphalt binder rich mortar. The mix has a gap-graded aggregate skeleton with coarse aggregate stone-on-stone contact.

Straight Edge means a straight edge made of metal with a level recessed in its upper surface parallel to the lower edge.

Surface Course means the HMA wearing course of any flexible or composite pavement.

Tolerance means a construction working tolerance only, minus or plus:

a) Minus
   i. Narrower than the horizontal design dimension as measured from centreline, and
   ii. Lower in elevation than the vertical design dimension.

b) Plus
   i. Wider than the horizontal design dimension as measured from centreline, and
   ii. Higher in elevation than the vertical design dimension.

Transition Treatment means a subexcavation at longitudinal and transverse changes in material or material condition designed to mitigate the impact of seasonal volume change due to frost or moisture.

Voids means air voids and voids in mineral aggregate (VMA).

Voids in Mineral Aggregate (VMA) means the intergranular void space between the aggregate particles in a compacted paving mixture that includes the air voids and the effective asphalt cement content, expressed as a per cent of the total volume.

Warm Mix Asphalt (WMA) means warm mixed and warm laid asphaltic concrete produced by using technologies that allow for the mixing, handling, and compaction of the asphaltic concrete mixture at a temperature typically 20°C to 50°C lower than conventional hot mix asphalt.

Wheel Track Rutting means longitudinal depression in the pavement wheel path.

2272.04 DESIGN AND SUBMISSION REQUIREMENTS

2272.04.01 Pavement Design

2272.04.01.01 General

The flexible pavement design shall conform with the restrictions and constraints specified in the Contract Documents.

The pavement design shall detail the excavations, material, staging, methods, quality control, inspections, and all other operations required to construct the pavement structure as specified in the Construction section and the Contract Documents, and meet the performance requirements of Tables 9 and 10.

The design service life of rehabilitated, new, and reconstructed flexible pavement structure shall be 20 years, minimum. The pavement design shall not include provisions for any work during the warranty period. The design shall be based on the performance of only routine, minor maintenance beyond the warranty period. Discretionary repairs, including crack sealing, may be carried out during the warranty period, subject to prior Owner approval.

The pavement design for the reconstruction of existing pavement structure shall include the removal or full depth reclamation of the existing pavement layers from the surface to a minimum depth of 100 mm into the underlying unbound granular layer if present. Where there is no underlying unbound granular layer, removal or full depth reclamation shall be to the bottom of the existing pavement layers. Where the underlying unbound granular layer is less than 100 mm in thickness, removal or full depth reclamation shall be to the bottom of the underlying unbound granular layer.

As required by other work or existing conditions, location specific pavement designs shall be completed. Other work or existing conditions include, but are not limited to, areas with grade revisions, turn tapers, added lanes, widening, sewer and culvert crossings, frost heaves, poor performing pavement areas, bridges and bridge approaches.

Where 150 mm or less of new granular material is to be placed, the material shall be granular Base. Where more than 150 mm of new granular material is to be placed, the upper portion of the material shall be 150 mm, minimum, granular Base.

For design purposes, traffic volume information is shown in Table 1. Other traffic information, if available, is included elsewhere in the Contract Documents.

Pavement structures used temporarily for public or construction traffic, prior to the completion of surface course paving, shall be designed for both the temporary traffic volume and the traffic volume in Table 1.

The design shall be according to accepted pavement design methodologies, such as MEPDG-1, GDPS-4-M, and MI-183. Where a pavement design methodology other than MEPDG-1 or GDPS-4-M is used, a design using MEPDG-1 or GDPS-4-M shall be completed and compared

to the selected design. All pavement design work, including design parameters, shall be documented in the Pavement Design Report.

Granular layers shall be designed to be placed at uniform thickness and quality for the full road embankment width, except where subdrainage systems will be used. Where subdrainage systems will be used, the granular layers shall be designed to be placed at uniform thickness and quality to the shoulder rounding, minimum, on the side of the Roadway where subdrainage system will be placed.

The HMA surface course mix used for miscellaneous pavement surfaces shall be the same mix used on the adjacent designated lanes for vehicular travel, and shall be a minimum thickness of 40 mm, except where rumble strips shall be constructed. Where rumble strips shall be constructed the minimum HMA thickness shall be 80 mm.

A transition to a different HMA surface course mix is permitted only at the end of the turn radii on intersecting roads and at ramp bullnoses.

The total thickness of HMA on bridge decks shall be as specified in the Contract Drawings.

2272.04.01.02 Geometric Constraints

The design top of pavement elevations at the horizontal alignment control line as specified in the Contract Documents shall be used for vertical profile control. When design top of pavement elevations are not provided, the existing top of pavement elevations at the horizontal alignment control line shall be used for vertical profile control. The final top of pavement elevations shall not be raised above the specified top of pavement design elevations or existing top of pavement elevations except as permitted in Table 2.

Each grade raise location shall be preceded and followed by a longitudinal transition zone sloping at 0.1%. The minimum distance between the last station of one grade raise and first station of the adjacent grade raise, excluding the transition zones, shall be 50 m.

Earth slopes, rock slopes, Subgrade, or drainage systems or a combination of these when shown in the Contract Drawings and on the cross-sections, are the Owner's grading and drainage design. The Owner's grading and drainage design shall not be changed, except:

a) The longitudinal profile and cross-section of the Subgrade may be raised.

b) In areas designed with 3H:1V or flatter earth embankment slopes, the longitudinal profile of the Subgrade may be lowered.

c) In earth excavation areas designed with 3H:1V or flatter front slopes, the longitudinal profile of the Subgrade may be lowered. If the Subgrade elevation is lowered in excavation areas, the pavement design shall provide adequate drainage of the Subgrade without changing the Owner's design of the elevation and depth of ditches except that the ditch elevation may be lowered and the corresponding back slope moved out at the locations in Table 3.

2272.04.02 Submission Requirements

2272.04.02.01 Pavement Design Report

A Pavement Design Report (in both hard copy and digital form) bearing the seal and signature of an Engineer shall be submitted to the Contract Administrator at least 5 Business Days prior to the start of any granular Base or Subbase placement, full depth reclamation, removal or recycling of the existing pavement or excavation of the existing pavement or Shoulders, except for the construction of frost heave treatments, culverts and sewers.

The Pavement Design Report shall include:

a) An original copy of the standard Owner's form (PH-CC-822CPD) "Certification of the Pavement Design and the Pavement Design Report" bearing the seal and signature of an Engineer certifying that the pavement design and the Pavement Design Report are in conformance with the requirements of the Contract Documents. The completed form shall be the first page after the report cover.

b) The printed name of the individual and company responsible for preparing the Pavement Design Report.

c) The rehabilitated, new, or reconstructed flexible pavement structure design for all areas specified in the Contract Documents, including the design for all locations requiring a location specific pavement design, all associated calculations, and details of pavement grade raises.

d) Documentation of field review, and field and laboratory investigations completed.

e) Borehole logs, laboratory testing results, pavement core depth data and core analysis data from field and laboratory investigations.

f) Material, construction and laboratory standards, specifications, procedures and sources for the material to be used in the work and any major deviations from standards, specifications and procedures.

g) The design gradation for granular Base and Subbase material.

h) The material and construction requirements for granular Shoulders.

i) Details of Subgrade treatment, subexcavation, slope, and drainage installations.

j) Transition treatment details, including frost and approach treatments for culverts and structures.

k) The pavement vertical profile control methodology.

2272.04.02.02 Grade Templates

Cross-section grade templates at maximum 25 m intervals in earth and 10 m in rock along the horizontal alignment shall be submitted to the Contract Administrator with the Pavement Design Report submission. The templates shall include design elevations and offset distances for Subgrade, Base, Subbase, top of pavement, and Shoulder surface, as applicable, at:

a) All break points; and

b) Edges of paved surfaces and edges of Shoulders for all Roadways, entrances, ditches, ramps, turn lanes and tapers, transition treatments, snow plough turnarounds, and truck pull-offs.

In areas of pavement rehabilitation where there is no Work beyond the existing Shoulder rounding, the grade templates shall be at maximum 25 m intervals in earth and rock.

In the event of a conflict between the submitted templates and the Contract Documents, the Contract Documents shall take precedence.

2272.04.03 Mix Designs

2272.04.03.01 General

Mix designs shall be submitted to the Contract Administrator, for information only, at least 5 Business Days prior to the start of mix production and placement. The mix design information shall be prefaced with an index sheet showing the location of the information listed in the clauses below.

The mix design method for all bituminous mixes shall include a check of the need for an anti-stripping additive.

2272.04.03.02 Mix Designs for Hot Mix Asphalt

The mix design submission for all HMA mixes shall include, but not be limited to, the following information:

a) For all HMA mixes:
   i. Contract number, item number, and mix type for which the mix design and JMF were completed and a description of what the use of the mix is to be.
   ii. The JMF.
   iii. Aggregate sources.
   iv. The type of anti-stripping additive and the percentage to be added by mass of total dry aggregate.
   v. Asphalt cement grade and source, identification and source of modifiers, and resulting grade of asphalt cement after addition of all mix components including anti-stripping additives.
   vi. Additive information including source, type, and percent by mass of asphalt cement.
   vii. Information regarding fines which are returned to the mix, aggregate breakdown during

production and the resultant changes in the aggregate gradations.

viii. The mix maximum relative density and the mix bulk relative density, surface dry (where applicable).

ix. Extracted bulk relative density, percentage asphalt cement and gradation for the RAP used in the mix, when RAP is used.

x. The mixing and compaction temperature used in the mix design.

xi. The percentage of asphalt cement in the RST when RST is used.

b) For HMA mixes designed using the Superpave Volumetric Mix Design method, documentation shall include reporting requirements of MTO laboratory test method LS-309 Superpave Mix Design.

c) The mix design submission for WMA mixes shall include the WMA technology to be used, the complete name and address of the WMA supplier, and the type and dosage of WMA additives, if applicable, and how the additives will be incorporated to produce the WMA.

2272.04.03.03 Mix Designs for Cold Mix Asphalt

The mix design submission for all CMA mixes shall include the following:

a) Information on the grade/type, manufacturer, and supplier of the asphalt cement or emulsified asphalt to be used.
b) The design rate of expanded asphalt or emulsified asphalt.
c) The amount of water to be added to the mix.
d) Maximum field rate adjustment allowed to the design rate without adverse effects to mix properties.

2272.04.03.04 Mix Designs for Hot-In-Place Recycled Mixes

The mix design submission for hot-in-place recycled mixes shall include the following:

a) The amount, name, manufacturer, and supplier of the rejuvenating agent or beneficiating HMA or both, if to be used;

b) The hot milling depth to meet the required mix properties and the design lift thickness;

c) The mix proportions, gradation, and source of the materials in the beneficiating HMA, if to be used;

d) A copy of all calculations that were completed to determine the amount of rejuvenating agent or beneficiating HMA or both, if to be used;

e) Air void laboratory test results and calculations for the HIR mix; and

f) A graph of temperature-kinematic viscosity relationship for the combined rejuvenating agent, the recovered AC present in the existing pavement, and the new AC in the beneficiating HMA.

2272.05 MATERIAL

2272.05.01 General

Material containing contaminants that may discharge into the environment or have an adverse effect on the natural environment or the Work shall not be used.

Material that may render the pavement unsuitable for future recycling or use as inert fill shall not be used.

The use of material not referenced in this specification is permitted with the submission of supporting technical evidence to the Contract Administrator, at least 10 Days prior to placement of the material. The supporting technical evidence shall bear the seal and signature of an Engineer and demonstrate that the material has been successfully used elsewhere under similar climatic and traffic conditions, and does not contravene any requirements of the Contract Documents. The submission shall include the source of the material, the approximate quantity of the material to be placed, and the location of placement.

2272.05.02 Aggregates

2272.05.02.01 General

Aggregates shall meet all of the requirements of this specification when tested according to the applicable MTO, AASHTO, and ASTM test methods identified herein.

Aggregates for granular Base and Subbase, HMA, CMA, and granular backfill below Subgrade shall not contain earth, humus, clay coatings, clay lumps or fragments, wood, clay brick, gypsum, gypsum plaster, cement kiln dust, wallboard, asbestos, steel slag and other contaminants.

Aggregates for granular shouldering shall be Granular A or Granular M according to OPSS 1010 and shall contain no more than 50% asphalt coated particles by mass when tested according to LS-621.

2272.05.02.02 Granular Base and Subbase Aggregates

Except as specified below, aggregates for granular Base and Subbase shall be clean, hard, durable particles produced from, or a combination of:

a) Quarried rock;
b) Gravel, cobbles, boulders, sand, fines, or talus from naturally formed deposits;
c) Air-cooled iron blast furnace slag or nickel slag;
d) RCM;
e) RAP; and
f) RST.

Aggregates for granular Base and Subbase shall not contain more than 15 percent by mass of crushed glass and/or ceramic material as determined by LS-609.

Aggregates for granular Base placed less than 150 mm below the bottom of the bituminous layers shall have 100% passing the 26.5 mm sieve, and not more than 10% passing the 75 µm sieve, when tested according to LS-602.

The maximum dimension of all aggregate particles in granular Base and Subbase material shall be less than 150 mm when placed greater than 150 mm below the bottom of the bituminous layers.

Granular Base aggregates used under paved lanes and full paved Shoulders shall not be blended with RAP containing steel slag aggregates.

2272.05.02.03 Hot Mix and Cold Mix Asphalt Aggregates

Except as specified below, aggregates for HMA and CMA shall be clean, hard, durable particles produced from, or a combination of:

a) Quarried rock;
b) Gravel, cobbles, boulders, sand, fines, or talus from naturally formed deposits;
c) RAP;
d) RST; and
e) CR.

Steel slag, air-cooled blast furnace slag, nickel slag and copper slag shall not be used as aggregates in HMA and CMA. RAP or RST containing steel slag or asbestos shall not be used as aggregates in HMA and CMA. Glass and/or ceramic material shall not be used in HMA and CMA.

For locations shown in Table 1 with a surface type of FC1, the coarse aggregate for the surface course for those locations shall be supplied from aggregate sources for Superpave 12.5FC1 listed in the DSM. For locations shown in Table 1 with a surface type of FC2, the coarse aggregate and fine aggregate for the surface course for those locations shall be supplied from aggregate sources for Superpave 12.5FC2 listed in the DSM.

For locations with an AADT greater than 500/lane, coarse aggregates containing limestone or dolostone shall not be used in the surface course. For locations with an AADT greater than 500/lane, fine aggregates containing limestone or dolostone shall not be used when the surface course is less than 35 mm thick. For locations with an AADT greater than 2500/lane, coarse and fine aggregates containing limestone or dolostone shall not be used in the surface course.

RAP shall not be used in the surface course mix. RAP and RST used in an HMA binder course mix shall be comprised of aggregates that, when combined with all of the other aggregates in the mix, meet the Owner’s physical property requirements specified in Tables 5A and 5B.

2272.05.02.04 Physical Property Requirements

The fraction of the combined HMA or CMA aggregates passing the 4.75 mm sieve shall meet the physical property requirements specified in Table 4A.

The fraction of the combined HMA or CMA aggregates retained on the 4.75 mm sieve shall meet the physical property requirements specified in Table 4B.

Base and Subbase aggregates shall meet the physical property requirements specified in Table 4C.

In addition to the physical property requirements for the combined HMA or CMA aggregate components described above, the combined fine and coarse aggregate fractions extracted from samples of HMA or CMA shall also meet the applicable physical property requirements specified in Tables 5A and 5B.

2272.05.03 Hot Mix Asphalt

The gradation of each HMA surface course mix, except SMA, shall be according to Table 6A. The gradation of each SMA surface course mix shall be according to Table 6B.

Coated gritting material shall be applied to SMA surface course as specified in the Contract Documents.

2272.05.04 Insulation

Insulation may be used within the pavement structure subject to the following conditions:

a) the insulation shall not be used on horizontal curves, interchange ramps, and speed change lanes, or within 250 m of horizontal curves, interchange ramps, speed change lanes, vertical curve crests, intersections and entrances, railroad crossings, and bridges;

b) the thickness of the insulation shall not exceed 100 mm;

c) the minimum depth of granular Base and Subbase material overlying the insulation shall be according to Table 7;

d) the insulation shall be installed full pavement width, including below Shoulders; and

e) transition treatments shall be constructed at the longitudinal installation limits.

The minimum granular depths in Table 7 do not account for the compressive strength of the insulation.

2272.07 CONSTRUCTION

2272.07.01 General

Flexible pavement structure construction shall be according to the Pavement Design Report and the Contract Documents, and includes, but is not limited to:

a) Rehabilitation of the existing and the construction of new drainage system(s) as required for the performance of the rehabilitated, new, or reconstructed flexible pavement structure(s). This includes, but is not limited to; ditch clean-out, new ditching, and subsurface drains.

b) Excavation, removal, recycling, or full depth reclamation of the material in existing pavement structure, Shoulders and Subgrade.

c) Supply and placement of granular material, HMA, CMA, recycled material, and other material required to construct the pavement structure(s), and for entrances, Shoulders, temporary roadwork, temporary edge ramps, and all other paved and unpaved areas.

d) The treatment of or subexcavation and backfill of Subgrade soils, and the construction of Subgrade slope and drainage installations as required.

e) Excavation and removal of existing material, and the supply and placement of granular material to construct transition treatments, including frost and approach treatments for culverts and structures, sidewalks, curb and gutter, barrier walls and concrete pads; unless otherwise specified in the Contract Documents.

f) Supply and placement of HMA on bridge decks and approach slabs at the total thickness specified in the Contract Documents.

g) Removal of temporary roadwork.

h) Placement of excavated/removed material in embankments, slope flattening in designated locations where applicable, and the management of excess material according to the Contract Documents.

i) Preparation and submission of all specified documentation.

j) Sampling and delivery of material for testing.

k) Repair or replacement of work that does not conform to the material or performance requirements, including all associated work.

l) The management of excess material as specified in the Contract Documents.

In the event of a conflict between the Pavement Design Report and the Contract Documents, the Contract Documents shall take precedence.

All inspection and material testing, except for QA sampling and testing, shall be carried out by or under the supervision of an Engineer. QA sampling and testing will be according to the Owner's procedures.

2272.07.02 Design Amendment

The pavement design may be amended to address localized problem areas occurring during construction.

The pavement design shall be amended to correct work identified by the Contract Administrator as not conforming to the Pavement Design Report.

Design amendments shall conform to the requirements of the Contract Documents.

The Engineer responsible for the pavement design shall review localized problem areas and non-conforming work and determine the design amendments required.

A Pavement Design Report Addendum, bearing the seal and signature of the Engineer, shall be submitted to the Contract Administrator within 5 Business Days of the review. An Addendum report is not required when non-conforming work is corrected to conform to the Pavement Design Report.

2272.07.03 Removals

Removals shall be performed in such a manner as to leave adjacent pavement and structures to remain in place undisturbed.

During the work of full-depth pavement removal, where public traffic is to be maintained throughout the work without the use of a temporary bypass, temporary granular ramping shall be constructed and maintained to convey public traffic through the area. The ramping shall be at 20H:1V. Following full-depth pavement removal, the existing roadway granular shall be restored according to OPSS 301, when such roadway is not designated for abandonment.

When the roadway is to be opened to traffic after the daily shut down and full width partial depth pavement removal is required, the following shall apply:

a) For two-lane highways, partial depth pavement removal shall be completed to the same station for the full pavement width prior to shutdown at the end of the day.

b) For multi-lane highways, partial depth pavement removal shall be completed to essentially the same station for the full pavement width for a specific direction prior to shutdown at the end of the day.

c) Prior to opening the lanes to traffic, transverse ramping shall be constructed at the limits of partial depth pavement removal at a slope not steeper than 120H:1V.

If, due to unforeseen circumstances, partial depth pavement removal cannot be completed to the

same station for the full pavement width prior to shut down at the end of the day, then temporary, longitudinal ramping shall be constructed at a slope not steeper than 10H:1V.

When removed pavement material is to remain temporarily on site due to construction operations, the removed material shall be placed on an asphalt or concrete surface until final disposition.

Partial-depth asphalt pavement removal operations and the resulting surfaces from partial-depth asphalt removal operations shall not be permitted between November 16th and June 1st, unless approved by the Owner.

2272.07.04 Subgrade and Granular Courses

2272.07.04.01 General

A granular course includes material produced by full depth reclamation of the existing bituminous mix(es) and underlying granular material with or without stabilization.

The surface of the uppermost layer of granular material shall be bladed, shaped and compacted to produce the required surface contour.

In the event of a conflict between meeting horizontal grading tolerances and meeting vertical grading tolerances, the vertical grading tolerances shall take precedence.

2272.07.04.02 Tolerances for Subgrade

All Subgrade surfaces shall, on completion, be shaped to the specified line, grade and cross-section within the following tolerances.

Vertical grading tolerances of finished earth Subgrade are:
+ 30 mm
- 30 mm

Vertical grading tolerances of finished rock Subgrade are:
+ 30 mm
- 100 mm

Horizontal grading tolerances of finished Subgrade are:
+ 300 mm
- 0 mm

Irrespective of compliance with the above tolerances, the completed grade shall present a uniform appearance.

2272.07.04.02 Tolerances for Granular Courses

All granular grade surfaces shall, on completion, be shaped to the specified line, grade and cross-

section within the following tolerances, and the surface shall not deviate more than 15 mm at any place along a 3 m straightedge.

Vertical grading tolerances of the finished granular Base and Subbase are:
+ 30 mm
- 30 mm

Horizontal grading tolerances of the finished granular Base and Subbase are:
+ 30 mm
- 0 mm

2272.07.04.03 Granular Shouldering

Granular shouldering operations shall be completed within 48 hours of completing the surface course paving on pavement sections that are open to traffic. Where the pavement section is not open to traffic, the granular shouldering shall be completed before traffic is permitted on the pavement.

All debris and deleterious material shall be removed from the Shoulder area before commencing Shoulder construction.

A temporary ramp of granular shouldering material shall be built and maintained along the exposed outside edges of each bituminous pavement course. Such ramps shall be of a height level with the pavement course and fall away from its edge at a slope not steeper than 4H:1V. Ramps shall be kept completed at all times to the end of that portion of pavement opened to traffic behind the paver, and no portion of the pavement shall be open to traffic until the ramps have been constructed.

2272.07.04.04 Grade Checks

The Contract Administrator shall be notified within 12 hours when the Subgrade, Base, and Subbase have been completed, including Shoulders, and prior to the next course being placed.

The Design-Builder shall be responsible for carrying out all grade checks to ensure that horizontal and vertical grading tolerances are met.

A competent survey crew shall carry out grade checks on all finished Subgrade and granular surfaces. Grade checks shall be based on horizontal and vertical grading tolerances, as specified in the Tolerances for Subgrade and Tolerances for Granular Courses clauses. The grade shall be certified at the stations and offsets on the grade templates.

2272.07.04.05 Submission of Grade Checks

All grade checks concerning horizontal and vertical grading tolerances, including all non-compliances, shall be submitted to the Contract Administrator within 2 Business Days following completion of the grade.

The Design-Builder shall sign and certify on the grade templates that the components of the work indicated on that template have been correctly constructed to the specified line and grade tolerances. If no template is available, the Design-Builder shall sign and submit form PH-CC 820 "Certification of Grade Elevation / Crossfall" to the Contract Administrator.

2272.07.05 Paving Operations

2272.07.05.01 General

HMA and CMA shall be placed and compacted to the thickness specified in the Pavement Design Report submission for each lift and shall meet all acceptance criteria specified in the Contract Documents including, but not limited to, surface tolerances and surface smoothness.

The HMA surface course shall be smooth and true to the design profile and cross-section, and be of uniform appearance and free of defects.

Longitudinal joints shall be parallel to the lane and visually uniform longitudinally. The longitudinal joints in the surface course shall be offset 50 mm from the edge of the demarcation between the lanes as specified in the Contract Documents.

2272.07.05.01 Operational Constraints

Public traffic shall only travel on an HMA surface, free from grooves in any direction, from November 16th of any year to June 1st of the following year.

Detours shall be paved with HMA prior to opening the detour to public traffic, except where specified otherwise in the Contract Documents.

For pavements with binder course(s) and AADT greater than 2500 per lane, the surface course or the next layer of binder course shall be placed less than 9 months after the first day that the binder course has been opened to public traffic. For pavements with binder course(s) and AADT not greater than 2500 per lane, the surface course or the next layer of binder course shall be placed less than 16 months after the first day that the binder course has been opened to public traffic.

At daily shutdown of construction operations, there shall be no longitudinal vertical edge drop greater than 40 mm on a portion of the Roadway that will remain closed to public traffic. This requirement does not apply when the entire Roadway will remain closed to public traffic, or when the open and closed portions of the Roadway are separated by a temporary concrete barrier.

2272.07.05.02 Partial Paving of Full Pavement Width

Partial paving of the full pavement width is not permitted.

2272.07.05.03 Temporary Ramp Downs

HMA and CMA courses shall be temporarily ramped down to the existing pavement at a slope of 120H:1V transversely. Transverse ramps downs shall not form part of the permanent pavement and shall be removed prior to paving of the adjacent section.

Where longitudinal ramp downs are permitted or if, due to unforeseen circumstances such as equipment breakdown occurring during paving, paving cannot be completed to the same station across the full pavement width, the HMA or CMA course shall be temporarily ramped down to the existing pavement at a slope of 10H:1V. Only one temporary longitudinal ramp down shall be in place across the width of the pavement at any time. The temporary longitudinal ramp down shall not form part of the permanent pavement and shall be removed prior to paving the adjacent section. The adjacent paving shall be completed such that the ramping is not in place more than 5 Days.

Loose coarse aggregate particles generated during construction of the longitudinal or transverse ramp downs or both shall be removed from the roadway surface prior to re-opening the roadway to traffic.

2272.07.06 Sampling of Aggregate

2272.07.06.01 General

All QA samples shall be duplicate samples. Each QA sample shall be treated as a discrete sample and not combined or blended with any other sample.

New or clean sample bags or containers that are constructed to prevent the loss of any part of the material or contamination or damage to the contents during shipment shall be used. Metal or cardboard containers are unacceptable. QA samples shall be identified both inside and outside of the sample container. Data to be included with QA samples shall be according to MTO Form PH-D-10.

In the event that the Design-Builder is unavailable to take any of the samples, no further materials shall be placed in the Work until the samples have been taken.

In addition to the duplicate samples, a third sample shall be taken when requested by the Contract Administrator. These third samples shall be shipped, no later than one Business Day from the date of sampling to the MTO Soils and Aggregates Section, Materials Engineering and Research Office, Room 15, Building C, 1201 Wilson Avenue, Downsview, Ontario M3M 1J8.

All samples shall be delivered to the designated QA laboratory in a condition that is suitable for testing.

One of each of the duplicate QA samples shall be randomly selected for testing by the QA laboratory. The QA laboratory shall retain the remaining QA samples for referee testing, if required.

2272.07.06.02 Base and Subbase Aggregate

Base and Subbase aggregate QA samples shall be taken according to the Contract Documents and LS-625 and shall be road samples or delivery samples from the Work at a location determined by the Contract Administrator.

When required, a front-end loader shall be used to obtain material for QA samples.

When it is not possible to take road or delivery samples, samples of compacted material taken with the permission of the Owner shall be used for QA acceptance purposes.

At least one set of duplicate QA samples of each Base and Subbase aggregate to be used in the Work shall be randomly sampled from lots of 25,000 tonnes or part thereof for physical properties. All materials delivered to the Work shall be included within a lot.

2272.07.06.03 Hot Mix Asphalt and Cold Mix Asphalt Aggregate

Unless otherwise specified, all QA HMA and CMA aggregate samples shall be taken at the production plant from individual stockpiles, according to the Stockpile Method clause. In the absence of individual stockpiles at the plant, QA samples shall be taken at the aggregate source.

During production, the following minimum number of random samples shall be obtained for every lot of 20,000 tonnes or part thereof of each HMA and CMA mix produced:

a) one set of duplicate samples of each aggregate used in the mix, including chip products;
b) one duplicate sample of HMA or CMA;
c) one duplicate sample of RAP, if RAP is used in the mix; and
d) one duplicate sample of RST, if RST is used in the mix.

When an anti-stripping additive is used, QA HMA and CMA aggregate samples shall be taken prior to the addition of the anti-stripping additive. If this is not practical for samples that are coated in hydrated lime, the lime shall be removed by washing prior to testing. In this case, the requirements for LS-601 are waived.

2272.07.06.04 Sample Size

The mass of each QA sample shall meet the requirements shown in Table 8. When more than 30 kg of material is required, the total sample shall be recombined prior to testing.

2272.07.06.05 Stockpile Method

The stockpiles from which the QA samples are to be taken shall contain a minimum quantity of 500 tonnes of each aggregate, or at least 10% of the total quantity of aggregate needed for each HMA and CMA mix, unless otherwise directed by the Contract Administrator. QA sampling from stockpile shall be according to LS-625.

2272.07.07 Crack Sealing

Five (5) years after the completion of surface course placement, cracks in the surface course shall be sealed as specified in the Contract Documents. The crack sealing shall be completed between September 1 and October 31. A meeting with the Owner shall be arranged at least 30 Days prior to the work, to review the work schedule and potential impacts on public traffic and work being performed by others. The crack sealing work shall be carried out according to any reasonable constraints and conditions the Owner may impose.

Crack sealing is not required on Roadway specified as local in Table 1.

A two (2) year performance warranty, as specified in the Contract Documents, shall apply to the crack sealing work.

2272.07.08 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

2272.07.09 Post-Construction Documentation

Within 15 Business Days after the date of issuance of the Certificate of Contract Completion, an original copy of the Owner's standard form PH-CC-822PCC "Post Construction Certification" bearing the seal and signature of an Engineer certifying that the material and construction are in conformance to the Pavement Design Report and the Contract Documents, shall be submitted to the Contract Administrator. The certification shall be based on a review of construction methods, and inspection and material testing records obtained throughout construction. The date of the Engineer's certification shall not be earlier than the date of issuance of the Certificate of Contract Completion.

The following documentation shall be submitted to the Contract Administrator with the Engineer's certification:

a) The final pavement construction details and drawings for the as-constructed Roadway(s), frost heave treatments, transition treatments including frost and approach treatments for culverts and structures, the type and location of insulation placement, and drainage systems; including the final Subgrade elevations, ditch grades, ditch profiles in areas of earth/rock ditch clean out, width and cross-fall for lanes and Shoulders.

b) A list of material sources for:
   i. Subbase and base aggregates.
   ii. Mix designs and aggregates for all selected mixes.
   iii. Mix properties for all bituminous material.
   iv. Asphalt cement and emulsions.
   v. Anti-stripping additive, if added, in the binder and surface courses.
   vi. Any other material used in the HMA and CMA including but not limited to fibres, RAP, RST, and mineral filler.
   vii. Tack coat used between HMA and CMA courses.

c) All JMF used with each mix design with the dates and locations where each one was used.

A copy of all inspection and material testing records reviewed by the Engineer prior to certification shall be retained by the Engineer for the duration of the performance warranty period and submitted to the Owner upon request.

2272.08 QUALITY ASSURANCE

2272.08.01 Performance Requirements Prior to Contract Completion

Acceptance of the work prior to Contract Completion shall be based on the following criteria with assessment or testing conducted by the Owner or the Owner's representative:

a) Grade Checks,
b) Aggregate in Base, Subbase, HMA, and CMA,
c) Surface Tolerance,
d) Surface Appearance,
e) Surface Smoothness, and
f) Geometrics and Longitudinal Joint Location.

The Owner shall be responsible for all costs associated with testing for QA purposes, unless otherwise specified. Individual test results shall be forwarded to the Design-Builder, as they become available.

2272.08.02 Grade Checks

2272.08.02.01 General

The Owner may conduct random QA grade checks to verify that the grade and cross-section of the Subgrade, Base, and Subbase, including Shoulers, are within the specified tolerances.

2272.08.02 Acceptance

If the Contract Administrator chooses not to take QA grade checks or if the QA grade checks conform to those determined by the Design-Builder, the work shall then be accepted.

However, if any discrepancies between the QA and the Design-Builder's grade checks are found, then, at the discretion of the Owner, additional QA grade checks may be carried out in any other location.

If the finished grade or cross-section or both are not within the specified tolerances, then:

a) The Contract Administrator shall notify the Design-Builder and advise where the tolerances have not been met.

b) The Design-Builder shall be charged for each station where the tolerances have not been met,

at the rate specified in the Payment Adjustment section.

c) The Design-Builder shall bring the Subgrade or granular surface to within the specified tolerances for grade, at no additional cost to the Owner.

2272.08.02 Aggregate in Base, Subbase, Hot Mix Asphalt, and Cold Mix Asphalt

2272.08.02.01 General

The laboratory designated by the Owner may carry out QA testing for purposes of ensuring that the aggregates used in the work conform to the physical property requirements of this specification.

QA testing of Base and Subbase may be waived by the Contract Administrator when the delivery quantity of Base or Subbase is less than 5000 tonnes.

With the exceptions of RAP and RST and unless otherwise noted, QA testing shall be conducted on combined HMA aggregate samples prepared from individual QA samples by splitting off sufficient quantities of each individual aggregate component, based on percentages stated in the HMA mix design and the overall combined quantity required for testing.

2272.08.02.02 Alternative to LS-614

LS-614 shall be used for acceptance, unless written notification to the Contract Administrator to replace it with LS-606 for acceptance is received prior to sampling of the applicable materials for QA purposes. Provided that the Contract Administrator has received such a request, LS-606 shall be used. Otherwise, conformance to LS-614 shall be required.

When notification to replace LS-614 is received after QA testing using LS-614 has been initiated, the Design-Builder shall then be charged $600.00 for each test initiated, which includes the cost of the testing using LS-614, administrative charges, and additional sampling, if required.

2272.08.02.03 Acceptance

2272.08.02.03.01 Base and Subbase Aggregate

The aggregates within a lot of Base or Subbase shall be deemed to be acceptable if all of the test results for the aggregates representing that lot meet all applicable requirements of this specification.

If QA test results of an aggregate sample representing a lot of Base or Subbase do not meet all of the requirements of this specification, then a payment reduction shall be given for the aggregates within that lot, as long the applicable test results for that sample:

a) Do not exceed the requirement for LS-618 by more than 10% of the specified value.
b) Meet all other physical property requirements of this specification.

If QA test results of an aggregate sample representing a lot of Base or Subbase do not meet the requirements listed above, then all of the aggregates within that lot shall be considered rejectable and any Base or Subbase that includes those aggregates shall be removed from the Work at no cost to the Owner.

Payment reductions shall be calculated as the product of the theoretical volume in cubic metres of aggregates within the lot that is left in the Work and $7.50/$m^3$ and $4.00/$m^3$, for Base and Subbase aggregates, respectively.

Irrespective of a reduced price payment, the warranty provisions of the Contract Documents shall apply.

2272.08.02.03.02 Hot Mix Asphalt and Cold Mix Asphalt Aggregate

The aggregates within a lot of HMA or CMA shall be deemed to be acceptable if all of the test results for the aggregates representing that lot meet all applicable requirements of this specification.

If QA test results of an aggregate sample representing a lot of HMA or CMA do not meet all of the requirements of this specification, then a payment reduction shall be given for the aggregates within that lot, as long the applicable test results for that sample:

a) Do not exceed the requirement for LS-614, or LS-606 if it has been accepted by the Owner as an alternative to LS-614, by more than 25% of the specified value.
b) Do not exceed the requirement for LS-618 by more than 10% of the specified value.
c) Do not exceed the requirement for LS-619 by more than 15% of the specified value.
d) Meet all other HMA aggregates requirements of this specification.

If QA test results of an aggregate sample representing a lot of HMA or CMA do not meet the requirements listed above, then all of the aggregates within that lot shall be considered rejectable and any HMA or CMA that includes those aggregates shall be removed from the Work at no cost to the Owner.

Payment reductions shall be calculated as the product of the theoretical volume in cubic metres of aggregates within the lot that is left in the Work and $25.00/m3, for both HMA and CMA aggregates.

Irrespective of a reduced price payment, the warranty provisions of the Contract Documents shall apply.

2272.08.02.04 Referee Testing

The Design-Builder may invoke referee testing for one or more attributes by submitting a written request to the Contract Administrator, within 5 Business Days following notification that an aggregate sample representing a lot does not meet the requirements of this specification.

Referee testing shall be carried out, as specified herein and elsewhere in the Contract Documents.

The retained duplicate QA samples shall be used for referee testing.

All referee test results for a lot shall replace the respective QA tests for acceptance of the applicable lot and shall be binding on both the Owner and the Design-Builder.

2272.08.03 Surface Tolerance

The surface tolerances of any pavement or granular surface shall be such that when tested with a 3 m straight edge placed anywhere, including the edge of the pavement, in any direction on the surface, except across the crown or drainage gutters, there shall not be a gap between the bottom of the straight edge and the pavement or granular surface:

a) greater than 15 mm for all CMA surfaces and granular surfaces,
b) greater than 6 mm for all HMA surfaces other than surface course, or
c) greater than 3 mm for all surface courses.

The elevation difference across longitudinal joints shall not exceed 5 mm, when measured with a straight edge placed on the asphalt surface with the higher elevation and overhanging the joint by not more than 50 mm. All joints which exceed the 5 mm tolerance shall be repaired such that the tolerance is met.

All traffic control shall be provided, as required, for the Owner to conduct surface tolerance measurements. All tolerance-related repairs shall be carried out according to the Repairs subsection.

2272.08.04 Surface Appearance

HMA deemed by visual appearance to have flushing, bleeding, segregation, fat spot, surface damage, chatter, and surface contamination but not limited to these, shall all be considered deficient material or work. The Design-Builder shall provide traffic control, for all surface appearance assessments. Deficient material, mixture, and work shall be removed and replaced or repaired or assessed a payment reduction.

2272.08.04.01 Challenging Severity of Segregation

The Design-Builder may challenge, in writing, the assessment of segregation as severe, within 5 Business Days of receiving the Owner's first visual assessment. The written challenge shall list the dimensions and the Design-Builder's assessment of the severity of each disputed area.

The Design-Builder shall be allowed a maximum of four separate written segregation challenges. Each written challenge may involve more than one disputed segregated area.

A representative of the Owner, who did not carry out the original assessment and who is not the Contract Administrator shall make a second visual assessment of the disputed areas. This second

visual assessment shall be carried out within 5 Business Days after the Contract Administrator has received the Design-Builder's written challenge and the results of that second visual assessment shall be binding on both the Owner and Design-Builder.

The Design-Builder may further challenge the Owner's second visual assessment of the segregation severity that has occurred in an HMA surface course other than an SMA surface course. Such a challenge shall be resolved by a representative of the Owner determining the macrotexture ratio according to LS-317. The segregation severity shall be assessed as severe when the macrotexture ratio is greater than 2.2. The results of the macrotexture ratio testing shall be binding on both the Owner and the Design-Builder.

2272.08.05 Surface Smoothness

The Design-Builder Administrator shall determine the acceptability of the HMA surface course smoothness as specified in the Contract Documents.

2272.08.06 Geometrics and Longitudinal Joint Location

2272.08.06.01 Pavement Width

The Contract Administrator shall conduct random spot checks of the width of each binder and surface course for acceptance. The Design-Builder shall provide and maintain offset stakes on both sides of the roadway, or other identifiers acceptable to the Contract Administrator, for use in checking the pavement width at 25 m maximum intervals until the Contract Administrator advises the Design-Builder that the stakes or identifiers are no longer required.

The width of each lift shall be accepted provided the:

a) Outside edges of the lanes and the paved shoulders are parallel to the centerline and visually uniform.

b) Width across all the adjacent lanes from the outside edge to outside edge is not less than the sum of the specified lane widths, and

c) Width of the paved shoulders is not less than the specified paved shoulder width.

If the width is not acceptable at any location, the Contract Administrator shall notify the Design-Builder in writing that the pavement is rejectable, and the Design-Builder shall submit a written proposal for corrective action to the Contract Administrator within 2 Business Days of receiving the notification.

2272.08.06.02 Pavement Elevation

The final elevation of the HMA surface course shall not be less than the design elevation; and shall not be more than the design elevation plus 25 mm except where a lower tolerance is required due to a minimum vertical clearance restriction or where the surface elevation must match an existing condition such as curb and gutter or barrier wall.

If the elevation is not acceptable at any location, the Contract Administrator shall notify the Design-Builder in writing that the pavement is rejectable, and the Design-Builder shall submit a written proposal for corrective action to the Contract Administrator within 2 Business Days of receiving the notification.

2272.08.06.03 Pavement Crossfall

The cross-fall of the HMA surface course, including paved Shoulders, shall not vary more than plus or minus 0.25% from the cross-fall specified in the Contract Documents. Pavement that exceeds this tolerance shall be repaired by removal and replacement.

2272.08.06.04 Longitudinal Joint Location

Longitudinal joints not meeting the Contract requirements shall be removed and replaced, or assessed a payment reduction.

2272.08.07 Repairs Prior to Contract Completion

All repairs shall be completed at no cost to the Owner.

All transverse joints in surface course repairs shall butt up to a full depth vertical surface. Repairs shall consist of the removal and replacement of the full thickness of the hot mix lift or the placement of an overlay when permitted by the Contract Administrator.

Repairs shall be full lane or full shoulder width except where localized repairs are allowed as specified in the Contract Documents.

The materials used for repairs and the construction of repairs shall meet the requirements of this specification.

The limits and type of repairs requires the acceptance of the Contract Administrator and shall be accepted prior to the repair being carried out.

Unless specified otherwise, all HMA repairs shall be a minimum width equal to the width of the lane or paved shoulder that requires repair and a minimum length of 5 m.

Un-repaired areas in the same lane shall not be less than 100 m in length. When the end of a repair area is less than 100 m from the start of the next repair area in the same lane, the repair shall include both repair areas and the area between them.

With the exception of emergency repairs, repairs shall be completed within 60 calendar days or prior to seasonal shutdown each year, whichever is the lesser, unless extended by mutual agreement.

All pavement surfaces not meeting the surface tolerance requirements shall be repaired by diamond grinding to a maximum of 5 mm or removed and replaced. Slurry produced from

diamond grinding shall be removed from the Working Area and managed as specified in the Contract Documents.

All granular surfaces not meeting the surface tolerance requirement shall be repaired by the addition of granular Base as required, and grading and compacting.

2272.08.08 Performance Warranty

2272.08.08.01 General

The emergency repair requirements specified elsewhere in the Contract Documents applies to all Work, including any locations exempted from the performance warranty.

For the duration of the performance warranty period, the performance requirements in Table 9 shall be met. The performance requirements in Table 9 and Table 10 shall both apply in the final 12 months of the performance warranty period. The following locations are exempt from the requirements of Tables 9 and 10:

- N/A

Descriptions of surface distresses in Tables 9 and 10 are according to this specification and SP-024. In the event of a conflict between this specification and SP-024, this specification shall take precedence.

If a performance requirement is not met, the specified consequences for non-conformance shall be completed.

Repairs required as a consequence for non-conformance and warranty administration shall be as specified in the Contract Documents.

When there are multiple non-conformances in the same segment, with conflicting repair requirements, the Owner shall resolve the conflict(s) by selecting the consequences for non-conformance that shall apply.

2272.08.08.02 Performance Warranty Period

The performance warranty period shall be seven (7) years.

2272.08.08.03 Performance Measurement Segments

Performance measurement segments shall be established by the Contract Administrator as specified in the Contract Documents.

NAD83 latitude and longitude geographic coordinates accurate to one metre shall be recorded at the start and end stations of all segments and submitted to the Contract Administrator in hardcopy and digital form prior to Contract Completion.

2272.10 PAYMENT ADJUSTMENT

2272.10.01 General

No additional payment shall be made for the work carried out to address non-conformance to the performance requirements.

The Owner has the right to withhold payment or make a set off anytime during construction or at the completion of the work until any specified consequences for non-conformance are complete. The amount withheld or set off shall be of an approximate value of the repair work.

2272.10.02 Payment Reduction for Grade Checks Outside Tolerance

For each station where the QA grade check of the finished grade is found to be outside of the specification limit, $250.00 shall be deducted from payment.

Any grading carried out to correct grades that are not within tolerances shall be carried out at no additional cost to the Owner.

2272.10.03 Referee Testing for Aggregate Physical Properties

If a lot is not accepted at full payment based on the referee test results, then the Design-Builder shall be responsible for the cost of the referee testing of that lot, including the cost of transporting the samples to the referee laboratory, at the rates specified elsewhere in the Contract Documents. In all other cases, the Owner shall bear the cost of the referee testing and the cost of transporting the samples of that lot.

2272.10.04 Segregation Challenge

If, under a challenge, as described in the Challenging Severity of Segregation clause, the Design-Builder is successful, the Owner shall pay for the cost of the traffic control, if the traffic control was not necessary for any other reason. The Owner shall not be responsible for any other costs associated with the second visual assessment, including the cost of delays.

If the Design-Builder is not successful, the Design-Builder shall be responsible for all costs associated with the second visual assessment, including the cost of traffic control and delays.

2272.10.05 Payment Adjustment Based on Performance

2272.10.05.01 General

A payment adjustment shall apply based on the performance measurement in the final year of the performance warranty. Payment adjustment calculations shall be completed for each segment.

Areas of pavement repaired as a consequence of non-conformance, prior to the performance measurement in the final year of the performance warranty, shall be ineligible for a payment increase. Areas of pavement requiring repair as a consequence of non-conformance, based on

the performance measurement in the final year of the performance warranty, shall be ineligible for a payment decrease.

Areas of pavement repaired as a result of third party damage shall be ineligible for payment increase or decrease. Performance measurements in such repaired areas shall be excluded from payment adjustment calculations.

When the performance warranty requirements for a performance measure are voided due to ESAL increase or high or low temperature, as specified in the Contract Documents, the calculated payment decrease amount for the voided performance measure, for each segment, shall be nil.

The payment increase or decrease amount shall be calculated for the performance measures of cracking, wheel track rutting, and roughness. The values of cracking, wheel track rutting, and roughness shall be determined as specified in the Contract Documents.

When the total payment increase amount for all performance measures and all segments exceeds the total payment decrease amount for all performance measures and all segments, the Owner shall pay the amount of the difference between the two totals to the Design-Builder.

When the total payment decrease amount for all performance measures and all segments exceeds the total payment increase amount for all performance measures and all segments, the Design-Builder shall pay the amount of the difference between the two totals to the Owner.

2272.10.05.02 Payment Adjustment Calculation for Cracking

When the combined length of all cracking 0 to 20.0 mm in width and cracks that have been sealed in a segment is less than 10% of the segment length, a payment increase amount for the segment shall be calculated according to the following formula:

$$PI_{SMC} = [(10 - L_{SMC}) / 10] \times 1.2 \times ESAL_{20YR}^{0.17} \times A \qquad \text{[Formula 1]}$$

Where,

PI_{SMC} = payment increase for low crack length, dollars
L_{SMC} = length of cracks 0 to 20.0 mm in the segment, as a percentage of the segment length, %
$ESAL_{20YR}$ = 20 year ESAL value specified in Table 1, millions
A = segment area eligible for payment increase, m^2

When the combined length of all cracking 0 to 20.0 mm in width and cracks that have been sealed in a segment is greater than 80% and less than or equal to 160% of the segment length, a payment decrease amount for the segment shall be calculated according to the following formula:

$PD_{SMC} = [(L_{SMC} - 80) / 80] \times 5 \times A$ [Formula 2]

Where,
PD_{SMC} = payment decrease for high crack length, dollars
L_{SMC} = length of cracks 0 to 20.0 mm in the segment, as a percentage of the segment length, %
A = segment area eligible for payment decrease, m^2

2272.10.05.03 Payment Adjustment Calculation for Wheel Track Rutting

When the average wheel track rutting depth in a segment is less than 3.0 mm, a payment increase amount, PI_{WTR}, for the segment shall be calculated according to the following formula:

$PI_{WTR} = [(3.0 - D_{WTR}) / 1] \times 0.8 \times ESAL_{20YR}^{0.17} \times A$ [Formula 3]

Where,
PI_{WTR} = payment increase for low wheel track rutting, dollars
D_{WTR} = average depth of wheel track rutting in the segment, or 2.0, whichever is the greater mm
$ESAL_{20YR}$ = 20 year ESAL value specified in Table 1, millions
A = segment area eligible for payment increase, m^2

When the average wheel track rutting depth in a segment is greater than 6.0 and less than or equal to 8.0 mm, a payment decrease amount, PD_{WTR}, for the segment shall be calculated according to the following formula:

$PD_{WTR} = [(D_{WTR} - 6.0) / 2] \times 5 \times A$ [Formula 4]

Where,
PD_{WTR} = payment decrease for high wheel track rutting, dollars
D_{WTR} = measured average depth of wheel track rutting in the segment, mm
A = segment area eligible for payment decrease, m^2

2272.10.05.04 Payment Adjustment Calculation for Roughness

When the roughness in a segment is less than 0.80 m/km, a payment increase amount for the segment shall be calculated according to the following formula:

$PI_{MRI} = [(0.8 - R_{MRI}) / 0.3] \times 2 \times ESAL_{20YR}^{0.17} \times A$ [Formula 5]

Where,
PI_{MRI} = payment increase for low roughness, dollars
R_{MRI} = measured MRI of the segment or 0.5, whichever is the greater, m/km
$ESAL_{20YR}$ = 20 year ESAL value specified in Table 1, millions
A = segment area eligible for payment increase, m^2

When the roughness in a segment is greater than 1.40 m/km and less than or equal to 1.60 for

freeway segments, 1.75 for arterial segments, and 1.90 m/km for collector or local segments, a payment decrease amount for the segment shall be calculated according to the following formula:

$PD_{MRI} = [(R_{MRI} - 1.40) / (R_C - 1.40] \times 5 \times A$ [Formula 6]

Where,

PD_{MRI} = payment decrease for high roughness, dollars
R_C = 1.60 for freeway, 1.75 for arterial, and 1.90 for collector segments, m/km
R_{MRI} = measured MRI of the segment, m/km
A = segment area eligible for payment decrease, m^2

Segments shall be classified as freeway, arterial, collector, or local according to Table 1.

Table 1
Traffic Volume Information

Roadway	Classification	AADT	ESAL (Millions)		Surface Type
			Warranty Period (7 years)	20 Year	
QEW	Freeway	36,700 (2016) (52% Southbound and 48% Northbound)	8.75	27.5	SP 12.5 FC2

Table 2
Permitted Locations of Pavement Grade Raise

Location			Permitted Grade Raise (mm)
Roadway	Sta. to Sta.	Township	
N/A			

Table 3
Permitted Locations of Ditch Elevation Lowering

Location				Permitted Ditch Grade Lowering (m)
Roadway	**Sta. to Sta.**	**Township**	**Lt/Rt**	
N/A				

Table 4A
HMA and CMA Aggregates Physical Property Requirements - Fraction Passing the 4.75 mm Sieve (Note 1)

Laboratory Test	MTO Test Number	Surface Type (Note 2)			Binder Course
		FC2	FC1	FCG	
Micro-Deval Abrasion, % maximum loss (Note 3)	LS-619	15	20	25	25

Table 4B
HMA and CMA Aggregates Physical Property Requirements - Fraction Retained on the 4.75 mm Sieve (Note 1)

Laboratory Test	MTO Test Number	Surface Type (Note 2, Note 4)								Binder Course
		FC2			FC1				FCG	
		(D)	(T)	(M)	(G)	(D)	(T)	(M)		
Absorption, % maximum	LS-604	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0
Unconfined Freeze-Thaw, % maximum loss (Note 5)	LS-614	7	6	6	6	7	6	6	6 (Note 6)	15 (Note 6)
Micro-Deval Abrasion, % maximum loss (Notes 4 and 7)	LS-618	15	10	15	10	15	10	15	17	21
Alternative Requirement for LS-614										
Magnesium Sulphate Soundness, % maximum loss (Note 6)	LS-606	-							12	15

Table 4C
Base and Subbase Aggregates Physical Property Requirements

Laboratory Test	MTO Test Number	Base	Subbase
Micro-Deval Abrasion Coarse Aggregate Loss, % maximum	LS-618	25	30
Micro-Deval Abrasion Fine Aggregate Loss, % maximum	LS-619	30	35
Amount of Contamination, % maximum	LS-630	1.0 (Note 8)	

Notes for Tables 4A, 4B, and 4C:

1. The aggregate used for the following tests shall be prepared by first splitting off sufficient quantities of each of the aggregate components, based on their individual percentages stated in the mix design and the overall blended quantity required for the test(s). Then, with the exceptions of RAP and RST, the split portions of each of the other aggregate components shall be placed in a vessel of appropriate size and blended together by mixing. The blended aggregate shall then be split on the 4.75 mm sieve and the portions passing and retained on the 4.75 mm sieve set aside for testing.
2. FC2, FC1, and FCG are identifiers to apply the appropriate aggregate requirements, and shall be according to Table 1.
3. In addition, the Micro-Deval Abrasion loss for any individual aggregate component where the aggregate passing the 4.75 mm sieve represents more than 5% of the overall mix design gradation, by mass, shall not exceed 35%.
4. Categories (G), (D), (T), and (M) refer to a group of specific lithologies (i.e. rock types) included in the "Product Name" cell for each approved source listed in DSM #3.05.25.
5. When this test is being carried out on the coarse aggregate fraction of a FC1 Surface Type mix that contains coarse aggregates from more than one source, the minimum value of the maximums shown below for the coarse aggregate types that are included in that mix shall be used for acceptance.
6. For FCG Surface Type and Binder Course, the Owner shall waive the requirements for LS-614, Unconfined Freeze-Thaw, provided the Design-Builder has submitted a written request that the coarse aggregate meet the alternative requirements for LS-606, Magnesium Sulphate Soundness.
7. In addition, the Micro-Deval Abrasion loss for any individual aggregate component where the aggregate retained on the 4.75 mm sieve represents more than 5% of the overall mix design gradation, by mass, shall not exceed 25%.
8. Combined mass of wood, clay brick and/or gypsum and/or gypsum wall board or plaster.

Table 5A
Physical Property Requirements for Aggregates Extracted From HMA and CMA - Combined Aggregates Passing the 4.75 mm Sieve (Note 1)

Laboratory Test	**MTO Test Number**	**Surface Type** (Note 2)			**Binder Course**
		FC2	**FC1**	**FCG**	
Acid Insoluble Residue for retained 2.36 mm fraction, minimum % retained on 75 µm sieve	LS-613	-	-	60 (Note 3)	-
Petrographic analysis, minimum % of Category 1 aggregates passing the 4.75 mm sieve and retained on the 2.36 mm sieve (Note 4)	LS-616, Part B	90 (Note 5)	-	-	-

Table 5B
Physical Property Requirements for Aggregates Extracted From HMA and CMA - Combined Aggregates Retained on the 4.75 mm Sieve (Note 1)

Laboratory Test	MTO Test Number	Surface Type (Note 2)			Binder Course
		FC2	FC1	FCG	
Petrographic Analysis, minimum % of Category 1 aggregates retained on the 4.75 mm sieve (Note 4)	LS-609, Part B	95 (Note 6)	95 (Note 6)	-	-
Petrographic Analysis, maximum % of Category 2 aggregates retained on the 4.75 mm sieve (Note 7)	LS-609, Part B	-	-	40 (Note 3)	-
Petrographic Analysis, maximum % of Category 3 Contaminants retained on the 4.75 mm sieve (Note 7)	LS-609, Part B	0.5	0.5	0.5	0.5
Acid Insoluble Residue, minimum % retained on the 75µm sieve (Note 8)	LS-613	45	45	60 (Note 9)	-

Notes for Tables 5A and 5B:

1. All of the aggregates used for the following tests shall be extracted from HMA and CMA using LS-282 and then split on the 4.75 mm sieve, prior to testing.
2. FC2, FC1, and FCG are identifiers to apply the appropriate aggregate requirements, and shall be according to Table 1.
3. This requirement is only applicable to surface courses placed on the Thousand Islands Parkway; Highway 33 from west of Bath to Picton; Highway 35 from County Road 121 northerly to Norland; and in the area to the north and west of a boundary defined by the north shore of Lake Superior, the north shore of the St. Mary's River, the south shore of St. Joseph Island, the north shore of Lake Huron easterly to the north and east shore of Georgian Bay (excluding Manitoulin Island), along the Severn River to Washago and a line easterly passing through Norland, Burnt River, Burleigh Falls, Madoc, and hence easterly along Highway 7 to Perth and northerly to Calabogie and easterly to Arnprior and the Ottawa River.
4. Acceptable rock types/lithologies that are present shall include lithologies that are consistent with the following aggregates for surface courses listed on DSM #3.05.25:
   a. Category 1 aggregates or their acceptable major mineral components or both listed on Table 1 of LS-616 Part B for fine aggregates.
   b. Category 1 aggregates listed on Table 2 of LS-609 Part B, for coarse aggregates used in FC1 and FC2 Surface Types.
5. Category 1 aggregates shall represent a minimum of 90%, by mass, of the extracted aggregate sample passing the 4.75 mm sieve and retained on the 2.36 mm sieve.
6. Category 1 aggregates shall represent a minimum of 95%, by mass, of the extracted aggregate sample retained on the 4.75 mm sieve.
7. Category 2 aggregates and Category 3 contaminants are listed on Table 2 of LS-609.
8. LS-613 shall be carried out, unless it can be proved to the Contract Administrator's satisfaction that the aggregate retained on the 4.75 mm sieve, including any aggregate derived from RAP or RST, does not contain any dolomitic sandstone or any Category 2 (i.e. carbonate) rock types, as listed in Table 2 of LS-609.
9. LS-613 shall only be required, when the fraction retained on the 4.75 mm sieve is found to contain more than 40% Category 2 aggregates, as determined by petrographic examination, in accordance with LS-609 - Part B, and where Design-Builder has invoked referee testing.

Table 6A
Gradation Requirements for Hot Mix Asphalt Used in Surface Courses

Percentage Passing by Dry Mass of Aggregates												
Sieve	**mm**								**µm**			
	19.0	**16.0**	**13.2**	**12.5**	**9.5**	**4.75**	**2.36**	**1.18**	**600**	**300**	**150**	**75**
Surface Course Mixes	100	-	-	90-100	90 max.	45-55	28-58	-	-	-	-	2-10

Table 6B
Gradation Requirements for Stone Mastic Asphalt Used in Surface Courses

Percentage Passing by Dry Mass of Aggregates												
Sieve	**mm**								**µm**			
	19.0	**16.0**	**13.2**	**12.5**	**9.5**	**4.75**	**2.36**	**1.18**	**600**	**300**	**150**	**75**
Surface Course Mixes	100	-	-	90-100	50-80	20-35	16-24	-	-	-	-	8-11

Table 7
Minimum Depth of Granular Material Over Insulation

Zone	Geographic Area	Minimum Granular Thickness (mm)
A	South of a line drawn from Quebec at Arnprior to Highway 41 at Kaladar to Highway 62 at Bannockburn to Highway 28 at Woodview to Highway 35 at Rosedale to Highway 12 at Brechin, along the south side of Highway 12 to Waubaushene, along the shore of Georgian Bay to Tobermory, and along the shore of Lake Huron to Sarnia.	400
B	Between Zone A and Zone C.	500
C	Between Zone D and a line drawn along the north side of Highway 17 from Mattawa to the Highway 17/144 interchange, to Highway 108 at Elliott Lake, to the Highway 129/554 intersection, to Highway 556 at Glendale, and to the Highway 17/552 intersection.	600
D	North of a line drawn along the north side of Highway 66 from Quebec to Kenogami Lake, from Kenogami Lake to Chapleau, along the north side of Highway 101 to Wawa, along the shore of Lake Superior to Nipigon, from Nipigon to Dryden, and along the north side of Highway 17 from Dryden to Manitoba.	700

Table 8
Sample Size

Material	Minimum Mass of Field Samples, kg (Note 1)
Granular Base	25
Granular Subbase	50
HMA and CMA Coarse Aggregate	25
HMA and CMA Fine Aggregate	15
HMA and CMA	30

Notes:
1. Individual sample containers shall hold no more than 30 kg of aggregate. Where more than 30 kg is required, additional sample containers shall be used.

Table 9
Performance Requirements During the Entire Warranty Period

Performance Requirement	Measurement Procedures	Acceptance Criteria	Consequences for Non-Conformance (Note 1)
Coarse Aggregate Loss	SP-024 Evaluation	No locations of coarse aggregate loss with a severity of severe or very severe	Remove and Replace HMA - Uniform Depth, within 30 Days
Flushing	SP-024 Evaluation	No locations of flushing with a severity of severe or very severe	Remove and Replace HMA - Uniform Depth, within 30 Days
Alligator Cracking	SP-024 Evaluation	No locations of alligator cracking with a severity of moderate, severe, or very severe (Note 2)	Reconstruction
Wheel Track Rutting	MTO ARAN Survey with 1.8 m baseline	No wheelpath locations 30 m or greater in length with an average rut depth > 14.0 mm (Note 2)	Reconstruction, within 30 Days
Roughness	ASTM E 950-09 Profilometer	No lane segments 30 m or greater in length with an average MRI > 2.6 m/km (Note 2)	Remove and Replace HMA-Variable Depth
Differential Frost Heaving (Note 3)	ASTM E 950-09 Profilometer	No lane segments 30 m or greater in length with an average MRI > 6.0 m/km (Note 2)	Reconstruction - Frost Heave Treatment

Notes:
1. Repairs required as a consequence for non-conformance shall be as specified in the Contract Documents. The repair limits shall be to the extent of the non-conformance, and extended at the Design-Builder's option.
2. Not applicable to miscellaneous pavement surface.
3. Applicable to all locations of new or reconstructed flexible pavement structures. At locations of rehabilitated flexible pavement structure, applicable only to areas excavated below subgrade during construction, and locations identified by the Owner as frost heaves in the Contract Documents.

Table 10
Performance Requirements During the Final Year of the Warranty Period

Performance Requirement	**Measurement Procedures**	**Acceptance Criteria**	**Consequences for Non-Conformance** (Note 1)
Coarse Aggregate Loss	SP-024 Evaluation	The total length of the locations of each individual surface distress of moderate severity shall be < 10% of the segment length (Note 2).	Remove and Replace HMA - Uniform Depth, within 30 Days (Note 3)
Flushing	SP-024 Evaluation	The total length of the locations of each individual surface distress of moderate severity shall be < 10% of the segment length (Note 2).	Remove and Replace HMA - Uniform Depth, within 30 Days (Note 3)
Alligator Cracking	SP-024 Evaluation	The total area of the locations of each individual surface distress of slight severity shall be < 10% of the segment length (Note 2, Note 6).	Reconstruction (Note 4)
Cracking	MTO ARAN Survey	The combined length of all cracking 0 to 20.0 mm in width and cracks that have been sealed shall be < 160% of the segment length (Note 6).	HMA Replacement (Note 5)
		No locations of cracking with a width > 20.0 mm.	Full Depth HMA Crack Repair (Note 7)
Wheel Track Rutting	MTO ARAN Survey with 1.8 m Baseline	The average depth of wheel track rutting measured in both wheel paths of each segment shall be < 8.0 mm (Note 6).	Remove and Replace HMA - Variable Depth (Note 5)
Roughness	ASTM E 950-09 Profilometer	The average MRI shall be < 1.60 m/km for each freeway segment, < 1.75 m/km for each arterial segment, and < 1.90 m/km for each collector or local segment (Note 6, Note 8).	Remove and Replace HMA - Variable Depth (Note 5)
Joint Separation	Horizontal Measure of the Width of Longitudinal Joint Separation	Separation shall be < 5.0 mm.	HMA Joint Sealing (Note 5)
		Separation shall be < 20.0 mm.	HMA Joint Strip Repair (Note 7)

Notes:
1. Repairs required as a consequence for non-conformance shall be as specified in the Contract Documents.
2. The length shall be measured longitudinally. Where locations overlap longitudinally, the length shall be measured from the start of the first location to the end of the last location.
3. All moderate severity distress shall be repaired.
4. All slight severity distress shall be repaired.
5. The repair limits shall be the entire segment length.
6. Not applicable to miscellaneous pavement surface.
7. The limits of the full depth crack repair or the strip repair shall be extended until the width is < 15 mm.
8. Segments shall be classified as freeway, arterial, or collector according to Table 1.

PERFORMANCE REQUIREMENTS FOR DESIGN AND CONSTRUCTION OF PAVEMENT MARKINGS

2273.01 SCOPE

This performance specification covers the responsibilities and obligations for the new installation, temporary installation and reinstatement of Pavement Markings and Symbols.

2273.02 REFERENCES

This work requires the mandatory use of the following documents:

- Ontario Traffic Manual (Publications Ontario)
  - Book 7 (March 2001)
  - Book 11 (March 2000)
- American Standards Testing Manual (ASTM) Volume 6
- Canadian Environmental Protection Act, 1999
  - Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations (P.C. 2009-1535 September 9, 2009)
- Hazardous Products Act,
  - Surface Coating Materials Regulations (P.C. 2005-621 April 19, 2005)

2273.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Chromaticity means colour of the line by reference to Commission Internationale de l'Eclairage (CIE) chromaticity diagram to define the area within which the colour must fall, as measured in accordance with ASTM E-1347.

Durability means the percentage of marking remaining on the roadway, as assessed in accordance with the MTO Durability Classification Guidelines.

Luminance means the luminous flux in a light ray, emanating from a surface or falling on a surface, in a given direction, per unit of projected area of the surface viewed from that direction, per unit of solid angle (reflective light), as measured in accordance with ASTM E-1347.

mcd/m²lx means a unit of measurement for retroreflectivity (millicandelas per square metre per lux).

New Installation of Pavement Markings means the application of pavement markings that are different from previous existing markings on a resurfaced section of highway, including center lines, edge of pavement lines, lane and turn lane lines and Pavement Marking Symbols,

including stop bars, crosswalks, school crossings; railway crossings and arrows.

Pavement Marking Material means a material formulated for application onto bituminous or concrete pavement in order to delineate vehicle operating limits.

Pavement Markings means directional dividing lines, lane lines, edge lines, transitional and continuity lines, interchange ramps and channelization lines, barrier lines, intersection markings, reserved facility markings, parking markings and including words, letters and symbols on pavements, used to delineate vehicle operating limits on highways conforming to the size and shape, as specified in OTM Book 11.

Reinstatement of Pavement Markings means the application of same type of pavement markings and in the same location as the previous existing markings on a resurfaced section of highway, including center lines, edge of pavement lines, lane and turn lane lines and Pavement Marking Symbols, including stop bars, crosswalks, school crossings; railway crossings and arrows.

Retroreflectivity means the property of a material or device in which, when directionally irradiated, the reflected rays are preferentially returned in direction close to the opposite of the direction of the incident rays, this property being maintained over wide variations in the direction of the incident rays.

Segment means the allocated area where retroreflectivity readings are taken.

Symbols means words, letters and symbols on pavements used to delineate vehicle operating limits.

Temporary Pavement Markings means pavement markings placed on temporary roadway surfaces or alignments during construction operations.

Traffic Paint means water-borne or organic solvent based paint specifically formulated for use as a pavement marking to delineate vehicle operating limits on concrete and bituminous pavements.

Water-Borne Traffic Paint means a Traffic Paint whose components are carried in water either as an emulsion or a dispersion and will form a solid paint film on deposition and evaporation of water and volatiles after application.

2273.04 DESIGN REQUIREMENTS

2273.04.01 General

As part of the design of Pavement Markings and Symbols, the Design-Builder shall:

a) Develop an inventory of existing Pavement Markings and Symbols (if applicable for Reinstatement of Pavement Markings); and

b) Select the materials, material sources, types, properties, and all requirements for the materials that are used for the Pavement Markings and Symbols, unless specified otherwise in this Performance Requirement.

2273.05 MATERIAL REQUIREMENTS

2273.05.01 General

The Design-Builder shall identify the selected Pavement Marking material(s) and provide Material Safety Data Sheets (MSDS) and Product Data Sheets to the Contract Administrator in advance of application.

2273.05.02 Prohibited Materials

VOC Content

Pavement Marking Materials must comply with the Canadian Environmental Protection Act, 1999, Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations. As of September 30, 2010, the VOC content limit for pavement markings that are applied between May 1st and October 15th annually shall be no more than 150g/l.

Lead Limit

Marking materials must comply with the Hazardous Products Act, Surface Coating Materials Regulations for lead. As of January 1, 2011, the concentration of lead for pavement markings shall be no more than 600mg/kg.

2273.06 EQUIPMENT REQUIREMENTS - Not Used

2273.07 CONSTRUCTION REQUIREMENTS

2273.07.01 General

During construction, the Design-Builder shall ensure that Pavement Markings and Symbols are placed in accordance with this Performance Specification.

Pavement Markings and Symbols shall have a minimum retroreflectivity as described in Table 3.

All retroreflectivity equipment used to determine conformance will conform to ASTM E 1710. Handheld retroreflectivity sampling shall be conducted in accordance with ASTM D 6359-99 section 6.2.

2273.07.03 Durability and Visibility

The Design-Builder shall ensure that:

a) Pavement Markings and Symbols are placed in the location identified in the Contract;

b) Pavement Markings and Symbols are clearly visible, legible and conform to the size and shape of the intended marking as specified in OTM Book 11; and

c) Pavement Marking line edges are straight and true with no severe splatter, overspray or tracking of marking material.

Based on the posted speed limit in kilometres per hour (vehicle speed), a minimum preview distance of 3.65 seconds is required. Based on this time, the following minimum preview distance in metres (m) identified in Table 1 shall be required:

Table 1 - Visibility Requirements

Vehicle Speed (km/hr)	**Preview Distance (m)**
60	61
70	71
80	81
90	91
100	101

Notes:
- No visual assessments shall be undertaken during any type of inclement weather.

MTO Durability Classification Guidelines

Class 1
95% - 100%





Class 2
75% -95%





Class 3
50% - 75%





Class 4
15% -50% (25%-50%)





Class 4
15% -50-% (15% -25%)





Class 5
0% - 15%

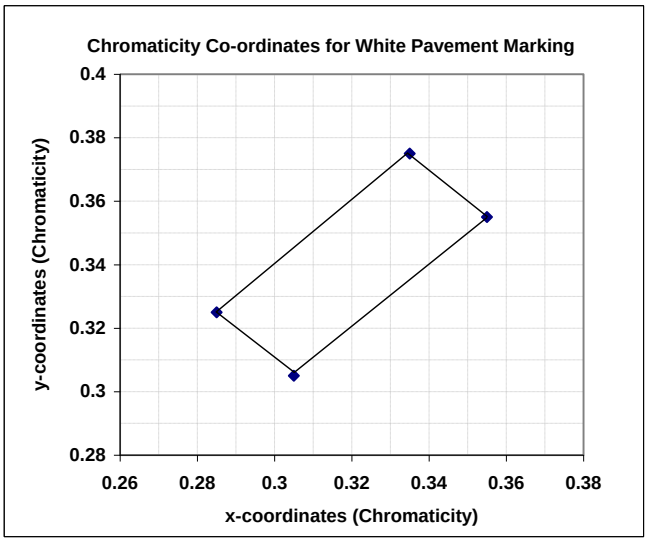




2273.07.04 Colour

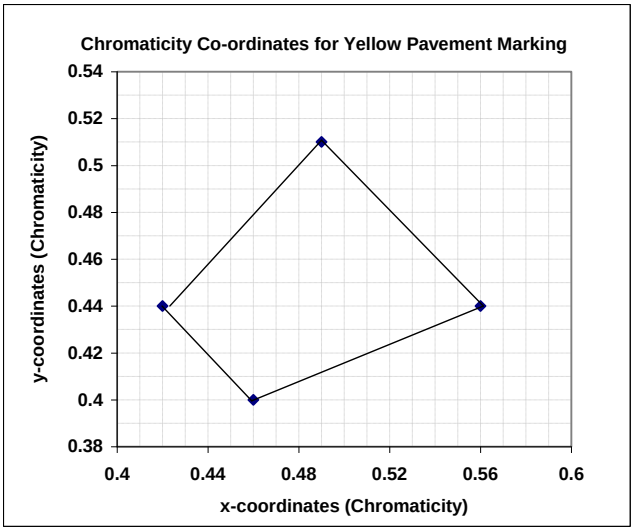
The colour of the Pavement Markings placed by the Design-Builder shall fall within the chromaticity coordinates box as outlined in Figure 1 (for white markings) and Figure 2 (for yellow markings). The chromaticity (x, y) shall be measured with a portable Minolta Colorimeter or equivalent acceptable to the Ministry in accordance with ASTM E 1347. The instrument shall be set to read x, y, and Y coordinates with 45 degree/0 degree bidirectional geometry, observer angle of 2 degrees and Illuminant C. Sampling frequency shall be conducted in accordance with ASTM D 6359-99 Section 6.2.

Figure 1. – White Chromaticity Coordinates



White	x-coordinates	0.355	0.305	0.285	0.335
	y-coordinates	0.355	0.305	0.325	0.375

Figure 2. – Yellow Chromaticity Coordinates



Yellow	x-coordinates	0.560	0.460	0.420	0.490
	y-coordinates	0.440	0.400	0.440	0.510

2273.07.05 Daytime Luminance Factor

The daytime luminance factor (Y) for Pavement Markings placed by the Design-Builder shall be > 45 for white and > 25 for yellow.

The daytime luminance factor (Y) shall be measured with a portable Minolta Colorimeter or equivalent in accordance with ASTM E 1347. The instrument shall be set to read x, y, and Y coordinates with 45 degree / 0 degree bidirectional geometry, observer angle of 2 degrees and Illuminant C. Sampling frequency, as specified for retroreflectivity shall be used, and conducted

in accordance with ASTM D 6359-99 Section 6.2.

2273.07.06 Information Management Requirements

2273.07.06.01 Samples

When requested by the Contract Administrator the Design-Builder shall obtain sample(s) of each marking material in the presence of the Contract Administrator. Sample(s) will be used by the ministry to audit the quality of materials used and for information purposes. The sample(s) shall be submitted to the following address with one (1) week from the time they were obtained:

Head, Concrete Section
Ministry of Transportation Ontario
Room 15, 145 Sir William Hearst Avenue
Downsview, Ontario, M3M 0B6

Sampling of Pavement Marking materials shall conform to Table 2.

Samples of Traffic Paint shall not be thinned or heated. The material shall be well mixed and homogeneous. The sample container shall be filled within 5 mm of the bottom of the lid rim.

The sample data label shall be completed with the manufacturer's name, coating colour, product code and batch number(s), contract number and location. The Sample Data Label, Form PH-CC-360, is available from the Contract Administrator.

Table 2

Material	Sample Size	Container Material	Source
Water borne Traffic Paint	125 ml	Plastic or plastic lined	Outlet valve (not spray gun)
Field reacted polymeric materials - Resin (Note 1)	250 g	Metal or plastic	Pail
- Catalyst *	(50 g)	Metal or plastic	Pail
Glass beads	250g	Metal or plastic	Bead gun
Preformed tape	1 m	Container not required	Roll
Thermoplastic materials	250 g	Steel panel	Applicator (Note 2)

Notes:
1. Material type and manufacturer's mixing ratio of each unmixed material should be indicated on container.
2. An 8 cm x 8 cm raw sample of the thermoplastic material can be substituted for the coated panel sample.

2273.08 PERFORMANCE REQUIREMENTS

2273.08.01 Performance Requirements

Pavement Markings and Symbols shall meet or exceed all performance requirements identified in Table 3 upon completion of the Work and throughout the duration of the warranty period:

Table 3

<table>
<tr><th>Feature</th><th colspan="6">Minimum Performance Requirements</th></tr>
<tr><td colspan="7">Upon Completion of the Work and During the Warranty Period (excluding winter months)</td></tr>
<tr><td rowspan="6">Retroreflectivity (mcd/m²lx)</td><td>Marking</td><td>Type</td><td>≥ 90 km/hr</td><td>80 km/hr (2 Lane Roadways with Centerline Only)</td><td>80 km/hr</td><td>80 km/hr (Full Width Surface Treated Roadways)</td></tr>
<tr><td rowspan="3">White</td><td>Edge</td><td>175</td><td>-</td><td>150</td><td>-</td></tr>
<tr><td>Skips</td><td>175</td><td>-</td><td>150</td><td>-</td></tr>
<tr><td>Symbols</td><td>100</td><td>100</td><td>100</td><td>100</td></tr>
<tr><td rowspan="2">Yellow</td><td>Centreline</td><td>150</td><td>150</td><td>125</td><td>100</td></tr>
<tr><td>Edge</td><td>125</td><td>-</td><td>100</td><td>-</td></tr>
<tr><td>Durability</td><td colspan="6">Pavement Markings shall meet or exceed Class 2 condition, as determined by the Ministry’s visual assessment using the MTO Durability Classification Guidelines.</td></tr>
<tr><td>Visibility</td><td colspan="6">100% of all Pavement Markings meet the requirements of Table 1.</td></tr>
<tr><td>Colour (Note 1)</td><td colspan="6">100% conformance with the Chromacity Coordinates specified in Figures 1 and 2 as measured by the Ministry conforming to ASTM E-1347.</td></tr>
<tr><td>Daytime Luminance Factor (Note 1)</td><td colspan="6">The daytime luminance factor (Y) for Pavement Markings shall be > 45 for white and > 25 for yellow as measured by the Ministry conforming to ASTM E-1347.</td></tr>
<tr><td>Location</td><td colspan="6">100% of the Pavement Markings and Symbols shall be placed in the location identified in the Contract</td></tr>
<tr><td colspan="7">Note:
1. Colour and Daytime Luminance Factor measurements are required only if the marking material(s) used are not on the current MTO DSM listing.</td></tr>
</table>

2273.08.02 Performance Indicators

The Ministry, at its discretion, may collect performance indicators. The collection may consist of up to 100% of the contract area and the exact location will be at the Ministry’s discretion. A more thorough data collection may be carried out if there is evidence of non-conformance. The additional data collection may include a review of the Design-Builder’s records, plans and actions taken.

The performance indicators that the Ministry collects will be shared with the Design-Builder and

will be the only indicators used by the Ministry to apply consequences for non-conformance.

2273.08.03 Conformance to the Performance Requirements

Upon completion of the collection of performance indicators, the Ministry will make an assessment of conformance or non-conformance to the performance requirements.

The Ministry will have the complete discretion in the choice of performance indicators to use in determining conformance. The assessment however, will include consideration of events that are beyond the care and control of the Design-Builder. The Ministry will examine all relevant factors involved with the situation including the Design-Builder's rationale as to why the situation occurred.

If, after completing the collection of performance indicators, assessing all the relevant data, including data provided by the Design-Builder, a non-conformance is determined, a Notice of Non-Conformance may be issued to the Design-Builder for features that do not conform to the performance requirements.

2273.08.04 Consequences for Non-Conformance to the Performance Requirements

The Design-Builder shall be responsible for performing all specified Consequences for Non-conformance to the Performance Requirements.

2273.08.04.01 Consequence Tables

The Consequences for Non-Conformance to the Performance Requirements are described in Table 4:

Table 4 - Consequences for Non-Conformance

Feature	Consequences for Non-Conformance
Retroreflectivity	• Retrace segment to meet performance requirements. • $1,000 per day per segment or portion thereof if the non-conformance remains after 10 days from the date the notice of non-conformance was issued.
Durability	• Retrace segment to meet performance requirements. • $1,000 per day per segment or portion thereof if the non-conformance remains after 10 days from the date the notice of non-conformance was issued.
Visibility	• Retrace segment to meet performance requirements. • $1,000 per day per segment or portion thereof if the non-conformance remains after 10 days from the date the notice of non-conformance was issued.
Colour	• Retrace segment to meet performance requirements. • $1,000 per day per segment or portion thereof if the non-conformance remains after 10 days from the date the notice of non-conformance was issued.
Daytime Luminance Factor	• Retrace segment to meet performance requirements. • $1,000 per day per segment or portion thereof if the non-conformance remains after 10 days from the date the notice of non-conformance was issued.
Location	• Replace Pavement Markings and Symbols in the location identified in the Contract. • $1,000 per day per segment or portion thereof if the non-conformance remains after 10 days from the date the notice of non-conformance was issued.

2273.09 WARRANTY REQUIREMENTS

2273.09.01 Warranty

The Design-Builder shall warrant that the Pavement Markings and Symbols will meet all performance requirements for the duration of the warranty period.

Notwithstanding the above warranty, the Design-Builder shall not be responsible for repairing damage to Pavement Markings and Symbols resulting from events beyond the Design-Builder's control, as determined by the Ministry, such as chemical and fuel spills, fires, and traffic accidents.

2273.09.02 Warranty Period

The warranty shall begin on the date of the Completion Certificate and shall continue for one (1) year.

2273.09.03 Termination of the Warranty

The Ministry shall terminate the warranty by issuing the “Release from Warranty” notice no later than 30 Days after the Ministry confirms that the repair and performance requirements were met or exceeded.

2273.09.04 Non-Compliance to the Warranty

Failure to comply with the requirements of the warranty may be referred to the Ministry of Transportation’s Qualification Committee using the infraction report process without prejudice to any right or remedy the Ministry may have in law.

PERFORMANCE REQUIREMENTS FOR DESIGN AND CONSTRUCTION OF DECK JOINT ASSEMBLIES, PREFORMED SEALS, JOINT FILLERS, JOINT SEALS, JOINT SEALING COMPOUNDS AND WATERSTOPS

3273.01 SCOPE

This performance specification covers the requirements for the removal of existing and the installation of deck joint assemblies and associated Work and the placing of preformed seals, joint fillers, joint seals, joint sealing compounds and waterstops as appropriate.

3273.02 REFERENCES

This work requires the mandatory use of the following documents:

Ministry of Transportation (MTO)

Designated Sources for Materials (DSM)
Structural Manual (MTO)

Ontario Provincial Standard Specifications

OPSS 914	Waterproofing Bridge Decks with Hot Applied Asphalt Membrane
OPSS 929	Abrasive Blast Cleaning - Concrete Construction
OPSS 1204	Polyvinyl Chloride Waterstops
OPSS 1210	Deck Joint Assemblies
OPSS 1212	Hot Poured Rubberized Asphalt Joint Sealing Compound
OPSS 1308	Joint Filler In Concrete
OPSS 1350	Concrete - Materials and Production

ASTM International

D 1056-07	Standard Specification for Flexible Cellular Materials, Sponge or Expanded Rubber
C 1202-10	Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration

3273.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Armouring Angle means the expansion joint angle at the gap.

Bearing means a structural device that transmits load while permitting translation or rotation or

both.

Blockout means a cavity created to permit the installation of deck joint assemblies.

Elastomer means a compound containing virgin polychloroprene (neoprene).

Joint Seal means ethyl vinyl acetate foam.

Joint Sealing Compound means a hot applied material, which is not preformed, used to seal a joint.

Nosing Angle means the angle that forms the outside edges of the blockout.

Preformed Seal means an extruded elastomer that, when retained in recesses in the deck joint assembly, prevents the passage of water and other materials.

Upturn means an upward vertical change in direction of the seal at the gutter lines.

3273.04 DESIGN REQUIREMENTS

3273.04.01 General

The Design-Builder shall notify the Contract Administrator, in writing, of the name and address of the manufacturer of the deck joint assembly within 30 Days of the Contract award.

The Design-Builder shall submit to the Contract Administrator 3 sets of deck joint assembly design drawings and Working Drawings prior to commencement of fabrication of the deck joint assembly, for information purposes only.

The deck joint assembly design drawings shall include, at a minimum, the following:

a) Type of Joint to be used and standard details.
b) Concrete removal limits and whether existing reinforcement are to be retained.
c) New reinforcement and dowels, mechanical couplers etc.
d) Connection details to end diaphragms.
e) Reconstruction of portion of ballast wall, barrier walls, curbs and approach slab necessary for expansion joint replacement.
f) Design movement of joints and setting gap versus temperature.

The design movement of expansion joints shall be established by the Design-Builder and shall be consistent with proper articulation of the structure taking into account thermal effects, shrinkage and creep of concrete, and structural deformation. The choice of expansion joint products shall be according to the movement rating of individual joint types given in the DSM.

The Design-Builder shall have a copy of the deck joint assembly Working Drawings at the site prior to and during installation of the deck joint assembly.

The deck joint assembly Working Drawings shall clearly indicate the following:

a) Material properties.
b) Dimensions.
c) Connection attachments.
d) Injection hose system components and name of approved injection company.
e) Shop, field, and stage construction splices.
f) Fasteners and accessories.
g) Installation details, including joint gaps versus temperature.
h) Individual alphanumeric identification number for each stage of installation.
i) Handling procedures including lifting points.
j) Manufacturer's recommended installation procedure for achieving the required bolt tension.

3273.05 MATERIAL REQUIREMENTS

3273.05.01 General

Concrete in which the deck joint assemblies are embedded shall be according to OPSS 1350 except as amended below:

a) The nominal maximum size of coarse aggregate for concrete shall be 13.2 mm.

b) Superplasticized concrete shall be used in expansion joints with cross slopes of 4% or less.

c) The concrete shall have an initial slump of 40 mm ± 20 mm. This slump shall be increased when required by the addition of the superplasticizer at the site according to the written instructions of the superplasticizer manufacturer. After the addition of the superplasticizer, the air content shall be 8.0% ± 1.5% and the slump shall be 150 mm ± 30 mm.

d) 28-Day compressive strength shall be as specified in the Design-Builder’s deck joint assembly design and shall not be less than 30 MPa.

e) Rapid chloride permeability of hardened concrete shall be less than 2500 coulombs at 28 Days.

f) Hardened Air Void System: Minimum air content = 3%, Maximum spacing factor = 0.230 mm

Deck joint assemblies shall be according to OPSS 1210.

Joint fillers shall be according to OPSS 1308.

Joint seals shall be according to ASTM D 1056 for ethyl vinyl acetate foam. The top surface of the ethyl vinyl acetate foam shall be embossed with the manufacturer's name and product identification.

Joint sealing compounds shall be according to OPSS 1212.

The lubricant shall be water soluble, non-adhesive, and non-staining. Lubricants used between the steel components and preformed seals shall not be deleterious to the joint materials or the surrounding concrete.

Preformed seals shall be according to OPSS 1210.

Waterstops shall be according to OPSS 1204.

Reinforcement shall be stainless steel. Stainless reinforcing steel shall be Type 316 LN, Type 2205 Duplex or XM28 and have a minimum yield strength of 500 MPa, unless otherwise specified. Stainless reinforcing steel shall be selected from the Ministry's DSM.

3273.05.02 Prohibited Materials

Not applicable.

3273.06 EQUIPMENT REQUIREMENTS

Only chipping hammers, with a maximum weight of 9.0 kg prior to any handle modification where applicable, and a maximum piston stroke of 102 mm, shall be used for concrete removals.

3273.07 CONSTRUCTION REQUIREMENTS

3273.07.01 General

Concrete shall be removed to the limits necessary for proper installation of the expansion joint assembly and for proper performance of the joint. The removal limits shall be determined based on actual structural configuration and conditions. Any deteriorated concrete in the deck immediately adjacent to the expansion joint dam that would affect the construction and performance of the joint shall be removed and repaired.

Existing waterproofing of the deck that has been removed or damaged by the Design-Builder as part of the expansion joint replacement operation shall be replaced with hot-applied rubberised asphalt waterproofing and protection board according to the DSM.

Concrete shall be removed in such a manner as to prevent damage to the concrete to remain in place. Reinforcing steel, prestressing tendons, shear connectors, structural steel, utilities and all other components that are to remain in place shall not be damaged or loosened.

The Design-Builder shall ensure that the deck joint assemblies are placed in the location identified in the Contract Documents

Deck joint assemblies shall be installed according to the deck joint assembly Working Drawings.

Concrete work, except as specified herein, shall be according to OPSS 904.

Any damage to the corrosion protection system, including surface areas of field welds, shall be repaired to reinstate the manufacturer's corrosion protection system.

The threaded portion of the bolts and the underside of bolt heads shall be liberally coated with an antiseize compound immediately prior to installation.

The bolts that have been fully tensioned and require removal after final installation shall not be reused to fasten the clamping bars.

3273.07.02 Traffic Restrictions

Traffic, including construction traffic, shall not be permitted on any part of each stage of the deck joint assembly until all of the following conditions are met:

a) Concrete has cured for 7 Days.
b) Concrete has attained a minimum compressive strength of 25 MPa.
c) Epoxy injection has been completed.
d) Epoxy has cured for a minimum of 24 hours.
e) For cold weather, epoxy has cured for 48 hours after epoxy injection or the curing time as specified in the manufacturer's data sheet.
f) For Type A joints, the clamping bars have been installed.

3273.07.03 Splicing

The location and number of field and stage construction splices and method of splicing of metal components shall be as detailed on the deck joint assembly Working Drawings. For new construction, where the length of the expansion joint is greater than 15 m and a splice is required, a splice shall be located at a lane demarcation line near the centreline of the structure.

The preformed seal shall be continuous with no splices.

3273.07.04 Placing

The deck joint assemblies shall be placed after the asphalt paving operation has been completed.

Before placing the steel reinforcement, the concrete faces of the blockout shall be abrasive blast cleaned according to OPSS 929.

Immediately prior to placing the concrete in the blockout, the top setting devices shall be adjusted to give the specified setting width required by the deck joint assembly Working Drawings.

Concrete shall be placed in the blockout no later than 48 hours after the blockout surfaces have been abrasive blast cleaned or the blockout surfaces shall be reblasted. Abrasive blast cleaned concrete surfaces shall receive a bonding agent immediately prior to placing concrete. Concrete shall be placed and consolidated to minimize voids under the deck joint assembly.

The setting device boltholes for all nosing angles, as well as for the armouring angles, of the joints shall be drilled to a depth of 20 mm, air blast cleaned, and immediately filled with epoxy.

After installation of the deck joint assemblies, the Design-Builder shall saw cut a 20 mm wide groove for the full depth of asphalt adjacent to each steel nosing angle. The grooves shall be cleaned, dried, and filled with hot poured rubberized joint sealing compound according to OPSS 914.

When an expansion joint system with an approved elastomeric concrete is specified in the Contract, the mixing, placing, and curing requirements shall be according to the manufacturer's specifications.

3273.07.05 Epoxy Injection

Epoxy shall be injected into the injection hose system once concrete in the expansion joint blockouts has been in place for a minimum of 7 Days and has a minimum compressive strength of 25 MPa.

The epoxy shall be kept at a temperature of 20 °C ± 5 °C prior to its use.

Only the supplier of the expansion joint system or an agent approved by the supplier shall inject the epoxy used in the injection hose system.

Epoxy shall be mixed and pressure injected according to the manufacturer's specifications.

Epoxy injection shall not be performed in cold weather conditions without protection, when the ambient air temperature is below 5 °C or is likely to fall below 5 °C within 48 hours immediately following the epoxy injection.

3273.07.05 Field Installation of Preformed Seals and Bolted Components

Preformed seals shall be installed with lubricant in one continuous piece. Seals shall not be bent more than 30° at any one location.

Prior to installation of the preformed seal, all steel surfaces in contact with the preformed seal shall be cleaned and the gap completely clear for its full length and width to the depth of the bearing seat. The preformed seal and bolted components shall be installed according to the deck joint assembly Working Drawings. Adhesives and sealants shall not be used.

3273.07.06 Placing Joint Fillers and Waterstops

Joint fillers and waterstops shall be firmly fixed in position before any concrete is placed so that their final position in the concrete remains as shown in the Contract and are true to line and grade.

Field splicing of waterstops shall be by heat fusion.

3273.07.07 Placing Joint Seals and Joint Sealing Compounds

Concrete at all joints shall be sound, clean, dry, and free of all dust, debris, and deleterious material.

The joint face shall be true to line such that the joint seal shall bear on the joint face fully and uniformly.

Gaps forming longitudinal joints between structures shall be sealed with a joint seal made of ethyl vinyl acetate foam installed with the laminations horizontal.

Prior to installation of the joint seal, the joint recess shall be abrasive blast cleaned and air blasted according to OPSS 929 to remove laitance and deleterious material.

Adhesive shall be applied liberally to both vertical sides of the joint seal and to both vertical faces of the joint recess. Excess adhesive shall be removed immediately.

The joint seal shall be installed such that it remains below the level of the concrete surface when fully compressed.

The joint seals shall not be field spliced.

3273.07.08 Placing Hot Poured Rubberized Asphalt Joint Sealing Compounds

Hot poured rubberized asphalt joint sealing compound shall be installed according to OPSS 914 except that the temperature of the air and the materials that is going to be in contact with the sealing compound shall be 2 °C or greater at the time of installation.

3273.07.09 Samples

When requested by the Contract Administrator the Design-Builder shall, according to Table 1 in OPSS 1210, provide the Contract Administrator with a sample taken from the extra length of the preformed seal supplied for each joint included in the Work.

At the time of placement of concrete, the Design-Builder shall cast, cure, and transport cylinders for testing by the Ministry. Cylinders shall be delivered to the Regional Quality Assurance laboratory. Cylinders for testing shall include the following:

1) For 28-Day compressive strength, one set of two 150 mm diameter by 300 mm long cylinders shall be tested according to OPSS 1350.

2) For air void system parameters, one 100 mm diameter by 200 mm long cylinder shall be tested according to OPSS 1350.

3) For rapid chloride permeability, one 100 mm diameter by 200 mm long cylinder shall be tested at 28 Days according to ASTM C1202-10.

3273.07.10 Testing

The Design-Builder shall perform the deck joint assembly water test, in the presence of the Contract Administrator according to the requirements of Table 1 of this specification.

3273.08 PERFORMANCE REQUIREMENTS

3273.08.01 Performance Requirements

The work outlined in this specification shall meet or exceed all performance requirements identified in Table 1 upon completion of the Work and throughout the duration of the warranty period:

Table 1

Feature	Minimum Performance Requirements
Upon Completion of the Work and During the Warranty Period	
Deck Joint Assemblies	
Seals	• Seal held in retainer and not damaged or defective.
Armouring or Nosing Angles	• No voids under the Armouring or Nosing Angles.
Coatings	• Coatings are not damaged (upon completion).
Bolts	• Bolts torqued to required level according to the Working Drawings.
Water tightness	• No leakage when subjected to water for 1 continuous hour maintaining a minimum depth of 25 mm along the tested length and a minimum depth of 100 mm above the deck joint assembly at the gutter lines. The width shall extend 50 mm beyond the concrete dams on both sides of the deck joint assembly.
Surface tolerance across the deck joint	• Deck joint assembly not higher than adjacent pavement and not greater than 3 mm below the adjacent pavement.
Concrete in Deck Joint Assemblies	
Compressive Strength	• Equal to or greater than the minimum design 28-Day strength, and not less than 30 MPa.
Air Void System	• Minimum air content = 3% • Maximum spacing factor = 0.230 mm
Rapid Chloride Permeability	• Less than or equal to 2500 coulombs at 28 Days.
Cracks	• Width of cracks shall be less than 0.30 mm (width of crack is measured at the widest point of the crack (not average width of crack)) and there shall be no rust staining or bleeding due to corrosion of embedded steel.
Soundness	• No delaminated or spalled concrete.
Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds, and Waterstops	• Seal in place and not damaged or defective. • No leakage when subjected to water for 1 continuous hour.

3273.08.02 Performance Indicators

The Ministry, at its discretion, may collect performance indicators. The collection may consist of up to 100% of the contract area and the exact location will be at the Ministry's discretion. A more thorough data collection may be carried out if there is evidence of non-conformance. The additional data collection may include a review of the Design-Builder's records, plans and actions taken.

The performance indicators that the Ministry collects will be shared with the Design-Builder and will be the only indicators used by the Ministry to apply consequences for non-conformance.

3273.08.03 Conformance to the Performance Requirements

Upon completion of the collection of performance indicators, the Ministry will make an assessment of conformance or non-conformance to the performance requirements.

The Ministry will have the complete discretion in the choice of performance indicators to use in determining conformance. The assessment however, will include consideration of events that are beyond the care and control of the Design-Builder. The Ministry will examine all relevant factors involved with the situation including the Design-Builder's rationale as to why the situation occurred.

If, after completing the collection of performance indicators, assessing all the relevant data, including data provided by the Design-Builder, a non-conformance is determined, a Notice of Non-Conformance may be issued to the Design-Builder for features that do not conform to the performance requirements.

3273.08.04 Consequences for Non-Conformance to the Performance Requirements

The Design-Builder shall be responsible for performing all specified Consequences for Non-conformance to the Performance Requirements.

3273.08.04.01 Consequence Tables

The Consequences for Non-Conformance to the Performance Requirements are described in Table 2:

Table 2 – Consequences for Non-Conformance

Feature	Consequences for Non-Conformance
Deck Joint Assemblies	
Seals	• Remove and replace.
Armouring or Nosing Angles	• Voids under the Armouring or Nosing Angles epoxy injected.
Coatings	• Repaired according to the manufacturer's instructions.
Bolts	• Missing or loosened bolts shall be replaced and torqued according to the Working Drawings.
Water tightness	• Repair or replace joint, until water tightness is tested and achieved.
Surface tolerance across the deck joint	• Remove and replace.
Concrete in Deck Joint Assemblies	
Compressive Strength	• Remove and replace.
Air Void System	• Remove and replace.
Rapid Chloride Permeability	• Remove and replace.
Cracks	• Repair cracks greater than 0.30 mm in width and those showing rust bleeding (Design-Builder shall submit repair proposal for approval by the Ministry).
Soundness	• Remove and replace.
Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds, and Waterstops	• Remove and replace.

3273.09 WARRANTY REQUIREMENTS

3273.09.01 Warranty

The Design-Builder shall warrant that the deck joint sssemblies and the placing of preformed seals, joint fillers, joint seals, joint sealing compounds, and waterstops will meet all performance requirements for the duration of the warranty period.

Notwithstanding the above warranty, the Design-Builder shall not be responsible for repairing damage to deck joint assemblies and the placing of preformed seals, joint fillers, joint seals, joint sealing compounds, and waterstops resulting from events beyond the Design-Builder's control, as determined by the Ministry, such as chemical and fuel spills, fires, and traffic accidents.

3273.09.02 Warranty Period

The warranty shall begin on the date of the Completion Certificate and shall continue for five (5)

years.

3273.09.03 Termination of the Warranty

The Ministry shall terminate the warranty by issuing the “Release from Warranty” notice no later than 30 Days after the Ministry confirms that the repair and performance requirements were met or exceeded.

3273.09.04 Non-Compliance to the Warranty

Failure to comply with the requirements of the warranty may be referred to the Ministry of Transportation’s Qualification Committee using the infraction report process without prejudice to any right or remedy the Ministry may have in law.

OPSS 539, November 2014, **CONSTRUCTION SPECIFICATION FOR TEMPORARY PROTECTION SYSTEMS**, is deleted in its entirety and replaced with the following:

539.01 SCOPE

This specification covers the requirements for the design, construction, maintenance, monitoring, and removal of a temporary protection system.

539.02 REFERENCES

This specification refers to the following specifications, standards, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 903 Deep Foundations as modified by DBSP 0903
OPSS 904 Concrete Structures as modified by DBSP 0904
OPSS 906 Structural Steel for Bridges as modified by DBSP 0906
OPSS 942 Prestressed Soil and Rock Anchors

Ontario Provincial Standard Specifications, Material

OPSS 1350 Concrete – Materials and Production as modified by DBSP 1350
OPSS 1601 Wood Material, Preservative Treatment, and Shop Fabrication

Ontario Ministry of Transportation Publications

Structural Manual

CSA Standards

S6-06 Canadian Highway Bridge Design Code

Ontario Ministry of Labour

Occupational Health and Safety Act, R.S.O. 1990, c.O.1, as amended

American Association of State Highways Transportation Officials (AASHTO)

AASHTO Guide Design Specification for Bridge Temporary Works, 1st Edition with Interim Revisions

International Organization for Standardization/International Electrotechnical Commission

(ISO/IEC)

17025 General Requirements for the Competence of the Testing and Calibration Laboratories

539.03 DEFINITIONS

For the purpose of this specification, the following definitions apply.

Anchor means:
a) A system consisting of prestressed tendons or non-prestressed rods installed in predrilled holes and encapsulated in grout or concrete. A system that derives its load carrying capacity in bond between the grout/concrete body and the surrounding soil or rock; or
b) A tie back to a deadman.

Bracing means the system of walers, struts, anchorages, and like members that connect frames, shores, or panels of a sheathing system to resist external pressures and to provide stability against lateral movement.

Certificate of Conformance means a document issued by the Quality Verification Engineer confirming that the specified components of the work are in general conformance with the requirements of the Contract Documents.

Cofferdam means a watertight enclosure.

Design Check Engineer means the Engineer retained by the Contractor to check the design and co-stamp the design drawings.

Design Engineer means the Engineer retained by the Contractor who has sealed and signed the Issued for Construction Drawings and/or Working Drawings required to complete all or part of the work specified in the Contract.

Dredge Line means the exposed lower limit of the protection system.

Engineer means a professional engineer licensed by the Professional Engineers of Ontario to practice in the province of Ontario.

Erector means a supervisory person that undertakes the construction of a protection system.

Protection System means the construction necessary to mechanically support existing or proposed work such that its function shall not be affected or construction necessary to support work such as open excavations during actual construction operations for safety and convenience.

Quality Verification Engineer means an Engineer qualified to provide the quality verification engineer services specified in the Contract Documents.

Raker means a structural member inclined to the front of the shoring wall providing lateral

support.

Shoring Wall means a structural wall consisting of wood, steel or concrete or any combination of these materials that supports earth or rock and any structure, materials, Utilities, or other facility contained in or on the supported earth or rock mass.

Top of Shoring Wall means the upper limit of the protection system.

539.04 DESIGN AND SUBMISSION REQUIREMENTS

539.04.01 Design

539.04.01.01 General

The protection system shall be designed for the performance level as specified in the Contract Documents.

The Contractor shall be responsible for the complete detailed design of the protection system required to carry out the work shown in the Contract Documents.

Protection systems that are not specified in the Contract Documents shall be assigned an appropriate performance level for design by the Design Engineer. The Design Engineer shall review the performance level selected at the time of submission of the specified Working Drawings.

The geotechnical and foundation portions of the design shall be based on a method published in AASHTO Guide Design Specification for Bridge Temporary Works and in general conformance with the CAN/CSA-S6. The design shall be appropriate for the specific site conditions.

A protection system shall be designed to provide protection for excavations at the locations as specified in the Contract Documents and at any other location where the stability, safety, or function of an existing structure or Utility may be impaired by construction work.

The temporary slope geometry used to determine requirements of the protection system shall be according to the Occupational Health and Safety Act.

Performance levels for protection systems are as follows:

Performance Level	Maximum Angular Distortion	Maximum Horizontal Displacement
1a	1:1000	5 mm
1b	1:1000	10 mm
2	1:200	25 mm
3	1:100	50 mm

Where:
Angular Distortion = $\pm \Delta/H$
Δ = Horizontal displacement (mm) at height H
H = Height (mm) above dredge line to point of measurement or height above the nearest system restraining support.

When performance level 1a is specified the bracing system shall be preloaded.

Where the bracing systems are preloaded, the effects of the preload shall not cause damage to adjacent facilities.

Protection systems with a face within a horizontal distance of ⅓ H of any part of a structure foundation shall be designed for performance level 1a.

539.04.01.02 Designer Qualifications

The Design Engineer shall have demonstrated expertise for the work. The Design Engineer shall have a minimum of 5 years' experience in designing protection systems of similar nature and scope to the required work.

The Design Check Engineer shall have demonstrated expertise for the work. The Design Check Engineer shall have a minimum of 5 years' experience in designing protection systems of similar nature and scope to the required work.

539.04.01.03 Design Assumptions

The design assumptions shall accurately represent the subsurface conditions prevalent at the site and shall be specific to the type of protection system used. The design shall address the subsurface conditions at the project site reported in the Contract Documents.

539.04.01.04 Vertical and Horizontal Loadings

Vertical and horizontal design loadings used shall represent existing conditions and accepted design practice. Future loadings that are known and may affect the protection system during its useful life shall be considered.

539.04.02 Submissions

539.04.02.01 Working Drawings

The Contractor shall submit 3 sets of Working Drawings to the Contract Administrator prior to commencement of the protection system installation, for information purposes only. Prior to making a submission, the seals and signatures of a Design Engineer and a Design Check Engineer shall be affixed on the Working Drawings verifying that the drawings are consistent with the Contract Documents.

Where multi-discipline engineering work is depicted on the same Working Drawing and the

Design Engineer or Design Check Engineer or both are unable to seal and sign the Working Drawing for all aspects of the work, the drawing shall be sealed and signed by as many additional Design and Design Check Engineers as necessary.

Prestressed anchor submissions shall be according to OPSS 942.

When other authorities are involved, 1 set of Working Drawings shall be submitted for each authority prior to the commencement of false work construction. The requirements of each authority shall be satisfied prior to commencement of the protection system installation.

The Contractor shall have a copy of the Working Drawings at the site during protection system installation.

For protection systems that are not specified in the Contract Documents, the Contractor shall submit the Working Drawings for these systems to the Design Engineer prior to the commencement of any construction.

The following information and details shall be shown on the Working Drawings:

a) Plans, Elevations, and Details
   i. Location of protection system and station limits.
   ii. Plan and elevation of shoring showing the extent of the protection system.
   iii. Details of the shoring system, including cross-sections.
   iv. Details of internal bracing.

b) Design Criteria
   i. Pressure diagrams including values of horizontal and vertical loads, dead load, and live load surcharge.
   ii. Design assumptions and parameters.
   iii. Anchor bond stresses.
   iv. Pile design.
   v. Anchor system stressing schedule specifying working loads, stressing loads, and lock in loads.
   vi. Details of preload, when required.
   vii. For protection systems not specified in the Contract Documents, the performance level shall be designated.

c) Materials
   i. Grade of structural steel and grade and species of structural wood.
   ii. Concrete strengths.
   iii. Grout strengths.
   iv. Details of protection from rain and frost action.
   v. Wood lagging and size.
   vi. Mill certificates or test reports from an independent organization certified by the Standards Council of Canada certifying that the steel meets the requirements of the grade where specified.
   vii. Details of patented accessories, including load test data.

d) Installation Procedure
   i. Installation sequence and procedure, including to the installation of piling, lagging, anchor systems, and rakers.

e) Monitoring Method
   i. The proposed method of monitoring the performance of the protection system during installation and use. The method of monitoring shall be consistent with the requirements specified in the Quality Control subsection.

f) Removal of protection system
   i. The details of the procedures associated with the removal of the protection system indicating: method, sequence of work, and removal limits, except when the protection system is specified in the Contract Documents to be left in place.

539.04.02.02 Amendments to Protection Systems

Work shall not proceed on amendments to the protection system until the Contractor has received sealed and signed approval to proceed from the Design Engineer and Design Check Engineer and has submitted a copy of the approval to the Contract Administrator.

Amendments to the protection system shall be submitted to the Contract Administrator on revised Working Drawings bearing the seal and signature of the Design Engineer and Design Check Engineer.

539.04.02.03 Preconstruction Survey

Prior to commencing the work, the Contractor shall submit to the Contract Administrator, a condition survey of property and structures that may be affected by the work. The survey shall include the locations and conditions of adjacent properties; buildings; underground structures; Utility services; and structures, such as walls abutting the site within a horizontal distance of $2H_w$ from the face of the protection system, where H_w is the height of the wall from the ground surface to the dredge line.

539.04.02.04 Materials

539.04.02.04.01 Structural Steel

539.04.02.04.01.01 Mill Certificates

The Contractor shall submit to the Contract Administrator at the time of delivery 1 copy of the mill certificates, indicating that the steel meets the requirements for the appropriate standards for H-piles, tube piles, casings, and sheet piles.

Where mill test certificates originate from a mill outside Canada or the United States of America the Contractor shall have the information on the mill certificates verified by testing by a Canadian laboratory. The laboratory shall be certified by an organization accredited by the

Standards Council of Canada to comply with the requirements of ISO/IEC 17025 for the specific tests or type of tests required by the material standard specified on the mill test certificate. The mill test certificates shall be stamped with the name of the Canadian testing laboratory and appropriate wording stating that the material conforms to the specified material requirements. The stamp shall include the appropriate material specification number, the date (i.e., yyyy-mm-dd), and the signature of an authorized officer of the Canadian testing laboratory.

For Contractor designed protection systems using previously used structural steel that a mill test certificate is not available and coupons have not been tested to verify the steel's material properties, a mill test certificate is not required when the yield strength specified on the Working Drawings does not exceed 250 MPa. If the yield strength specified exceeds 250 MPa, the Contract Administrator may request that the material be tested to confirm the material properties indicated on the Working Drawings. The costs of this testing shall be covered by the Owner if the test results indicate that the material is according to the Working Drawings and by the Contractor if the test results indicate that the material is not according to Working Drawings.

539.04.02.05 Milestone Inspections

539.04.02.05.01 Excavation Depths Less Than or Equal to Three Metres

The Contractor shall notify the Contract Administrator 3 days prior to the completion of the following milestones.

The Quality Verification Engineer shall provide written permission to the Contractor to proceed to the next stage of the Work after each of the following interim inspections of the work and prior to commencement of the successive operation:

a) Installation of protection system, including excavation to dredge line.
b) Removal of protection system.

A copy of the written permission to proceed shall be submitted to the Contract Administrator prior to commencement of the next operation.

539.04.02.05.02 Excavation Depths Exceeding Three Metres

The Contractor shall notify the Contract Administrator 3 days prior to the completion of the following milestones.

The Quality Verification Engineer shall provide written permission to the Contractor to proceed to the next stage of the Work after each of the following interim inspections of the work and prior to commencement of the successive operation:

a) Layout and extent of protection system.
b) Piling.
c) Installation of protection system, including excavation to dredge line.
d) Removal of protection system.

A copy of the written permission to proceed shall be submitted to the Contract Administrator prior to commencement of the next operation.

539.05 MATERIALS

539.05.01 Wood

Wood shall be according to OPSS 1601.

Wood shall be of the size, grade, and species shown on the Working Drawings and shall be in sound condition, free from defects that may impair its strength. Wood lagging does not have to be grade-stamped.

539.05.02 Proprietary Shoring and Patented Accessories

Where proprietary shoring or patented accessories are to be used, the Contractor shall follow the manufacturers' recommendations for load carrying capacity. The recommended load carrying capacities shall be supported by test results from an accredited testing laboratory approved by the Owner.

539.05.03 Concrete

Concrete shall be according to DBSP 1350, as amended.

539.05.04 Other Materials

The Design Engineer may consider other suitable materials when sufficient information is available to quantify the allowable design loads or when the manufacturer's recommendations regarding load carrying capacities are supported by test results from an independent organization accredited by the Standards Council of Canada.

539.06 EQUIPMENT – Not Used

539.07 CONSTRUCTION

539.07.01 General

The Contractor shall be responsible for the design, materials, construction, maintenance, monitoring, and removal of a temporary protection system.

The erector shall be experienced in the method of construction of protection systems. Such experience shall have been obtained within the preceding 5 years on projects of similar nature and scope to the required work.

Protection systems shall be built according to the specifications and the Working Drawings.

Piling shall be according to DBSP 0903, as amended, and the Working Drawings.

Concrete construction shall be according to DBSP 0904, as amended. Concrete shall be placed in the dry. Where cofferdams are used they shall be sealed sufficiently to permit concrete to be placed in the dry.

The Contractor shall carry out dewatering as required to facilitate the installation of the protection system.

Tremie concrete shall be placed according to the requirements of DBSP 0904, as amended.

Structural steel shall be according to DBSP 0906, as amended, and the Working Drawings. Prestressed anchors shall be supplied, installed, and stressed according to OPSS 942.

The protection system shall be protected from the detrimental effects of rain and frost action.

Material used in the protection system shall remain the property of the Contractor.

Loss of soil from behind the shoring shall be prevented during and following the installation of the lagging.

539.07.02 Removal of Protection Systems

Protection systems shall be removed from the right-of-way unless it is specified in the Contract Documents that the protection system may be left in place.

Where piles are left in place, the top shall be removed to at least 1.2 m below the finished grade or ground level or at least 0.6 m below the streambed.

The method and sequence of removal shall be such that there shall be no damage to the new work, existing work, and facility being protected.

All disturbed areas shall be restored to an equivalent or better condition than existed prior to the commencement of construction.

539.07.03 Quality Control

539.07.03.01 General

In addition to the quality control measures instituted by the Contractor, the Contractor shall complete a preconstruction condition survey and monitor the protection system installation as specified herein and as shown on the Working Drawings.

539.07.03.02 Inspection of Welds

The Contractor shall be responsible for visual inspection of all welds. Any required testing of welds shall be as specified by the Design Engineer of the protection system.

539.07.03.03 Monitoring

539.07.03.03.01 General

Monitoring shall be conducted by a Registered Ontario Land Surveyor or Design Engineer according to the program submitted with the Working Drawings.

The minimum requirements for monitoring shall include the survey measurements of scaled targets attached to the shoring wall at the elevations specified. The scaled targets shall be placed at a maximum spacing of 6 m with targets placed at the extreme ends and the targets distributed between the outer limits. The survey targets shall be monitored for horizontal displacement from the vertical at the frequency specified.

All test results, observations, and records, including the preconstruction survey, taken during construction and operation of the protection system shall be available on the site for review by the Contract Administrator.

If movement of the protection system is more rapid than is expected, or, if movement approaches the allowable limit, the Contract Administrator shall be notified immediately, and suitable measures shall be taken to ensure stability of the protection system and to ensure movement does not exceed the performance level specified in the Contract Documents.

539.07.03.03.02 Excavation Depths Less Than or Equal to Three Metres

The protection systems shall be monitored during construction. Readings shall be taken during installation of the protection system at the top of the protection system at each construction stage during the installation. After installation the above readings shall be taken every two weeks.

539.07.03.03.03 Excavation Depths Exceeding Three Metres

The protection systems shall be monitored during construction. Readings shall be taken during installation of the protection system at the top, at each restraint point, at the dredge line, and halfway between the restraint points at each construction stage during the installation of the protection system. After installation the above readings shall be taken weekly.

539.07.03.04 Certificates of Conformance

539.07.03.04.01 Excavation Depths Less Than or Equal to Three Metres

For protection systems to facilitate excavation depths less than or equal to 3 m and provided that surcharge loading due to vehicular traffic, construction equipment and materials, or other is beyond a horizontal distance defined by a 1H:2V line projected from the dredge line at the face of the protection system to the roadway surface, a completed Certificate of Conformance shall be submitted to the Contract Administrator upon completion of the operation of the protection system and removal of the protection system. The Quality Verification Engineer's seal and signature shall be affixed on the completed Certificate of Conformance confirming that the protection system was installed, monitored, and subsequently removed in general conformance

with the Working Drawings and Contract Documents.

Should traffic be within a horizontal distance defined by a 1H:2V line projected from the dredge line at the face of the protection system to the roadway surface, the Certificate of Conformance requirements as specified in the Excavation Depths Exceeding Three Metres clause shall apply.

539.07.03.04.02 Excavation Depths Exceeding Three Metres

For protection systems to facilitate excavation depths that exceed 3 metres or should traffic, construction equipment and materials, or other be within a horizontal distance defined by a 1H:1V line projected from the dredge line at the face of the protection system to the roadway surface, a completed Certificate of Conformance shall be submitted to the Contract Administrator upon completion of the operation of the protection system and removal of the protection system. The Quality Verification Engineer's seal and signature shall be affixed on the completed Certificate of Conformance confirming that the materials have been supplied and installed in general conformance with the Working Drawings and that the protection system was installed, monitored, and subsequently removed in general conformance with the Working Drawings and Contract Documents.

539.07.04 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

539.08 QUALITY ASSURANCE – Not Used

539.09 MEASUREMENT FOR PAYMENT – Not Used

539.10 BASIS OF PAYMENT – Not Used

OPSS 902, November 2010, **CONSTRUCTION SPECIFICATION FOR EXCAVATING AND BACKFILLING - STRUCTURES**, is deleted in its entirety and replaced with the following:

902.01 SCOPE

This specification covers the requirements for excavating and backfilling for structures, including dewatering.

902.02 REFERENCES

This specification refers to the following specifications, standards, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 206 Grading
OPSS 501 Compacting
OPSS 510 Removal
OPSS 518 Control of Water from Dewatering Operations
OPSS 539 Temporary Protection Systems as modified by DBSP 0539

Ontario Provincial Standard Specifications, Material

OPSS 1004 Aggregates - Miscellaneous
OPSS 1010 Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1205 Clay Seal
OPSS 1860 Geotextiles

902.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Bedding means granular material to be placed in areas so designated in the Contract Documents.

Certificate of Conformance means a document issued by the Quality Verification Engineer confirming that the specified components of the work are in general conformance with the requirements of the Contract Documents.

Channel means a natural or artificial watercourse.

Culvert means a structure that provides an opening through an embankment and to which roadway loads are distributed through fill or that is designated as a culvert in the Contract

Documents.

Design Engineer means the Engineer retained by the Contractor who has sealed and signed the Issued for Construction Drawings and/or Working Drawings required to complete all or part of the work specified in the contract.

Designated Payment Surface means the original ground surface shown in the Contract Documents, unless a specially designated payment surface is shown either by elevation or by profile. The specially designated payment surface is horizontal in the transverse direction.

For rock excavation the designated payment surface shall be the existing rock surface as established in the field before rock excavation begins, unless another designated payment surface is specified.

Earth means all soils except those defined as rock, and excludes stone masonry, concrete and other manufactured materials.

Engineer means a professional engineer licensed by the Professional Engineers of Ontario to practice in the Province of Ontario.

Foundation means that portion of the ground below the structure base or footings that supports the structure or that portion of the ground supporting the pile caps.

Quality Verification Engineer means an Engineer qualified to provide the quality verification engineer services specified in the Contract Documents.

Rock means natural beds or massive fragments, of the hard, stable, cemented part of the earth's crust, igneous, metamorphic, or sedimentary in origin, which may or may not be weathered, and includes boulders having a volume of 1 cubic m or greater.

Soil means all loose or moderately cohesive organic or inorganic deposits of the earth's crust such as silt, sand, gravel, or clay or any of their mixtures.

Structure means any bridge, tunnel, concrete culvert, retaining wall, dock, guide way, or sign support.

902.04 DESIGN AND SUBMISSION REQUIREMENTS

902.04.01 Design Requirements

902.04.01.01 Dewatering

Where dewatering is required, the Contractor shall be responsible for the design of the dewatering scheme for the intended purpose.

902.04.02 Submission Requirements

902.04.02.01 Preconstruction Survey

Prior to commencing the work, a condition survey of property and structures that may be affected by the work shall be submitted to the Contract Administrator. The survey shall include the locations and conditions of adjacent properties; buildings; underground structures; Utility services; and structures, such as walls abutting the site.

902.04.02.02 Milestone Inspections

The Contractor shall notify the Contract Administrator 3 days prior to the completion of the following milestones.

The Quality Verification Engineer shall provide written permission to the Contractor to proceed to the next stage of the Work after each of the following interim inspections of the work and prior to commencement of the successive operation:

a) Dewatering of excavation for structure.

b) Completion of excavation for foundation.

c) Excavation for backfill and frost tapers.

d) Backfilling.

A copy of the written permission to proceed shall be submitted to the Contract Administrator prior to commencement of the next operation.

902.05 MATERIALS

902.05.01 Granular

Granular material to be used for backfill, bedding, and frost tapers shall be according to OPSS 1010.

The 19.0 mm clear stone to be used for wall drains shall be according to OPSS 1004.

902.05.02 Native Backfill

Native and imported material shall be approved by the Design Engineer. All material shall be free from frozen lumps, cinders, ashes, refuse, vegetable or organic matter, rocks and boulders over 150 mm in any dimension, and other deleterious material.

902.05.03 Clay Seal

Clay seal shall be according to OPSS 1205.

902.05.04 Geotextile

Geotextile shall be according to OPSS 1860 and be of the type, class, and filtration opening size (FOS) range specified in the Contract Documents.

902.06 EQUIPMENT

902.06.01 Compaction Equipment

Compaction equipment shall be according to OPSS 501.

902.07 CONSTRUCTION

902.07.01 Removals

Removals shall be according to OPSS 510.

902.07.02 Removal of Ice and Snow

All ice and snow shall be removed from all portions of the work area before any excavation and backfill operations proceed. Frozen materials shall not be incorporated into the work. Material shall not be placed over frozen ground, ice, or snow.

902.07.03 Protection Systems

Protection systems shall be according to DBSP 0539, as amended.

Protection systems shall be installed:

a) Where the stability, safety, or function of an existing structure, roadway, railway, or other facility can be impaired by an excavation or temporary slope.

b) To permit excavation where there is a necessity to retain the sidewalls of an excavation and to permit dewatering by restricting water flow and facilitating safe execution of the work.

902.07.04 Dewatering Structure Excavation

Until backfilling has been completed and to permit the placing of concrete in the dry, the Contractor shall carry out all work necessary to control the flow of water into the excavation and to prevent disturbance of the founding material.

Control of water shall be according to OPSS 518.

All temporary dewatering shall remain the property of the Contractor and shall be removed from the right-of-way when they are no longer required.

902.07.05 Excavation

902.07.05.01 General

Deterioration of the foundation soil or rock, surface water from entering and eroding the face of the excavation, and build up of hydrostatic pressures that may have harmful effects upon the temporary or permanent structures shall be prevented.

902.07.05.02 Excavation for Foundations

Excavation for footings, working slabs, and granular pads shall be to the neat lines specified in the Contract Documents.

The bottom of the excavation on which the footing, working slab, or granular pad is to rest shall not be disturbed. In soft conditions, construction of the footing or structural slab shall commence immediately after the final removal of material to the foundation level has been completed.

In the case of concrete culverts of the open footing type, no excavation shall be made between the footings below the level of the stream bed or the top of the footings, whichever elevation is lower, unless authorized in writing by the Design Engineer.

The elevation of the bottom of the footing, working slab, or granular pad shall not be changed without the approval of the Design Engineer.

Over excavated areas shall be restored to their original conditions. Over excavated areas shall be backfilled with a material suitable for the particular application and approved by the Design Engineer. Concrete fill shall be used for over excavation in rock. Where material other than concrete is used, the material shall be compacted to the dry density specified in OPSS 501.

When authorized by the Design Engineer, additional excavation, as may be required, shall be carried out.

902.07.05.03 Excavation for Backfill and Frost Tapers

Excavation for backfill and frost tapers shall be to the neat lines specified in the Contract Documents.

Over excavated areas shall be restored with material approved by the Design Engineer. The material shall be compacted to the dry density specified in OPSS 501.

902.07.05.04 Preservation of Channel

Where a channel cross-section is altered, it shall be restored to its original condition.

902.07.06 Backfilling

902.07.06.01 General

Frozen materials shall not be incorporated into the work.

Footings shall be protected against frost action.

Other than the backfill placed to the tops of the footings, no fill shall be placed against an abutment, wing wall, retaining wall, or concrete culvert until the concrete has reached 70% of its design strength.

Backfilling around culverts, arches, rigid frames, and piers shall proceed simultaneously and evenly on both sides of the structure. The differential in surface elevation of the backfill material on each side of the structure and individual component shall not be greater than 500 mm.

All voids around abutments, piers, or other permanent work shall be backfilled to the level of the surrounding ground or to the grade specified in the Contract Documents, whichever is the lower before the general backfilling commences.

When rock fill is to be placed around a structure the structure shall be protected to prevent damage from the rock fill.

The minimum height of fill specified in the Contract Documents shall be placed before traffic or construction equipment shall pass over the culvert.

Granular material shall be placed within the lines and grades specified in the Contract Documents.

Wall drains shall have a 0.05 m^3 pocket of 19 mm minimum size clear stone wrapped in geotextile placed over the opening of the wall drain at the backfilled side of the wall.

902.07.06.02 Compaction

Backfill shall be placed according to OPSS 206 and compacted according to OPSS 501.

Only hand operated vibratory type compaction equipment shall be used for compaction of fill material within the restricted zone behind all earth retaining structures.

902.07.07 Clay Seal

When specified in the Contract Documents, clay seals shall be placed to the dimensions shown.

902.07.08 Certificate of Conformance

A completed Certificate of Conformance shall be submitted to the Contract Administrator upon completion of the work. The Quality Verification Engineer's seal and signature shall be affixed

on the completed documentation confirming that the work has been carried out in general conformance with the Contract Documents.

902.07.09 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

902.08 QUALITY ASSURANCE - Not Used

902.09 MEASUREMENT OF PAYMENT - Not Used

902.10 BASIS OF PAYMENT - Not Used

CONSTRUCTION SPECIFICATION FOR DEEP FOUNDATIONS

OPSS 903, Construction Specification for Deep Foundations, is deleted in its entirety and replaced with the following:

903.01 SCOPE

This specification covers the requirements for the supply and installation of deep foundation units.

903.02 REFERENCES

This specification refers to the following specifications, standards, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 904	Concrete Structures as modified by DBSP 0904
OPSS 905	Steel Reinforcement for Concrete
OPSS 909	Prestressed Concrete - Precast Girders as modified by DBSP 0909
OPSS 911	Coating Structural Steel Systems

Ontario Provincial Standard Specifications, Material

OPSS 1302	Water
OPSS 1350	Concrete - Materials and Production as modified by DBSP 1350
OPSS 1440	Steel Reinforcement for Concrete

CSA Standards

G40.20-04/G40.21-04 (R2009)	General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
CAN3-056-1962(R2006)	Round Timber Piles
O80 Series-08	Wood Preservation
W47.1-03 (R2008)	Certification of Companies for Fusion Welding of Steel
W48-06	Filler Materials and Allied Materials for Shielded Metal Arc Welding
W59-03(R2008)	Welded Steel Construction (Metal Arc Welding)
W178.1-08	Certification of Welding Inspection Organizations
W178.2-08	Certification of Welding Inspectors

Canadian General Standards Board (CGSB)

48.9712-2006 Non-destructive Testing, Qualification and Certification of Personnel

ASTM International

A 252-98(2007)	Welded and Seamless Steel Pipe Piles
A 328/A 328M-07	Steel Sheet Piling
D 1143/ D 1143M-07	Standard Test Methods for Deep Foundations under Static Axial Compressive Load
D 3689-07	Standard Test Methods for Deep Foundations under Static Axial Tensile Load
D 3966-07	Standard Test Method for Deep Foundations under Lateral Loads

American Petroleum Institute (API)

API 13A	Drilling Fluid Materials, 17th Edition, 10.00.08
RP 13B-1	Standard Procedure for Field Testing Water Based Drilling Fluids, 4th Edition,

Steel Structures Painting Council (SSPC)

SP10/NACE No.2-Jan. 1, 2001 Near-White Blast Cleaning

International Organization for Standardization/International Electrotechnical Commission (ISO/IEC)

17025	General Requirements for the Competence of the Testing and Calibration Laboratories

903.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Anvil means the component of a diesel hammer that acts as an impact block for the ram

Bedrock means a natural solid bed of the hard, stable, cemented part of the earth's crust, igneous, metamorphic, or sedimentary in origin that may or may not be weathered.

Caisson Pile means a cast in place deep foundation unit with or without an enclosing liner formed by placing concrete in a bored or excavated hole.

Cap Block means a material placed on top of the helmet to cushion the blow of the hammer and to attenuate the peak impact energy without causing excessive loss of the impact energy.

Casing means open ended enclosing cylindrical steel tubing or pipe permanently installed in the ground. Casings are structurally required and can be used to stabilize and excavated hole.

Certificate of Conformance means a document issued by the Quality Verification Engineer confirming that the specified components of the work are in general conformance with the requirements of the Contract Documents.

Deep Foundation Unit means a structural member, driven or otherwise, installed in the ground to transfer the loads from a structure to soil or rock and derives supporting resistance from the surrounding soil or rock or from the soil or rock strata below its tip or a combination of both.

Design Engineer means the Engineer retained by the Contractor who has sealed and signed the Issued for Construction Drawings and/or Working Drawings required to complete all or part of the work specified in the contract.

Displacement Caisson Pile means a pile formed in the ground by driving a casing or liner with a concrete plug or an expendable metal plate attached to it and replacing the displaced soil with unreinforced or reinforced concrete.

Driven Pile means one of the following pile types: steel H, tube, or sheet piles; wooden pile; or precast reinforced concrete pile that has been installed by means of a pile driver.

Driving Shoe means reinforcement attached to the bottom of the pile and designed to protect the pile during driving or to penetrate into a hard stratum.

Driving to a Set means driving the pile to the requirement that satisfies pile driving criteria correlated to a required pile resistance.

Engineer means a professional engineer licensed by the Professional Engineers of Ontario to practice in the province of Ontario.

Follower means a removable extension that transmits the hammer blows to the head of the pile.

Helmet means a formed steel cap that fits over the top of a pile head to retain in position a resilient cap block.

Jetting means the use of a jet of water at high pressure directed into the ground below the pile tip to assist its penetration

Liner means open ended enclosing steel tubing or pipe temporarily installed in the ground to facilitate the construction of caisson piles

Pile means a relatively slender structural element that is installed, wholly or partly in the ground by driving, drilling, auguring, jetting, or other means.

Pile Cap means a footing or some other structural component used to transfer the load to the piles as well as maintaining them in position.

Pile Cushion means a pad of resilient material placed between the helmet and the top of a

precast reinforced concrete or wooden pile to minimize damage to the head during driving.

Pile Group means the piles supporting a pile cap.

Pumped Concrete means a method of transporting concrete through hose or pipe by means of positive and continuous pressure.

Quality Verification Engineer means an Engineer qualified to provide the quality verification engineer services specified in the Contract Documents.

Ram means the moving or driving part of an air, steam, diesel, or drop pile hammer that delivers an impact blow to an anvil and to the pile.

Retapping means verifying that the specified resistance previously attained has been sustained by imparting appropriate hammer energy to the pile and monitoring pile penetration.

Rock Points means a specially designed steel tip fitted to piles to enable them to be driven into hard, sound sloped bedrock.

Sheet Pile means a pile that is designed to interlock with adjacent piles and form a continuous wall for the purpose of resisting mainly lateral forces and to reduce seepage.

Slurry means a drilling fluid, consisting of water mixed with one or more of various solids or polymers, used to maintain the stability of the side walls and bottom of an excavation.

Tremie means a hopper with a vertical pipe used for placing concrete under water. The foot of the pipe is always submerged in concrete except during commencement of concreting and the upper level of the concrete in the pipe is always above water level.

903.04 DESIGN AND SUBMISSION REQUIREMENTS

903.04.01 Design Requirements

903.04.01.01 Concrete

The Contractor is responsible for providing plastic concrete with suitable characteristics for installation. The concrete shall be flow able, non-segregating concrete that does not exhibit rapid slump loss.

903.04.02 Submission Requirements

903.04.02.01 General

All submissions shall bear the seal and signature of the Design Engineer experienced in the field of deep foundations.

When welded field splices are used, the Contractor shall submit the welding procedures to the

Contract Administrator as documentation of quality and milestone activity. The Canadian Welding Bureau shall have approved the welding procedures.

903.04.02.02 Preconstruction Survey

Prior to commencing the work, the Contractor shall submit to the Contract Administrator, a condition survey of property and structures that may be affected by the work. The survey shall include the locations and conditions of adjacent properties; buildings; underground structures; Utility services; and structures, such as walls abutting the site.

903.04.02.03 Materials

903.04.02.03.01 Mill Certificates

The Contractor shall submit to the Contract Administrator at the time of delivery 1 copy of the mill certificates, indicating that the steel meets the requirements for the appropriate standards for H-piles, tube piles, casings, and sheet piles.

Where mill test certificates originate from a mill outside Canada or the United States of America the Contractor shall have the information on the mill certificates verified by testing by a Canadian laboratory. The laboratory shall be certified by an organization accredited by the Standards Council of Canada to comply to comply with the requirements of ISO/IEC 17025 for the specific tests or type of tests required by the material standard specified on the mill test certificate. The mill test certificates shall be stamped with the name of the Canadian testing laboratory and appropriate wording stating that the material conforms to the specified material requirements. The stamp shall include the appropriate material specification number, the date (i.e., yyyy-mm-dd), and the signature of an authorized officer of the Canadian testing laboratory.

903.04.02.03.02 Concrete

The Contractor shall submit a suitable, site-specific concrete mix design that meets the requirements of the hardened concrete to the Contract Administrator 14 days prior to construction, as documentation of quality and milestone activity.

903.04.02.03.03 Slurry

The Contractor shall submit the following to the Contract Administrator 14 days prior to construction, as documentation of quality and milestone activity:

a) The type, source, and physical and chemical properties of the bentonite or polymer.

b) The source of water.

c) Method of mixing slurry.

d) The water solids ratio and the mass and volumes of the constituent parts, including any chemical admixtures or physical treatment employed to produce slurry with the required

physical properties.

e) Details of procedure to be used for monitoring the quality of the slurry.

f) A test report showing the properties of the slurry and certifying that the slurry meets the requirements of API RP 13B-1.

g) Method of disposal of the slurry.

903.04.02.04 Installation

903.04.02.04.01 Driven Piles

The Contractor shall submit the following to the Contract Administrator 14 days prior to construction, as documentation of quality and milestone activity:

a) A schedule of work identifying time and sequence of activities.

b) Type of equipment, anvil, helmet, and hammer details, including the hammer energy assumed by the Contractor, stated potential energy (rated energy) of the hammer, operating efficiency, and weight of ram.

c) Working Drawings of precast concrete piles showing the pile dimensions, concrete strength, tendon arrangement, working stresses and arrangement of steel reinforcement, schedules, elongation calculations, method and sequence of casting, complete specifications and details of the prestressing steel, and lift anchors and lifting point locations.

d) The method of maintaining the steel reinforcement cages in position, when steel reinforcement cages are used in tube piles.

e) Procedure for monitoring pile installation.

f) Details of the method of attaching proprietary driving shoes.

g) When load testing is specified in the Contract Documents, details of the full-scale test, including site preparation and the details of the load application, components, equipment, testing apparatus, and method of monitoring.

h) Information pertinent to establishing the resistance of a pile when the wave equation analysis method is used.

903.04.02.04.02 Caisson Piles

The Contractor shall submit the following to the Contract Administrator 14 days prior to construction, as documentation of quality and milestone activity:

a) A schedule of work identifying time and sequence of activities.

b) Detailed procedures for caisson excavation in overburden and rock.

c) Detailed procedures for casing and liner installation and for the withdrawal of the liner.

d) Detailed procedures for slurry displacement method of excavation, including disposal of slurry upon completion.

e) Detailed procedures for tremie concrete, including the size of tremie delivery pipe.

f) Detailed procedure for placing concrete in the dry.

g) Method of maintaining the steel reinforcement cages in position in the caisson.

h) Details of filling the annular void around a casing.

i) Details of procedure to be used for monitoring installation.

j) When load testing is specified in the Contract Documents, details of the full-scale test, including site preparation, details of the load application, components, equipment, testing apparatus, and method of monitoring.

903.04.02.04.02.01 Milestone Inspections

The Contractor shall notify the Contract Administrator 3 days prior to the completion of the following milestones.

The Quality Verification Engineer shall provide written permission to the Contractor to proceed to the next stage of the Work after each of the following interim inspections of the work for caisson piles and prior to commencement of the next operation:

a) Excavation

b) Steel reinforcement installation

c) Placing of concrete

A copy of the written permission to proceed shall be submitted to the Contract Administrator prior to commencement of the initial and subsequent operation.

903.04.02.04.03 Displacement Caisson Piles

The Contractor shall submit the following to the Contract Administrator 14 days prior to construction, as documentation of quality and milestone activity:

a) A schedule of work identifying time and sequence of activities.

b) Type of equipment, anvil, helmet, and hammer details, including the hammer energy assumed by the Contractor, stated potential energy (rated energy) of the hammer, operating efficiency, maximum stroke or drop, and weight of the ram.

c) Details of procedures used for installation of displacement caisson piles, including detailed procedures for liner installation and withdrawal.

d) Method of maintaining the steel reinforcement cages in position in the pile.

e) Details of procedure to be used for monitoring pile installation.

f) When load testing is specified in the Contract Documents, details of the full-scale test, including site preparation, and the details of the load application, components, equipment, testing apparatus, and method of monitoring.

903.04.02.04.04 Steel Reinforcement Cages

The Contractor shall submit Working Drawings showing the fabrication details of the steel reinforcement cages, including the lifting points and lifting lugs, to the Contract Administrator 14 days prior to fabrication, as documentation of quality and milestone activity.

903.04.02.05 Qualifications

The Contractor shall submit copies of the Canadian Welding Bureau's certification of the Independent Testing Company, the Non-destructive Testing Technician, and the Welding Inspector to the Contract Administrator 5 days prior to the commencement of any non-destructive testing, as documentation of quality and milestone activity.

903.04.02.06 Review of Splice Test Results and Permission to Proceed

Upon completion of the testing of the splices, the Quality Verification Engineer shall review all test results to verify that all the welds were done according to the welding procedures and Contract Documents and issue the Contractor written permission to proceed with the work.

903.05 MATERIALS

903.05.01 Wooden Piles

Wooden piles shall be according to CAN3-056 and shall be clean and peeled. Treated piles shall be pressure treated with creosote according to CAN/CSA-080.

Wooden piles shall be provided with collars sufficiently strong to prevent splitting of the head of the wooden pile during driving.

903.05.02 Steel Piles

903.05.02.01 H-Piles

Steel H-piles shall be according to CAN/CSA G40.20/G40.21, Grade 350 W.

903.05.02.02 Tube Piles

Steel tube piles shall be according to ASTM A 252, minimum Grade 2.

903.05.02.03 Sheet Piles

Steel sheet piles shall be according to ASTM A 328M.

903.05.02.04 Straightness Tolerance for Steel Piles, Casings, and Liners

Steel piles, casings, and liners shall conform to a straightness tolerance of 1.5 mm maximum per metre of length.

Steel sheet piles shall be sufficiently straight to prevent binding in the interlock during driving.

903.05.03 Driving Shoes and Rock Points

Rock points and driving shoes shall be as specified in the Contract Documents.

Driving shoes shall transfer the driving stresses to the pile over the full cross-sectional area of the pile.

Where precast concrete piles are driven into dense or hard material, a steel driving shoe cast into the concrete shall be provided.

Where wooden piles are driven into dense material, a steel plate driving shoe shall be provided to prevent damage to the bottom of the pile.

903.05.04 Casing for Caissons

Casings shall be according to ASTM A 252, Grade 2. If welded, they shall be welded by the electric arc method according to CSA W59.

The casing wall thickness specified is the minimum that shall be supplied. The wall thickness shall be increased as required to ensure the casing is not damaged during handling and installation.

903.05.05 Steel Reinforcement

Steel reinforcement shall be according to OPSS 1440.

903.05.06 Concrete

903.05.06.01 General

Concrete shall be according to DBSP 1350.

903.05.06.02 Tube Piles

Concrete shall have a slump of 150 to 180 mm.

903.05.06.03 Caisson Piles

Concrete shall have a slump of 150 to 180 mm. When approved by the Design Engineer in writing, admixtures may be used. Where the liner is to be withdrawn, sufficient retarder shall be added to prevent arching of concrete during liner withdrawal and to prevent setting of concrete until after the liner is withdrawn.

903.05.07 Precast Concrete Piles

The production of precast reinforced concrete piles shall be according to DBSP 0904, OPSS 905, and DBSP 0909.

Steel reinforcement shall be placed such that direct loading during the ram stroke shall not occur.

Lifting anchors shall be at least 25 mm clear from reinforcement or prestressing steel in the pile.

Concrete in precast reinforced concrete piles shall be according to DBSP 1350 and have a nominal minimum 28-Day compressive strength of 45 MPa.

Concrete for precast reinforced concrete piles shall be cured according to DBSP 0904.

Concrete for precast reinforced concrete piles shall be placed in smooth mortar-tight forms that are supported to prevent excessive deformation or settlement during placing or curing.

Unformed surfaces shall be finished smooth.

When removed from the form, the pile shall present true, smooth, even surfaces free from honeycombs and voids. The pile shall be straight so that a line stretched from butt to tip on any face shall not be more than 25 mm from the face of the pile at any point.

Each precast reinforced concrete pile shall have the date of manufacture (i.e., yyyy-mm-dd) inscribed on it.

903.05.08 Slurry

903.05.08.01 Solids

Bentonite and polymers shall be according to API Spec 13A.

903.05.08.02 Water

Water shall be according to OPSS 1302.

903.05.08.03 Slurry Composition

The slurry shall consist of a stable colloidal suspension of pulverized solids or polymers thoroughly mixed with water. The density, viscosity, sand content, and pH of the slurry being used during excavation shall be according to API RP 13B-1.

903.06 EQUIPMENT

903.06.01 Hammers

Hammers shall be capable of installing the piles, casings, and liners to the depth or resistance specified in the Contract Documents, without damage to the portions that are not cut off.

The hammer used to chisel the rock point into the rock shall be capable of delivering a controlled blow in 10% increments ranging in energy from zero to the maximum hammer energy.

For precast reinforced concrete piles, the heaviest hammer practicable shall be employed and the stroke limited so as not to damage the piles. When choosing the size of the hammer, consideration shall be given to whether the pile is to be driven to a resistance or to a given depth.

903.06.02 Helmets and Striker Plates

The head of steel piles shall be protected by a striker plate or a helmet. Helmets shall have adequate and suitable cushioning material. Helmets and striker plates shall distribute the blow of the hammer evenly throughout the cross-section of the pile head.

903.06.03 Leads

Pile driver leads shall be built to afford freedom of movement for the hammer and shall be held in position at the top and bottom by guys, stiff braces, or other approved means to ensure support of the pile, casing, or liner while it is being driven. Swinging leads shall not be permitted.

Batter piles, casings, or liners shall be driven with leads aligned parallel to the axis of the pile, casing, or liner. The leads shall be equipped with a fixed, rigid, adjustable kicker.

903.06.04 Followers

When use of followers are specified in the Contract Documents, followers shall be of type, size, shape, length, and weight as to permit driving the pile, casing, or liner at the location and to the required depth or ultimate resistance specified in the Contract Documents. The follower shall be provided with a socket or hood carefully fitted to the top of the pile, casing, or liner to minimize loss of energy and to prevent damage to the pile, casing, or liner, and shall have sufficient rigidity to prevent "whip" during driving.

When followers are permitted, an identical follower shall be used when the set is being determined.

903.07 CONSTRUCTION

903.07.01 Transporting, Storing, and Handling Piles, Casings, Liners, and Reinforcing Steel Reinforcement Cages

903.07.01.01 General

Piles, casings, liners, and steel reinforcement shall be transported, stored, and handled in such a manner that damage is prevented and the strength of the components is not affected by deterioration or deformation.

Components shall be lifted and placed using appropriate lifting equipment, temporary bracing, guys, or stiffening devices so that the components are at no time overloaded, unstable, or unsafe.

Material shall be supported to prevent unequal settlement when stacked.

903.07.01.02 Wooden Piles

Cant hooks, dogs, pile pulls, or use of other lifting methods that might damage the integrity of the pressure treated surface shall not be used. Cuts or breaks in the surface of treated piling shall be given three brush coats of hot creosote oil. Bolt holes shall be treated with three applications of hot creosote oil applied with a bolt hole treater.

903.07.01.03 Handling Holes in Steel Piles

Unless otherwise approved by the Design Engineer, holes shall only be made in the portion of the pile to be cut off or in the portion of the pile to be encased in concrete.

When other holes are approved to be cut in a pile they shall be covered by splice plates placed on both sides of the section. The thickness and the mechanical properties of the plate material shall be at least equivalent to the pile material.

903.07.01.04 Precast Reinforced Concrete Piles

Precast concrete piles shall be handled only from the designated lifting points.

When lifting or transporting precast reinforced concrete piles lift anchors, slings, or other approved means shall be used. Care shall be taken when lifting and transporting to avoid any overstressing of the pile or cracking of the concrete.

Precast reinforced concrete piles shall be so handled to avoid breaking or chipping their edges.

Lift anchors shall be removed and the holes filled with a non-shrink grout or epoxy installed according to the manufacturer's recommendations.

903.07.01.05 Caisson Casings and Liners

Casings and liners shall be handled and stored in such a manner to avoid damage or distortion to them. The casings and liners shall be maintained circular within ± 2% of the casing or liner diameter.

903.07.02 Driven Piles

903.07.02.01 Pile Driving Requirements and Restrictions

Piles shall not be driven until embankment work or excavation work has been completed to the underside of the footing. When driving of the piles is completed, all material between the piles shall be removed to the correct elevation and any holes or voids created shall be filled to the correct elevation with compacted material approved by the Design Engineer.

Piles shall be installed at the locations specified in the Contract Documents and to the set or depth specified without being damaged. Damage to the pile, casing, or liner during driving shall be prevented by limiting the drop or energy and number of blows of the hammer. The hammer, helmet, cap block, striker plate, and pile shall be coaxial and shall sit squarely upon each other.

A shorter stroke shall be used and proper precaution shall be taken when there is a danger of damaging or over driving the piles, casing, or liners under conditions such as:

a) In the early stages of driving a long pile where a hard layer near the ground surface has to be penetrated.

b) Where there is very soft material of a considerable depth and a large penetration is achieved at each hammer blow.

c) Where it is anticipated the pile shall meet refusal on rock or other impenetrable soil.

d) When piles are driven onto sloping bedrock.

Damage to adjacent structures, Utilities, and fresh concrete shall be prevented during pile installation. Piles shall not be driven within a radius of 8 m of concrete that has been in place for less than 72 hours. Piles shall not be driven within a radius of 15 m of concrete that has been in place for less than 72 hours without the approval of the Design Engineer.

The tops of all piles shall be either square to the longitudinal axis of the pile or horizontal as indicated in the Contract Documents.

Piles shall not be forced into their proper position by the use of excessive manipulation. Pile damage due to excessive driving shall be avoided.

903.07.02.02 Driving Shoes and Rock Points

Driving shoes and rock points shall be installed in locations specified in the Contract Documents.

Driving shoes shall be welded in accordance with the Contract Documents.

When driving shoes are specified in the Contract Documents, the Titus H bearing pile point, standard model, may be substituted for the driving shoes.

When Oslo points are specified in the Contract Documents, the Titus H bearing pile point, rock injector model, may be substituted for the pile points.

Where proprietary driving shoes are used, they shall be welded or otherwise attached to the driven piles according to the manufacturer's specifications.

903.07.02.03 Splicing

903.07.02.03.01 General

Any damaged material shall be cut-off prior to splicing.

903.07.02.03.02 Wooden Piles

Wooden piles shall not be spliced.

903.07.02.03.03 H-Piles, Tube Piles, and Sheet Piles

Welding shall be according to CSA W59 and shall be done by a qualified welder employed by a firm certified according to CSA W47.1, Division 1 or Division 2.1.

Steel H-piles and steel tube piles may be spliced providing the pieces being spliced are not less than 3 m long. Splices in marine structures shall be located below the low water level, unless otherwise encased in concrete.

Sheet piles shall not be spliced without approval by the Design Engineer.

903.07.02.03.04 Precast Reinforced Concrete Piles

Precast reinforced concrete piles shall only be spliced when specified in the Contract Documents and the splices shall only be made with approved mechanical splicing devices.

903.07.02.04 Concrete in Steel Tube Piles

Concrete in steel tube piles shall be placed according to DBSP 0904.

903.07.02.05 Cutting Off Piles

903.07.02.05.01 General

Driven piles shall be cut to the elevation as specified in the Contract Documents.

The length of pile supplied shall be sufficient to ensure there is no damaged material below the cut off. Damaged material at the pile head shall be cut off.

Piles shall not be cut off until retapping, redriving, and specified load testing are complete.

903.07.02.05.02 Wooden Piles

Where wooden piles are broomed, splintered, or otherwise damaged below the cut-off elevation, the pile shall be considered defective and shall be replaced.

903.07.02.06 Protective Coating for Steel H and Steel Tube Piles

Exposed steel H and steel tube piles shall have a coal tar epoxy protective coating applied from an elevation 600 mm below the low water level or finished ground surface up to the top of the exposed steel.

The steel surfaces shall be cleaned according to SSPC-SP10 prior to application of a coal tar epoxy system that shall be according to OPSS 911.

903.07.02.07 Monitoring Driven Piles

903.07.02.07.01 General

The driving of piles shall be carefully monitored and controlled and pile driving records produced for each pile. The Quality Verification Engineer shall witness the work.

The Contractor shall not overdrive the piles. When driving to a specified ultimate resistance, driving to a set or driving to bedrock, the Contractor shall drive the piles to the anticipated tip elevation. If the piles do not reach set at the anticipated tip elevation, the Contractor shall notify the Design Engineer.

In soils where there is a possibility of piles moving upward due to ground heave, elevations of completed pile tops shall be measured at intervals while nearby piles are being installed. The readings shall be recorded and submitted to the Design Engineer and Contract Administrator (as documentation of quality and milestone activity) as the work proceeds.

903.07.02.07.02 Driving to a Specified Elevation

Piles shall be driven to an elevation specified in the Contract Documents. Driving piles to other elevations shall only be done when approved in writing by the Design Engineer.

903.07.02.07.03 Driving to a Specified Ultimate Resistance

903.07.02.07.03.01 General

The Quality Verification Engineer shall establish the reference set used to determine ultimate resistance and measure and record the set for individual pile acceptance.

The set and rebound measurements shall be obtained by the Quality Verification Engineer. The Quality Verification Engineer shall determine the measured ultimate resistance and verify that the design ultimate resistance has been achieved.

903.07.02.07.03.02 Driving to a Set

The founding elevation shall be established by driving to a set determined in accordance with the dynamic formula specified in the Contract Documents or by the application of the wave equation analysis procedure that verifies the pile resistance. This set shall be established on the first pile of every ten piles driven in a pile group.

The other piles shall be controlled by the pile penetration rate in blows per millimetre that correlates to the set.

When new conditions, such as change in hammer size, change in pile size, or change in soil material occur, new sets shall be determined.

903.07.02.07.03.03 Driving to Bedrock

When driving piles to bedrock, the Contractor shall adequately seat the pile on bedrock without damaging the pile.

Where rock points are used, the rock points shall penetrate into the rock. Piles driven using rock points shall be driven to ensure adequate seating on the bedrock without damaging the pile.

Driving of piles on sloping bedrock shall be stopped when initial contact is made with the bedrock. The bedrock elevation shall be recorded. Driving shall then continue, commencing with energy of 10% of the maximum energy of the hammer. The pile shall be driven in sets of 20 blows at this energy until no penetration is observed. Twenty additional blows shall be applied, and, if no penetration is observed, the energy shall be increased by an additional 10% and the above procedure repeated.

Driving shall continue with these stepped increases in energy and with the same series of blows as described above, until the pile has been seated on the bedrock.

If unrealistic excessive penetration per blow is observed, driving shall be stopped and this excessive penetration immediately reported to the Design Engineer.

The Quality Verification Engineer shall determine when the hammer energy can be increased and when the driving is complete for each pile.

903.07.02.07.04 Wave Equation Analysis

When requested by the Contract Administrator, the Contractor shall supply all equipment, material, and personnel to conduct the wave equation analysis procedure. The Quality Verification Engineer shall review the results of the analysis.

903.07.02.07.05 Hammer Performance

When requested by the Contract Administrator, the Contractor shall verify, in the presence of the Design Engineer, the hammer performance using the pile driving analyzer or other approved equivalent. Hammer performance shall be verified to ensure that the actual potential energy (rated energy) is not less than 90% of the stated potential energy. The Contractor shall provide all instrumentation, access, and assistance for the testing and monitoring as directed by the Design Engineer.

903.07.02.07.06 Retapping Tests on Piles

In each pile group, 10% of the piles rounded up to the next whole number, but no fewer than two piles, shall be retapped no sooner than 24 hours after installation of the individual pile to confirm that the ultimate axial resistance has been sustained.

Retapping of piles driven to bedrock is not required.

903.07.02.07.07 Retapping and Redriving Piles

When the retapping tests indicate that the ultimate axial resistance has not been achieved on any one pile, all piles in the group shall be retapped.

Where the retapping reveals that the ultimate axial resistance of the piles has not been achieved, the piles that have not achieved the ultimate axial resistance shall be redriven to the specified resistance.

Where piles have risen, the piles shall be redriven to the original depth.

903.07.02.08 Jetting

Jetting shall be carried out in such a manner that the resistance of the piles already in place and the safety of adjacent structures shall not be impaired. Jetting shall be stopped at least 1 m above the final expected pile-tip elevation and at least 1 m above the tip elevation of any piles previously driven within 2 m of the jet. Where piles are to be end bearing on rock, jetting may be carried to the rock surface.

The driving and jetting of precast reinforced concrete piles shall not be carried out simultaneously.

903.07.03 Caisson Piles

903.07.03.01 General

Caissons shall be constructed as specified in the Contract Documents.

The final bearing elevation shall be as specified in the Contract Documents or as determined by the Design Engineer. When permanent casings are not specified, the caisson shall be constructed in a drilled hole with or without the use of a temporary liner or slurry as determined by the Contractor.

903.07.03.02 Excavation

903.07.03.02.01 General

Sidewall stability shall be maintained throughout the excavation and concrete placement operation. Soil cave-in into the excavation hole shall be prevented.

The bottom of the excavation shall be cleaned before the start of concrete placement.

Excavation methods shall be such that the sides and bottom of the hole are straight and free of loose material that might prevent intimate contact of the concrete with undisturbed soil or bedrock.

Except when founded on sloping rock, the caisson bottom shall be level. On sloping rock, the caisson bottom may be stepped, with each step not greater than ¼ the diameter of the bearing area.

903.07.03.02.02 Casings

When an auger is used to excavate for a casing, the diameter of the auger shall be no greater than the outside diameter of the casing.

903.07.03.02.03 Liners

The diameter of the excavation for the installation of liners shall not exceed the diameter of the liner by more than 150 mm.

903.07.03.02.04 Slurry Method

The level of slurry in the excavation shall be sufficient to prevent the intrusion of water and to maintain a stable wall with no cave-in, sloughing, or basal heave.

Slurry shall be tested as specified in API RP 13B-1. The Contractor shall provide all test equipment required for the tests. A slurry sampler capable of obtaining samples at any depth within the caisson hole shall be available at all times.

At least 1 set of tests shall be completed every 4 hours during the slurry operation. Samples shall be taken from the mud tank and from within the caisson at a depth within 300 mm of the bottom.

903.07.03.03 Inspection of the Excavation

The bottom of excavations shall be visually inspected.

903.07.03.04 Dewatering

Where dewatering is required, the Contractor shall affect a dewatering scheme in such a manner as to prevent any disturbance to the base founding material. The dewatering shall not create subsidence or cause ground loss that may adversely affect the work or adjacent structures.

903.07.03.05 Backfilling Liners Left in Place

The annular space between a liner permanently left in place and shaft excavation shall be filled with concrete or fluid grout.

903.07.03.06 Steel Reinforcement

Steel reinforcement steel shall be installed according to OPSS 905. Steel reinforcement cages shall be checked to ensure conformance to the Working Drawings prior to installation and during placement of concrete.

The steel reinforcement cage shall be fabricated in one piece.

Welding of steel reinforcement and use of splices shall not be done unless specified in the Contract Documents.

The steel reinforcement shall not be displaced or distorted during the construction of the caisson.

903.07.03.07 Concrete

903.07.03.07.01 General

Concrete shall be placed in the caisson according to DBSP 0904, as amended, and as specified herein. Concrete shall be placed immediately following interim inspection of the caisson hole by the Quality Verification Engineer.

The reinforcement shall not be displaced or distorted during the construction of the caisson.

Arching of concrete during casing withdrawal shall be prevented.

903.07.03.07.02 Concrete Placed in the Dry

The concrete may be placed free fall provided the fall is vertically down the centre of the opening and transverse ties, spacers or other objects do not impede the free fall. In the event of interference with the concrete free fall, an elephant trunk or other means shall be used to prevent concrete segregation.

Concrete shall be placed in a continuous operation from the bottom to the top of the caisson or, where columns are cast integral with the caisson, to the elevation of the bottom of the column steel reinforcement cage. The concrete shall be vibrated for the last 1.5 m of the pour.

903.07.03.07.03 Concrete Placed Under Water or Under Slurry

Tremie or pumped concrete shall be carried out in one continuous operation. The tremie or pumping operation shall be a continuous flow of concrete that prevents the inflow of water or slurry.

Where tremie concrete is to be placed in a caisson under water, the Contractor shall maintain an adequate head of water within the excavations to prevent the inflow of water through the base or walls of the caisson as the concrete is being placed.

Where tremie is placed under slurry, the caisson shall be filled with concrete entirely by tremie and the method of deposition shall not be changed part way up the caisson.

When concrete placement is not started within 6 hours of acceptance of the excavation, the excavation shall be redrilled, cleaned, and the slurry tested before concrete placement commences.

903.07.03.07.04 Withdrawal of Liners

Arching of concrete during withdrawal of the liner shall be prevented.

During withdrawal, the bottom of the liner shall have a minimum embedment into the concrete being placed and a sufficient head of concrete shall be maintained above the bottom of the liner at all times to prevent intrusion of soil and water into the hole.

During withdrawal, upward or downward movement of the steel reinforcement shall be monitored. Upward or downward movement shall be restricted to 150 mm.

A theoretical concrete level shall be calculated based on the quantity of concrete placed and the caisson dimensions, and this theoretical level shall be compared to the actual level of concrete in the caisson to provide a check for possible separation of shaft concrete during liner withdrawal.

903.07.03.07.05 Founding Elevation

The final founding elevation shall be as specified in the Contract Documents or an elevation approved in writing by the Design Engineer. When casings are not specified in the Contract

Documents, the caisson shall be constructed in a drilled hole with or without the use of a liner or slurry as determined by the Contractor.

Except when founded on sloping unweathered bedrock, the caisson bottom shall be level. On sloping unweathered bedrock, the caisson bottom may be stepped, with each step not greater than one quarter the diameter of bearing area.

The bearing area of the caisson pile shall be approved by the Quality Verification Engineer prior to placing concrete.

903.07.04 Displacement Caisson Piles

Work shall be carried out in accordance with the displacement caisson pile suppliers' installation procedures. A permanent liner shall be used when specified in the Contract Documents.

The sequence of installation shall be such as to prevent damage to any recently completed piles.

The pile shall not be founded above or below the specified pile tip elevation without approval in writing from the Design Engineer.

The Quality Verification Engineer shall witness the pile installation operation.

903.07.05 Tolerances

903.07.05.01 Driven Piles

a) Cut-off elevation ± 25 mm.

b) Deviation from vertical not more than 1H:50V, except in the case of a pile cap or footing supporting only a single row of piles the deviation shall not be more than 1H:75V in the direction of the span.

c) The deviation from the specified inclination for battered piles shall not exceed 1H:25V.

d) The centre of the pile at the junction with the pile cap shall be within 150 mm measured horizontally of that specified except in the case of a pile cap or footing supported on a single row of piles the deviation shall not be more than 75 mm measured horizontally in the direction of the span.

903.07.05.02 Caissons and Displacement Caisson Piles

a) Cut-off elevation ± 25 mm.

b) Horizontal location at cut-off not more than 5% of shaft diameter or 75 mm, whichever is less.

c) Vertical alignment not more than 2% of the caisson length from vertical for vertical caissons,

or 2% of the caisson length from the specified inclination for battered caissons.

903.07.06 Load Test

When a load test is specified in the Contract Documents, the testing shall be according to ASTM D 1143M for piles under vertical static load, ASTM D 3689 for piles under tensile load, and ASTM D 3966 for piles under lateral loads. The Quality Verification Engineer shall witness the pile load test. The Contractor shall submit all records and results of the pile load test attached with the Certificate of Conformance.

The Contractor shall provide all necessary personnel, equipment, and material to make adjustments during the tests and shall have at least one skilled worker present for the complete duration of each test. The Contractor shall ensure that this worker shall have demonstrated experience in load testing of piles.

The Contractor shall do all necessary grading work to ensure a level dry working area at the test location and shall erect an adequate enclosure sufficient to provide complete protection from adverse weather conditions for the complete duration of the tests, including all temporary work required to obtain access to the site for the personnel, equipment, and materials.

On completion of the tests, the Contractor shall clear and restore the site to the satisfaction of the Contract Administrator. Piles that are not part of the finished work shall be cut off 1.2 m below ground level or 0.6 m below stream bed level. Any resulting void shall be backfilled with suitable fill material.

903.07.07 Repair of Welds

Any section of weld that does not meet the requirements of the Contract Documents shall be removed and rewelded.

903.07.08 Quality Control

903.07.08.01 Inspection and Testing of Welds

903.07.08.01.01 Qualifications of Companies and Individuals

The Contractor shall employ an independent testing company to carry out the non-destructive testing of welds. The independent testing company shall be certified by the Canadian Welding Bureau to the requirements of CSA W178.1 for bridge structures by radiographic or ultrasonic test methods and shall have no corporate affiliation with the Contractor.

Testing shall be done by a non-destructive testing technician employed by an independent testing company. The non-destructive testing technician shall have documented evidence of training and professional knowledge, skill, and experience in non-destructive testing of structural steel welds and material and have a valid certificate showing qualification to a Level II or III according to CAN/CGSB-48.9712 and the Canadian Welding Bureau for the non-destructive testing specified.

A welding inspector, employed by an independent testing company, shall perform visual Inspection. The welding inspector shall have documented evidence of training, professional knowledge; skill and experience in visual inspection of structural steel welds and material, and have a valid certificate showing qualification to a Level II or III according to CSA W178.2.

903.07.08.01.02 Visual Inspection of Welds

A representative sample of not less than 30% of the welds, as determined by the Quality Verification Engineer or welding inspector shall be visually inspected for conformance to the requirements of CSA W59, the Contract Documents, and the Working Drawings.

903.07.08.01.03 Non-Destructive Testing of Welds

The Contractor shall carry out radiographic or ultrasonic testing using procedures according to CSA W59.

Ultrasonic or radiographic testing shall be carried out on the entire length of selected splice welds chosen at random by the Quality Verification Engineer or the Welding Inspector assigned to carry out visual inspection. Selection shall be based on the following criteria:

a) For pile groups other than at integral abutments, 10% of the splice welds, rounded to the next highest number, but no fewer than two.

b) For pile groups at integral abutments, 10% of the splice welds, rounded to the next highest number, but no fewer than two of when the welds are below 6 m of the pile cut-off elevation.

c) For pile groups at integral abutments, all splice welds within 6 m of the pile cut-off elevation.

903.07.08.01.04 Repaired Welds

All welds that have been repaired shall be visually inspected and shall undergo non-destructive testing.

903.07.08.02 Non-Destructive Test Reports and Visual Inspection Reports

After completion of the inspection and testing, the Contractor shall submit 2 copies of all inspection and testing reports to the Contract Administrator, as documentation of quality and milestone activity.

903.07.08.03 Certificate of Conformance

A completed Certificate of Conformance shall be submitted to the Contract Administrator upon completion of the deep foundation work. The Certificate of Conformance shall be sealed and signed by the Quality Verification Engineer and shall state that the deep foundation work has been carried out in general conformance with the Contract Documents and Working Drawings. The Certificate of Conformance shall also certify that the interim milestone inspections have

been completed as specified.

903.08 QUALITY ASSURANCE – Not Used

903.09 MEASUREMENT FOR PAYMENT – Not Used

903.10 BASIS OF PAYMENT – Not Used

904.02 REFERENCES

Section 904.02 of OPSS 904 is amended by the addition of the following:

Ontario Ministry of Transportation Publications

Laboratory Testing Manual:
LS 417Method for Determination of Total Chloride Ion in Concrete (Acid Soluble)

MTO Manual:
Structure Rehabilitation Manual

ASTM International

C 876 - 09 Standard Test Method for Corrosion Potentials of Uncoated Reinforcing Steel in Concrete

904.04.01.02 Bridge Deck Placement Plan

Clause 904.04.01.02 is deleted in its entirety.

904.04.01.03 Temperature Control Plans

Clause 904.04.01.03 of OPSS 904 is amended by deletion of the first paragraph and its replacement with the following:

The Contractor's Engineer shall be responsible for ensuring that temperature control plans are in compliance with the Contract requirements. A copy of approved temperature control plan signed by the Contractor's Engineer shall be submitted to the Contract Administrator upon request.

904.04.01.04 Curing Compound

Clause 904.04.01.04 of OPSS 904 is deleted in its entirety.

904.04.01.05 Approach Slab Seat Elastomer and Ballast Wall Elastomer

Clause 904.04.01.05 of OPSS 904 is deleted in its entirety and replaced with the following:

The Contractor's Engineer shall be responsible for obtaining a completed certificate verifying compliance from the supplier upon completion of fabrication and prior to installation of the approach slab seat elastomer or ballast wall elastomer or both. The certificate shall be signed by the manufacturer confirming that the fabricated elastomer meets the requirements of this

specification and the Contract Documents. A copy of completed certificate shall be submitted to the Contract Administrator upon request.

904.07 CONSTRUCTION

904.07.05 Placing Concrete

904.07.05.02 Concrete Placing Restrictions

Clause 904.07.05.02 of OPSS 904 is amended by deleting the first sentence and replacing it with the following sentence:

No concrete shall be placed until the Contractor's Engineer has signed the submitted MTO form, PH-CC-736, verifying that all the required information has been received.

904.07.05.03 Concrete in Structure and in Deck

Clause 904.07.05.03 of OPSS 904 is amended by replacing the term Contract Administrator in the fourth paragraph and replacing it with Contractor's Engineer.

904.07.09.02.01 Submission of Temperature Records

Clause 904.07.09.02.01 is of OPSS 904 is deleted in its entirety and replaced with the following:

Complete datalogger temperature records and a record of any actions taken to maintain control of temperature and temperature difference shall be forwarded to the Contract Administrator at the end of the temperature monitoring period.

904.07.14 Testing for Early Strength

Subsection 904.07.14 is deleted in its entirety. Requirements for testing for early strength are stated elsewhere in the Contract Documents.

904.07.16 Cracks in Formed and Unformed Surfaces

Subsection 904.07.16 of OPSS 904 is amended as follows:

Delete and replace the 2nd paragraph with the following:

Based on criteria in Table 4, the Contractor's Engineer shall identify areas requiring repair or replacement, and shall identify the limits of such repair or replacement, and shall provide this information to the Contract Administrator along with a proposal for remedial action to be taken. No repairs shall proceed until the proposal has been approved by the Contractor's Engineer in writing.

Delete and replace the last sentence of the 4th paragraph with the following:

The Contractor shall not proceed with waterproofing of a bridge deck until repairs have been completed and permission to waterproof has been given by the Contractor's Engineer, and milestone inspection by the Owner has been completed.

904.07.17 Concrete Cover

Subsection 904.07.17 of OPSS 904 is deleted in its entirety and replaced with the following:

The Contract Administrator will carry out the concrete covermeter survey as specified in the Concrete Cover subsection of the Quality Assurance section. The Contractor shall clear all debris and obstructions, provide unhindered access and notify the Contract Administrator in writing when the test area is ready for the concrete covermeter survey.

From the time of the receipt of the written notification by the Contract Administrator, the Contractor shall allow the Contract Administrator a time period of 3 Business Days to complete the survey. The time period shall be extended if inclement weather or the ambient air temperatures fall below 5ºC within that time period.

When the survey indicates the cover does not meet the Contract requirements, a proposal for remedial action shall be signed by the Contractor's Engineer and submitted to the Owner (or CA) for approval prior to proceeding with the remedial work.

Waterproofing of a bridge deck shall not proceed until the cover survey and any associated remedial work has been completed, permission is given by the Contractor's Engineer, and Owner (CA) is provided with the opportunity to carry out milestone inspection(s).

904.08 QUALITY ASSURANCE

904.08.03 Approach Slab Seat and Ballast Wall Elastomers

Subsection 904.08.03 of OPSS 904 is deleted in its entirety and replaced by the following:

The Owner may require samples of approach slab seat and ballast wall elastomers. When required, the Contract Administrator shall select a random sample of the approach slab seat and ballast wall elastomers, 600 mm in length each, from each structure for testing.

The elastomer samples shall be delivered by the Contractor to:

Head, Concrete Section
Ontario Ministry of Transportation
Room 15, Building C
1201 Wilson Avenue
Downsview, ON M3M 1J8

Elastomers that do not meet the Contract requirements shall be considered unacceptable and a financial penalty shall be applied.

904.08.01 Acceptance

Subsection 904.08.01 of OPSS 904 is amended by the addition of the following:

In addition to submission of any proposals in the Construction section by the Contractor's Engineer, proposals to correct major deficiencies affecting service life or long term performance shall be submitted in writing to the Owner for approval prior to proceeding with the work.

In addition to the acceptance requirements stated herein, concrete in the structure shall meet the requirements of Table 5 during and up to the end of the warranty period.

Section 904.08 of OPSS 904 is amended by the addition of following subsection:

904.08.05 Milestone Inspections

The Contractor shall notify the Contract Administrator 3 days prior to reaching the following milestones, in order for the Ministry to complete inspections, which may include testing:

a) Readiness to begin concrete placement for bridge decks, piers, abutments, tunnels and culverts over 3.0 metres in span

b) Readiness to apply bridge deck waterproofing; and

c) Completion of waterproofing and readiness to begin paving or backfilling

Table 5:
Performance Requirements During and Up to the End of the Warranty Period

Feature	Test Method	Performance Requirements	Consequence of Non-conformance
Concrete Surface Scaling	Visual inspection and assessment of severity of scaling according to Figures 1 - 6.	At the end of the warranty period there shall be no medium, or severe scaling and total area of light scaling shall be no more than 20% of the component.	Areas of medium and severe scaling shall be removed and replaced. For light scaling greater than 20% of the component, the Contractor shall submit a repair proposal for approval by the Ministry.
Concrete Delamination	As described in Structure Rehabilitation Manual	Debonded and spalled areas shall not be present.	Remove and replace
Cracks	Visual inspection and measurement by means of crack comparator	Width of cracks shall be less than 0.30 mm and linear measurement of cracks greater than 0.30 mm within 1 m^2 shall be less than 2 m (width of crack is measured at the widest point of the crack (not average width of crack).	Repair cracks greater than 0.30 mm in width according to OPSS 932, unless the linear measurement of cracks greater than or equal to 0.30 mm per m^2 exceeds 2 m. If the linear measurement of cracks greater than 0.30 mm in width exceeds 2 m per m^2, remove and replace.
Spalls, exposed reinforcement, honey-combing, and other observed defects and deterioration	Visual inspection	No spalls, exposed reinforcement, honey-combing, or other observed defects and deterioration shall not be present at the end of the warranty period.	Remove and replace.

Figure 1. Example of Light Scaling



Figure 2. Example of Light Scaling



Figure 3. Example of Medium Scaling



Figure 4. Example of Medium Scaling



Figure 5. Example of Severe Scaling



Figure 6. Example of Severe Scaling



OPSS 906, November 2012, **CONSTRUCTION SPECIFICATION FOR STRUCTURAL STEEL FOR BRIDGES**, is deleted in its entirety and replaced with the following:

906.01 SCOPE

This specification covers the construction requirements for the fabrication, delivery, and erection of structural steel.

906.02 REFERENCES

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 911	Coating Structural Steel
OPSS 919	Formwork and Falsework
OPSS 922	Installation of Bearings

Ontario Provincial Standard Specifications, Materials

OPSS 1202	Bearings-Elastomeric Plain and Steel Laminated
OPSS 1203	Bearings-Rotational and Sliding Surface

Ontario Ministry of Transportation Publications

Structural Manual

Canadian Standards Association Standards (CSA)

G40.20/40.21-04	General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
S16-01 (R2007)	Limit States Design of Steel Structures
W47.1-03	Certification of Companies for Fusion Welding of Steel
W48-06	Filler Metals and Allied Materials for Metal Arc Welding
W59-03	Welded Steel Construction (Metal Arc Welding)
W178.1-08	Certification of Welding Inspection Organizations
W178.2-08	Certification of Welding Inspectors
S6-14	Canadian Highway Bridge Design Code

ASTM International

A 325M-07	Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa

	Minimum Tensile Strength [Metric]
A 490M-04ae1	High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric)
A 563M-06	Carbon and Alloy Steel Nuts
A 588/ A 588M-05	High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, With Atmospheric Corrosion Resistance
F 436-07	Hardened Steel Washers

International Organization for Standardization/International Electrotechnical Commission (ISO/IEC)

17025:2005 - General Requirements for the Competence of the Testing and Calibration Laboratories

Joint Publications of the Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE)

SSPC-SP6/NACE No. 3:2007 - Commercial blast cleaning

American Society of Mechanical Engineers (ASME) Standards

B46.1-2009 - Surface Texture (Surface Roughness, Waviness, and Lay)

906.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Bearing Contact Area means two planes that are in contact or have a separation between them not exceeding 0.12 mm.

Certificate of Conformance means a document issued by the Quality Verification Engineer confirming that the specified components of the work are in general conformance with the requirements of the Contract Documents.

Design Engineer means the Engineer retained by the Contractor who has sealed and signed the Issued for Construction Drawings and/or Working Drawings required to complete all or part of the work specified in the contract.

Engineer means a Professional Engineer licensed by the Professional Engineers of Ontario to practice in the province of Ontario.

Erection Diagrams means drawings showing the dimensioned layout of the steel structure, from which shop details are made, and that correlate the fabricator's piece markings with the location in the structure.

Faying Surface means the mating surface of a member that is in contact with another member to which it is to be joined.

Flush means a profile of weld reinforcement in which there is a smooth gradual transition between base and weld metal involving grinding where necessary. Weld reinforcement not exceeding 1 mm in height, may remain on each surface, unless the weld is part of a faying surface when all reinforcement shall be removed.

Fracture Critical Member means a member, including attachments, in a single load path structure that is subject to tensile stress and whose failure could lead to collapse of the structure.

Inspector means an individual who is a Canadian Welding Bureau (CWB) certified Level II or Level III inspector according to the requirements of CSA W178.2 and has documented evidence of professional knowledge, skill, and experience in the inspection of fabrication and erection of steel bridges.

New Steel means structural steel that has not previously been used.

Non-Destructive Testing Technician means an individual who has documented evidence of training, professional knowledge, skill, and experience in non-destructive testing of structural steel welds and material, and has a valid certificate showing qualification to a Level II or lll according to CAN/CGSB 48.9712 and the CWB for the non-destructive testing specified.

Primary Tension Member means a member including attachments that are subject to tension stress.

Quality Verification Engineer means an Engineer qualified to provide the quality verification engineer services specified in the Contract Documents.

Smooth means a profile of weld reinforcement, in which the surface finish or weld reinforcement has sufficient smooth gradual transition, involving grinding where necessary. Weld reinforcement not exceeding the following limits, may remain on each surface:

2 mm for plate thickness ≤ 50 mm
3 mm for plate thickness > 50 mm

Snug Tight means the tightness attained by a few impacts of an impact wrench or the full effort of a person using a spud wrench.

906.04 DESIGN AND SUBMISSION REQUIREMENTS

906.04.01 Design Requirements

906.04.01.01 General

Design shall be according to CAN/CSA S6 and the Structural Manual.

906.04.01.02 Welding

Welding design shall be according to CSA W59.

Welding procedures shall be according to CSA W47.1 and CSA W59, except where modified by CAN/CSA-S6, Clause A10.1.5.

Symbols for welding and non-destructive testing shall be according to CSA W59-M.

906.04.02 Submissions

906.04.02.01 General

When other authorities are involved in the approval of the design or construction of a highway structure, submissions shall be made at least 5 weeks prior to commencement of work and one additional copy of the submission shall be provided for each authority.

906.04.02.02 Shop Details and Welding Procedures

The Contractor shall submit 3 sets of the shop details and welding procedures to the Contract Administrator prior to commencement of fabrication, as documentation of quality and milestone activity. Prior to making a submission, an Engineer's seal and signature shall be affixed on the shop details and welding procedures verifying that the details and procedures are consistent with the Contract Documents.

The shop details shall include at least the following:

a) Full detail dimensions and sizes of all component parts of the structure. These dimensions shall make allowance for changes in shape due to weld shrinkage, camber, and any other effects that cause finished dimensions to differ from initial dimensions.

b) Erection marks.

c) All necessary specifications for the materials to be used.

d) Identification of areas requiring special surface treatment.

e) Identification of fracture-critical and primary tension members and component parts. Attachments having a length of more than 100 mm in the direction of tension and welded to the tension zone of a fracture-critical or primary tension member shall be treated as part of that member.

f) Bolt installation requirements, including number of fitting up bolts required at each connection and oversize and slotted holes.

g) Details of all welds.

h) Identification of material and welds requiring non-destructive testing, including the limits of the weld undergoing testing and the frequency and type of testing.

i) Temporary welds.

j) Location of shop and field splices.

The fabricator shall not commence fabrication until he has received one set of sealed and signed shop detail drawings and welding procedures.

The fabricator shall have a copy of the shop detail drawings and welding procedures at the manufacturing plant during fabrication.

906.04.02.03 Erection Diagrams and Erection Procedure Drawings and Calculations

The Contractor shall submit 3 sets of the erection diagrams and erection procedure drawings and calculations to the Contract Administrator prior to commencement of erection, as documentation of quality and milestone activity. Prior to making a submission, an Engineer's seal and signature shall be affixed on the erection diagrams and erection procedure drawings and calculations verifying that the erection diagrams and erection procedure drawings and calculations are consistent with the Contract Documents.

Erection diagrams and erection procedure drawings shall include at least the following:

a) Principal dimensions of the structure.
b) Erection marks.
c) Sizes of all members.
d) Field welding requirements, including identification of welds requiring non-destructive testing.
e) Size and type of bolts.
f) Bolt installation requirements, including the number of fitting up bolts required at each connection and identification of oversize and slotted holes.
g) Bracing during erection of structural steel.
h) Treatment at faying surfaces for joints designed as slip critical.

The Contractor shall carry out the erection according to the sealed and signed erection diagrams and erection procedure drawings and calculations.

The Contractor shall have a copy of the erection diagrams and the erection procedure drawings and calculations at the site during erection.

906.04.02.04 Mill Test Certificates

Prior to the use of any material in fabrication, 2 copies of the mill test certificates for that material shall be submitted to the Contract Administrator, confirming that the material is according to the Contract Documents.

Copies of the mill test certificates for all material to be used in the fabrication shall be available for review at the fabricating plant during fabrication. The certificates shall show that the

material is according to the Contract Documents.

If the material cannot be identified by mill test certificates, coupons shall be taken and tested and these test certificates shall be made available.

Where mill test certificates originate from a mill outside Canada or the United States of America, the Contractor shall have the information on the mill test certificate verified by testing by a Canadian laboratory. This laboratory shall be certified by an organization accredited by the Standards Council of Canada to comply with the requirements of ISO/IEC 17025 for the specific tests or type of tests required by the material standard specified on the mill test certificate. The mill test certificates shall be stamped with the name of the Canadian laboratory and appropriate wording stating that the material is in conformance with the specified Contract Document's requirements. The stamp shall include the appropriate material specification number, testing date (i.e., yyyy-mm-dd), and the signature of an authorized officer of the Canadian laboratory.

906.04.02.05 Test Reports for Fasteners

Proof that the bolts, nuts, and washers meet the chemical composition, mechanical properties, dimensions, workmanship, and head burst as required by ASTM A 325M, ASTM A 490M, ASTM A 563M, or ASTM F 436M shall be submitted to the Contract Administrator. Verification of the acceptability of assemblage of zinc-coated bolts, nuts, and washers delivered to the job site shall also be submitted to the Contract Administrator.

For bolts, nuts and washers supplied from a manufacturer outside Canada or the United States of America, the above information shall be verified by testing by a Canadian laboratory as outlined in the Mill Test Certificates clause.

906.04.03 Interim Inspection after Fabrication of Components

Upon completion of fabrication of the components, and prior to erection, the Quality Verification Engineer shall conduct an interim inspection of the work to verify that the fabrication of components has been carried out in conformance with the shop details, welding procedures and Contract Documents and issue the fabricator written permission to proceed with the work. A copy of the written permission to proceed shall be submitted to Contract Administrator, prior to shipping of the components, as documentation of quality and milestone activity.

906.05 MATERIALS

906.05.01 Steel

Structural steel shall be new, satisfy the requirements for grade and Charpy impact tests specified in the Contract Documents and shall be according to CAN/CSA G40.20/G40.21.

ASTM A 588 may be substituted for CAN/CSA G40.20/G40.21 grade 350A steel and, when the Charpy impact energy requirements are verified by the submission of test documentation, ASTM A 588 may be substituted for CAN/CSA G40.21 grade 350AT steel.

Substitution of other material for size and grade is not permitted unless approved by the Design Engineer. A copy of the approval shall be submitted to the Contract Administrator, prior to the substitution, as documentation of quality and milestone activity.

The steel shall be identified as specified in the Control of Material clause in the Quality Control subsection.

906.05.02 High Strength Bolts, Nuts and Washers

High strength bolts shall be according to ASTM A 325M or ASTM A 490M.

High strength nuts, and hardened washers shall be suitable for use with the types of bolts being specified and shall be according to ASTM A 563M, and ASTM F 436M.

The nuts, bolts, and washers shall be supplied and shipped together as an assembly from the same manufacturer.

High strength bolts, nuts, and washers for use with unpainted corrosion-resistant steel shall be Type 3. Bolts, nuts, and washers used with steel specified in the Contract Documents to receive a paint coating or galvanizing shall be Type 1 and shall be galvanized. High strength ASTM A 490M bolts shall not be galvanized or plated.

906.05.03 Electrodes

Welding electrodes, electrode and flux or electrode and gas combinations shall be low hydrogen (level H16 or less) and shall be according to W47.1, W48, and W59, Section 12.

The weld metal shall meet the Charpy V notch impact energy requirements of CAN/CSA-S6, Table 10.13 for fracture-critical members and Table 10.12 for primary tension members.

Weld metal used with corrosion resistant steels shall have similar corrosion resistance and colour to the base metal and shall be according to CSA W59.

906.05.04 Shear Connectors

Material requirements for stud shear connectors shall be according to CSA W59, Appendix H. Only studs of Type B shall be used.

906.05.05 Pins and Rollers

Pins and rollers more than 175 mm in diameter shall be forged and annealed or forged and normalized. Pins and rollers 175 mm or less in diameter shall be forged and annealed, forged and normalized, or cold-finished carbon-steel shafting.

906.05.06 Bearings

Bearings shall be according to OPSS 1202 or OPSS 1203, or both.

906.06 EQUIPMENT - Not Used

906.07 CONSTRUCTION

906.07.01 Fabrication

906.07.01.01 General

The fabrication shall be according to CAN/CSA-S6, Clause A10.1.4.

All Atmospheric Corrosion Resistant (ACR) steel components shall be abrasive blast-cleaned according to SSPC-SP6/NACE No. 3 to completely remove mill scale, rust, coating, oxides, corrosion products, oil, grease, dust, dirt and other foreign matter.

906.07.01.02 Plate Edges

Plasma arc cutting of plates up to and including 20 mm in thickness is permitted. Plasma arc cutting of plates thicker than 20 mm shall not be permitted unless approval is received in writing from the Design Engineer. A copy of the approval shall be submitted to the Contract Administrator, prior to plasma arc cutting, as documentation of quality and milestone activity.

When permitted, plasma arc cutting of plates shall use oxygen as the cutting gas and all edges shall be free of dross.

Inspection and repair of planar discontinuities shall be according to CSA W59.

Corners of oxygen cut girder flanges shall be chamfered 1.5 to 2.0 mm by grinding.

906.07.01.03 Straightening of Material

Material with sharp kinks shall be rejected. Straightening of bends shall only be done using mechanical means or by the application of controlled heating according to CSA W59. Details of the straightening procedure including testing requirements, signed and sealed by an Engineer shall be submitted to the Contract Administrator prior to the straightening, as documentation of quality and milestone activity.

Straightening shall only be carried out in the presence of the Owner’s inspector. The Contract Administrator shall be given one-week’s notice to arrange for the inspection.

If deemed necessary, the Contract Administrator shall specify additional testing to be performed by the Contractor. If evidence of damage is discovered, the material shall be rejected and the cost of testing shall be born by the Contractor.

906.07.01.04 Cambering

When rolled sections are heat cambered, the details of the heat cambering procedure, signed and

sealed by an Engineer, shall be submitted to the Contract Administrator prior to cambering, as documentation of quality and milestone activity.

Plate girders shall have the required camber cut into the web with suitable allowance for camber loss due to cutting and welding.

The use of heat to alter the camber of fracture critical or primary tension members shall not be permitted unless approved by the Design Engineer prior to the application of heat. A copy of the approval shall be submitted to the Contract Administrator, prior to the use of heat, as documentation of quality and milestone activity.

The ends of cambered girders shall be vertical under full dead load.

906.07.01.05 Horizontally Curved Girders

906.07.01.05.01 Heat Curving of Rolled Beams and Welded Girders

Girders shall be cambered before heat curving.

A detailed procedure for the heat curving operation, signed and sealed by an Engineer, shall be submitted to the Contract Administrator prior to heat curving, as documentation of quality and milestone activity.

906.07.01.06 Identification Marking for Erection

Each member shall carry an erection mark for identification.

Permanent marking shall be affixed in an area not exposed to view in the finished structure.

906.07.01.07 Welded Construction

906.07.01.07.01 General

All welded construction shall be according to CSA W59 and CAN/CSA-S6, Clause A10.1.5.

All welding shall be carried out by welders having a CSA W47.1 identification card valid for the type of welding to be done and for the duration of the welding work.

The fabrication weld metal requirements, base metal repairs, and repairs of weld in fracture critical and primary tension members shall be according to CAN/CSA-S6, Clause 10.23.5.

Any company undertaking welded fabrication or erection or both shall be certified according to CSA W47.1, Division 1 or 2.

906.07.01.07.02 Altering the Sweep of Fracture-Critical and Primary Tension

Members

The use of heat to alter the sweep of fracture critical or primary tension members shall not be permitted unless approved by the Design Engineer prior to the application of heat. A copy of the approval shall be submitted to the Contract Administrator, prior to the application of heat, as documentation of quality and milestone activity.

906.07.01.07.03 Submissions of Repair Procedures

CWB accepted welding procedure specifications, data-sheets, and repair procedures for prequalification, signed and sealed by an Engineer, shall be submitted for approval to the Design Engineer prior to commencement of work. A copy of the approval shall be submitted to the Contract Administrator, prior to the repairs, as documentation of quality and milestone activity.

906.07.01.07.04 Assembly for Welding

Assembly shall be according to CSA W59 and the following:

a) Bearing stiffeners shall be vertical under full dead load.

b) Intermediate stiffeners shall be either true vertical or perpendicular to the horizontal work lines used to layout the girder.

c) Bearing stiffeners fitted to bear shall have a minimum bearing contact area of 75% and a maximum separation of 1 mm over the remaining area.

d) Fitted intermediate stiffeners shall have a minimum bearing contact area of 25% and a maximum separation of 2 mm.

906.07.01.07.05 Temporary Welds

Temporary welds shall not be used on fracture-critical and primary tension members.

Temporary welds shall not be used on flange material in compression, unless approved by the Design Engineer. A copy of the approval shall be submitted to the Contract Administrator, prior to the use of temporary wells, as documentation of quality and milestone activity.

906.07.01.07.06 Preheat, Interpass Temperature, and Heat Input Control

When making welding repairs to fracture-critical and primary tension members, the preheat requirements shall be according to CAN/CSA-S6, Table 10.14.

906.07.01.07.07 Profile of Welds

Profile of welds shall be according to CSA W59 and the Structural Manual.

906.07.01.07.08 Corrections

Welding corrections and repairs to fracture-critical and primary tension members shall be according to CAN/CSA S6, Clause 10.23.5.

Any steel members subjected to shape corrections or straightening shall be allowed to cool in still air.

906.07.01.07.09 Peening

Peening, when required, shall be subject to approval by the Design Engineer. A copy of the approval shall be submitted to the Contract Administrator, prior to peening, as documentation of quality and milestone activity.

906.07.01.07.10 Stress-Relief Heat Treatment

Stress-relief heat treatment temperatures shall be recorded using thermo-couples or other methods acceptable to the Design Engineer. A record showing temperature and time data of the heat treating operation shall be maintained and be made available to the Design Engineer or Contract Administrator upon request.

906.07.01.07.11 Welding Inspection

906.07.01.07.11.01 General

All inspection shall be according to CSA W59.

906.07.01.07.11.02 Identification Cards – Canadian Welding Bureau

Prior to commencement of welding, the Contractor shall make available the Canadian Welding Bureau's transferable or non- transferable identification cards for each tacker, welder or welding operator to be employed on the work to the Contract Administrator. Such identification cards shall be currently valid and shall indicate the welding processes and the welding positions at which the personnel are qualified to weld.

906.07.01.07.11.03 Certification of the Independent Testing Organization

The independent organization undertaking welding testing under the Quality Control subsection shall be certified for testing bridges in conformance with CSA W178.1. The certification shall encompass at least the following methods: radiographic, ultrasonic, and magnetic particle.

906.07.01.07.11.04 Certification of the Non-Destructive Testing Technician

The independent organization’s non-destructive testing technician undertaking non-destructive testing of welds under the Quality Control subsection shall be certified for testing bridges in conformance with CSA W178.2. Certification shall be to either Level II or III for the methods used, as required by CAN/CGSB 48.9712.

906.07.01.07.12 Welding Corrections and Repairs for Fracture-Critical and Primary Tension Members

906.07.01.07.12.01 General

Repair procedures shall be according to CAN/CSA-S6, Clause 10.23.5.

906.07.01.07.12.02 Approval for Non-Critical Repairs

Non-critical repairs are those listed in CAN/CSA-S6, Clause 10.23.5.4.

Repair procedures for non-critical repairs shall be submitted to the Design Engineer for pre-approval. A copy of the pre-approval shall be submitted to the Contract Administrator as documentation of quality and milestone activity.

906.07.01.07.12.03 Approval for Critical Repairs

Repair procedures more severe than those described in CAN/CSA-S6, Subclause 10.23.5.4, are considered critical and shall be individually approved by the Design Engineer before repair welding proceeds. A copy of the approval shall be submitted to the Contract Administrator, prior to the repairs, as documentation of quality and milestone activity.

Critical repairs include those listed in CAN/CSA-S6, Clause 10.23.5.5.

906.07.01.07.13 Non-Destructive Testing of Fracture Critical Members

The fabricator shall maintain on-going documentation of all visual and non-destructive testing for review by the Contract Administrator. The complete documentation shall be submitted to the Contract Administrator upon completion of the project.

906.07.01.07.14 Repair of Welds

Any section of weld that does not meet the acceptance standards shall be removed, re-welded, and re-examined.

906.07.01.07.15 Bolted Construction

906.07.01.07.15.01 General

Bolted construction shall be according to CAN/CSA-S6, Clause A10.1.6

Bolts shall be sufficiently long to exclude threads from the shear plane.

906.07.01.07.15.02 Plasma Arc Cutting of Holes

Plasma arc cutting of holes shall only be permitted in plates up to and including 20 mm in

thickness. Plasma arc cut holes shall be produced by mechanically guided means and the diameter of the holes shall be greater than or equal to the thickness of the plate. When plasma arc cutting of holes is permitted, the cutting gas as well as the shielding gas shall be oxygen and the surface roughness shall not exceed 13 microns (500 micro-inches) as defined in ASME B46.1. Occasional gouges not more than 1.5 mm in depth are permitted. Thermally cut holes shall be 2 mm larger than the nominal diameter of the bolt and the taper shall not exceed 0.5 degrees.

906.07.01.07.15.03 Holes Drilled Using Numerically Controlled Machines

As an alternative to the shop trial assembly requirements of CAN/CSA-S6 when numerically controlled machines have prepared the boltholes, a check assembly consisting of the first components of each type of bolthole pattern to be made shall be undertaken to adequately demonstrate the accuracy of the drilling. If the check assembly is satisfactory, further assemblies of like components are not required. If the check assembly is unsatisfactory, the work shall be redone or repaired in a manner acceptable to the Design Engineer.

906.07.01.07.15.04 Inspection

Inspection shall be according to CSA W59 and CAN/CSA-S6 as required.

906.07.01.07.16 Tolerances

906.07.01.07.16.01 Dimensional and Workmanship Tolerances

Dimensional and workmanship tolerances shall be according to CSA W59 and CAN/CSA-S6, Clause A10.1.7.

906.07.01.07.16.02 Sweep

Sweep shall be as defined in CSA W59. The specified tolerance for sweep is the length divided by 1000 (L/1000). This shall apply to any segment up to and including the total length of the fabricated and/or erected member.

906.07.02 Transportation, Delivery, and Storage

The Contractor shall perform all work necessary to ensure safe loading, delivery, unloading, and storage of structural steel.

The work shall consist of loading the members, transporting them, and unloading at the site and shall include temporary works for access.

Structural steel shall be loaded for shipping in such a manner that it can be transported and unloaded at its destination without being excessively stressed, deformed, or otherwise damaged. Plate girders shall be transported with their webs in a vertical plane. Where girders cannot be shipped with their webs in the vertical plane, static and dynamic forces during handling, transportation, and storage shall be determined using a dynamic load allowance of 100%. Computed stresses shall be according to CAN/CSA-S6, Clause 10.10 and the maximum cyclic

stress range shall not exceed the constant amplitude fatigue threshold for the appropriate fatigue categories specified in CAN/CSA-S6, Table 10.4. All the calculations and associated sketches, including reasons why the girders cannot be shipped with the webs in the vertical plane, signed and sealed by an Engineer, shall be submitted to the Design Engineer for approval prior to shipping. A copy of the approval shall be submitted to the Contract Administrator, prior to shipping, as documentation of quality and milestone activity.

Structural steel shall be stored so as to avoid excessive stress deformation or other damage.

The delivery schedule shall be provided to the Contract Administrator not less than 5 Days before any shipping begins.

Advertising by means of removable signing is permitted on elements only while in transit to the specified site. Painting of advertisements directly on elements is not permitted.

906.07.03 Erection

906.07.03.01 General

Erection shall be according to CAN/CSA-S6, Clause A10.1.10.

The Contract Administrator shall be notified in writing of the starting erection date at least 10 Days prior to the commencement of field operations.

Repairs to erected material shall only be permitted after the Design Engineer has approved the repair procedure. A copy of the approval shall be submitted to the Contract Administrator, prior to the repairs, as documentation of quality and milestone activity.

Welding shall not be used to fill misplaced holes.

Hammering that can damage or distort the members is not permitted.

906.07.03.02 Falsework

Falsework shall be according to OPSS 919.

906.07.03.03 Connections

Holes made in the field shall be drilled or sub-drilled and reamed.

Any error that prevents the proper assembly and fitting of parts shall be reported and the proposed method of correction shall be submitted to the Design Engineer for approval prior to the commencement of the work. A copy of the approval shall be submitted to the Contract Administrator, prior to the corrections, as documentation of quality and milestone activity.

Bolt heads shall be located on the outside faces of the exterior girders.

Bolt heads in field splices for box girders shall be located on the exterior surfaces.

906.07.03.04 Maintaining Alignment and Camber

The steel shall be erected to the alignment and elevations specified in the Contract Documents.

906.07.03.05 Bearings

The installation of bearings shall be according to OPSS 922.

906.07.03.06 Coatings

Coating of new structural steel shall be according to OPSS 911.

906.07.04 Quality Control

906.07.04.01 General

Quality control shall be according CAN/CSA-S6, Clause A10.1.8. The acceptance standards of CSA W59 for dynamically loaded structures shall also apply.

In addition to quality control measures instituted by the Contractor, the Contractor shall be responsible for the quality control procedures specified herein.

906.07.04.02 Control of Material

A record for each component shall be kept to identify the material as to heat number, corresponding mill test certificate, and colour coding or other identifying markings.

906.07.04.03 Visual Inspection

The Contractor’s Inspector shall carry out full visual inspection.

906.07.04.04 Non-Destructive Testing

906.07.04.04.01 General

An independent testing organization, hired by the Contractor, shall carry out all non-destructive testing of the welds for bridge structures by using radiographic, ultrasonic, magnetic particle, and liquid penetrant test methods.

A non-destructive testing technician shall do the testing.

Neither the technician nor the independent testing organization shall be changed without the approval of the Contract Administrator.

906.07.04.04.02 Testing of Welds

Radiographic, ultrasonic, or magnetic particle testing shall be carried out using procedures according to CSA W59.

The amount and location of welding to be tested shall not be less than:

a) Visual inspection of all welds.

b) Radiographic or ultrasonic inspection of groove welds in flanges and webs of built-up girders:
   i. Flange splices in tension or stress reversal zones: 100% of all welds.
   ii. Flange splices in compression zones: 100% of the weld of 1 in 4 splices.
   iii. Web splices for ½ the depth from the tension flange: 100% of the weld length for each weld.
   iv. Web splices for ½ the depth from the compression flange: 100% of the weld length of 1 in 4 splices.

If defects are found during testing of compression zones, two additional zones shall be tested for each zone exhibiting defects.

c) Magnetic particle inspection of web-to-flange fillet welds:
   i. Submerged-arc welds - 25% of length of each weld.
   ii. Semi-automatic welds - 50% of length of each weld.
   iii. Manual welds - 100% of length of each weld.

d) Magnetic particle inspection of fillet welds in connection plates and stiffeners to which diaphragms or cross bracing are attached:
   i. For ½ the depth from the tension flange: 100% of weld length of each weld.
   ii. Transverse welds on tension flanges: 100% of weld length of each weld.

e) Arc strikes shall be lightly ground and checked for cracks by magnetic particle inspection.

Radiographic and ultrasonic testing shall be performed prior to the assembly of the flanges to the webs.

906.07.05 Repair of Welds

The section of weld that does not meet the acceptance standards shall be removed, re-welded, and re-examined.

906.07.06 Inspection Reports

Inspection reports shall bear the seal and signature of an Engineer.

Copies of all inspection reports shall be submitted to the Contract Administrator.

906.07.07 Erected Girder Elevations

The top of girder elevations specified in the Contract Documents shall be checked and the as constructed elevations shall be submitted to the Design Engineer for approval.

906.07.08 Certificate of Conformance Upon Completion of the Work

Upon completion of erection, the Contractor shall submit to the Contract Administrator a **Certificate of Conformance** sealed and signed by the Quality Verification Engineer. The Certificate shall state that the Work has been carried out in general conformance with the signed and sealed shop details, welding procedures, erection diagrams, erection procedure drawings and Contract Documents.

906.07.09 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

906.08 QUALITY ASSURANCE

906.08.01 General

Visual inspection, non-destructive testing, and sampling may be done in the fabricating shop and in the field by an Owner's inspector to confirm the material supplied, fabrication, and erection has been done as specified in the Contract Documents.

The Contractor shall supply electric power, scaffolding, protection from the weather, and free access for inspection and testing of material, to all aspects of the fabrication, delivery, and erection of the structural steel.

1350.04 DESIGN AND SUBMISSION REQUIREMENTS

1350.04.02.01.01 General

Clause 1350.04.02.01.01 of OPSS 1350 is amended by deletion of the last paragraph and its replacement with the following:

The mix shall not be placed until the Contractor's Engineer provides written confirmation to the Owner that the concrete mix design submission meets the Contract requirements.

1350.07 PRODUCTION

1350.07.05.01 Contractor Sampling for Quality Control Purposes

Clause 1350.07.05.01 of OPSS 1350 is amended by the addition of the following new clause:

1350.07.05.01.01 Compressive Strength Verification

The Contractor shall cast and test cylinders for 28-day compressive strength testing, for each 50 m^3 of concrete placed, as a minimum, to verify that the concrete meets the specified requirements. In addition, the Contractor shall be responsible for casting and testing cylinders for verification of early strength.

Casting and testing of concrete cylinders shall be in accordance with CSA A 23.2-3C and 9C, respectively. Testing shall be carried out at a laboratory certified by CCIL in accordance with CSA A 283 as a concrete testing laboratory. Results shall be submitted to the Contract Administrator as they become available.

No referee cylinders are required by the Owner for compressive strength verification testing.

1350.07.05.09 Compressive Strength

Clause 1350.07.05.09 of OPSS 1350 is deleted and replaced with the following:

1350.07.05.09 Compressive Strength, Air Void System Parameters and Rapid Chloride Permeability - for Acceptance Testing

1350.07.05.09.01 General

The Contractor shall remove or prepare samples for acceptance testing according to Table 4DB. Cores shall be the basis of acceptance of 28-Day compressive strength, air void system parameters and rapid chloride permeability, except for components where cylinders are

specified.

The Contractor shall transport all cores and acceptance cylinders to the Regional Quality Assurance Laboratory for testing by the Owner.

The individual test results shall be forwarded to the Contractor as they become available. The Contractor shall forward individual test results and monthly summaries to the concrete supplier.

1350.07.05.09.02 Concrete Cores

The Contractor shall remove cores from each component, divided into sublots for sampling purposes according to Table 4DB. Each core shall be removed at a random location within the sublot, as specified by the Contract Administrator. All cores shall be removed when the concrete is between 7 to 10 Days of age, and cores from bridge decks shall be removed prior to application of any waterproofing membrane. For concrete barriers and barrier walls on structures, the cores shall be removed from the lower sloped portion of the wall at the designated locations. For parapet walls, the cores shall be removed from the lower one-third of the wall at the designated locations.

Steel reinforcement and other embedded material shall be avoided when possible while coring. The Contractor shall use a covermeter to establish reinforcement location prior to coring.

The Contract number, component identification, sublot number, exact location of each individual core, date of concrete placement, and date of extraction shall be marked legibly on each core with durable ink. Each core shall be placed in a plastic bag and sealed to prevent loss of moisture, before they are placed in security bags.

The cores shall be protected from extremes in temperature from the time they are removed until they are delivered to the Regional Quality Assurance laboratory within 24 hours of coring. The cores shall be accompanied with a transmittal form and the Form A of the concrete mix design for the component.

1350.07.05.09.03 Concrete Cylinders

1350.07.05.09.03.01 General

The Contractor shall cast, cure and transport the cylinders according to CSA A 23.2-3C. The concrete cylinders for determination of compressive strength, air void system parameters and rapid chloride permeability shall be 100 mm diameter x 200 mm long

All concrete test cylinders shall be cast in moulds. The moulds shall be single use moulds according to CSA A23.2-1D, made of plastic, with a lid. The lids shall be chemically and physically compatible with the concrete and shall provide watertight closure for the moulds.

Test information shall be recorded on MTO form PH-CC 322. A copy of MTO form PH-CC 322, identification of the component, sublot number, a transmittal form and the Form A of the concrete mix design for the component shall be submitted with each set of the concrete

cylinders.

The Contractor shall continuously record and monitor temperature immediately adjacent to the cylinders during the field-curing period. The maximum time interval for recording the temperature shall be every 15 minutes.

The Contractor shall submit cylinder curing temperature records to the Contract Administrator at the completion of the field-curing period.

1350.07.05.09.03.02 Concrete Cylinders for Compressive Strength

For each sublot, one set of three concrete cylinders shall be cast for determination of 28-Day compressive strength and a second set of three cylinders shall be cast for referee testing purposes.

In addition to acceptance cylinders cast according to Table 4DB, the Contractor shall also cast information test cylinders if requested by the Contract Administrator. No referee cylinders shall be cast when cylinders are requested by the Owner for information purposes.

1350.07.05.09.03.03 Concrete Cylinders for RCP and AVS

For components identified in Table 4DB, the Contractor shall cast cylinders for acceptance of air void system parameters and rapid chloride permeability. For each sublot, three concrete cylinders shall be cast. One cylinder shall be used for determination of air void system parameters and one cylinder shall be used for determination of rapid chloride permeability. The remaining cylinder shall be used for referee testing of rapid chloride permeability.

1350.07.05.10 Air Void System Parameters

Clause 1350.07.05.10 of OPSS 1350 is deleted in its entirety.

1350.07.05.11 Rapid Chloride Permeability

Clause 1350.07.05.11 of OPSS 1350 is deleted in its entirety.

1350.08 QUALITY ASSURANCE

1350.08.01 Acceptance of Concrete Compressive Strength
1350.08.02 Acceptance of Air Void System in Hardened Concrete
1350.08.03 Acceptance of Rapid Chloride Permeability

Subsections 1350.08.01, 1350.08.02, and 1350.08.03 of OPSS 1350 are deleted in their entirety and replaced with the following:

1350.08.01 Acceptance of Components Based on 28-Day Compressive Strength,

Air Void System Parameters and Rapid Chloride Permeability

1350.08.01.01 General

Concrete components shall be accepted based on 28-Day compressive strength, air void system parameters and rapid chloride permeability, according to this specification.

Referee testing of compressive strength, air void system parameters and rapid chloride permeability for a sublot may only be invoked by the Contractor within 5 Business Days of receiving the test results. The referee testing shall be carried out by referee laboratory designated by the Owner based on the applicable roster. Referee test results shall be forwarded to the Contractor as they become available. The referee testing of compressive strength, air void system parameters and rapid chloride permeability shall be according to this specification.

The cost of referee testing for compressive strength, air void system parameters and rapid chloride permeability shall be as specified in the Contract Documents.

When the referee result confirms the acceptance test result, the Contractor shall be charged the cost of the referee testing. When the referee result does not confirm the acceptance test result, the Owner shall bear the cost.

Unacceptable components shall be subject to removal and replacement at the Contractor's expense. The replacement components shall be evaluated for acceptance on the same basis as the original component. The Contractor may submit an alternative proposal to removal in writing for the Owner’s consideration for the unacceptable component. If the Contract Administrator determines that an unacceptable component may remain in the work, it shall be subject to the calculated penalty.

1350.08.01.02 Acceptance of Concrete Compressive Strength

1350.08.01.02.01 Basis of Acceptance

Acceptance of compressive strength of each component shall be based on the average strength of all sublots, rounded to one decimal place. Each sublot is represented by an average strength of three cores or three cylinders.

28-Day compressive strength of a component shall be considered acceptable when it meets all of the following:

a) The average of the component’s compressive strength tests shall be equal to or greater than the specified strength.

b) No individual strength test shall be more than 4.0 MPa below the specified strength.

1350.08.01.02.02 Acceptance Testing

Cores shall be tested according to CSA A 23.2-14C. Cylinders shall be tested according to LS-

426.

1350.08.01.02.03 Structural Adequacy

When the average of the component strength tests is less than the specified strength or when an individual strength test result falls below the specified minimum 28-Day strength by more than 4.0 MPa, the Contractor has the option of doing one of the following;

Remove the sub-standard concrete or element, or

Prove its structural adequacy and pay a penalty in accordance with the Calculation of Penalty clause.

In order to prove structural adequacy, the Contractor shall take and test additional 100 mm diameter cores at intervals along the member in order to establish the limits of the unacceptable concrete. The locations of these cores shall be as agreed to by the Contract Administrator. Cores shall be removed, and provided to the Owner for testing, in moist condition, according to CSA A 23.2-14C.

Once the limits have been established, the Contractor's Engineer shall carry out a structural analysis to verify that the structural adequacy, as required by the CHBDC, is satisfied. If structural adequacy is verified, the Contractor's Engineer shall issue the Contractor written permission to continue with the work.

A copy of the written permission to continue with the work, along with the Contractor's Engineer's calculations including calculations for the volume of the sub-standard concrete, shall be submitted to the Owner for information purposes.

If structural adequacy is not verified, the deficient concrete or element shall be removed and replaced.

1350.08.01.02.04 Referee Testing

Where 28-Day compressive strength is determined on concrete cores, the referee testing shall be carried out on new cores removed from the component within 24 hours of invoking the referee testing.

The Contractor shall remove a set of three 100 mm diameter and 200 mm long cores for referee testing for each disputed sublot at locations no more than 1 meter from the locations from which the disputed acceptance cores were removed. The core extraction and timing of delivery to the referee laboratory shall be according to the "Concrete Cores" clause of this specification. The referee testing of the cores shall be according to CSA A 23.2-14C on moisture conditioned cores.

Where 28-Day compressive strength is determined on concrete cylinders, the referee testing process shall be based on duplicate set of three cylinders cast at the same time as the acceptance cylinders. The referee testing of concrete cylinders shall be according to LS-426.

If the difference between the referee test result and the acceptance test result is less than the confirmation value, then the acceptance test result is confirmed, and the acceptance test result shall be used in the determination of acceptance of the component. If the difference between the referee test result and the acceptance test result is greater than the confirmation value, the acceptance test result is not confirmed, and the acceptance test result shall be disregarded and the referee test result shall replace the acceptance test result in the acceptance requirements of this specification. The confirmation value for confirming the acceptance test result shall be the greater of 10% of the specified strength or 10% of the strength of the acceptance cylinders, expressed to one decimal place.

If the referee test result is more than 4.0 MPa below the specified strength, the result shall be reviewed to determine if structural adequacy is in question and, if so, the relevant provisions of this specification shall be followed.

1350.08.01.03 Acceptance of Air Void System Parameters in Hardened Concrete

1350.08.01.03.01 Basis of Acceptance

For a component to be considered acceptable, each sample representing the component shall have air content of 3.0% or more and spacing factor of 0.230 mm or less in all concrete except for silica fume overlays and HPC, where the spacing factor shall be 0.250 mm or less.

An unacceptable component is represented by one or more samples that fail to meet the air content and/or spacing factor requirement.

1350.08.01.03.02 Acceptance Testing

One sample per sublot shall be used for determination of air void system parameters according to LS 432. One half of each sample shall be tested to determine the acceptability of concrete. The other half of each sample shall be retained by the Owner for audit purposes.

1350.08.01.03.03 Referee Testing

When referee testing is invoked, all samples representing a component shall be referee tested and the acceptance test results discarded. The sublot referee test results shall replace the acceptance test result in the acceptance requirements of this specification.

Referee testing shall be carried out by the referee laboratory according to LS-431 on the same half of the sample that was tested for acceptance.

1350.08.01.04 Acceptance of Rapid Chloride Permeability

1350.08.01.04.01 Basis of Acceptance

HPC and silica fume overlay components shall be considered acceptable when they meet all of

the following:

a) The average of the component's rapid chloride permeability tests shall be equal to or less than 1000 coulombs.

b) No individual rapid chloride permeability test shall be greater than 1250 coulombs.

All other concrete components shall be considered acceptable when they meet all of the following:

a) The average of the component's rapid chloride permeability tests shall be equal to or less than 2,500 coulombs.

b) No individual rapid chloride permeability test shall be greater than 3000 coulombs.

1350.08.01.04.02 Acceptance Testing

For acceptance testing based on cores, one core per sublot shall be used for determination of rapid chloride permeability according to LS 433 except for overlays, patches and refacing for which two cores per sublot shall be used. Where one core is used, 2-50 mm long samples shall be cut from it and tested. For overlays, patches and refacing, 1-50mm sample shall be cut from each of two cores per sublot, and tested.

For acceptance testing based on cylinders, one concrete cylinder per sublot shall be used for determination of rapid chloride permeability according to LS 433. Two 50 mm long samples shall be cut from the cylinder and tested.

Acceptance testing shall be carried out at 28 to 32 Days.

1350.08.01.04.03 Referee Testing

When acceptance testing is based on cores, the referee testing shall be carried out on new cores removed from the sublot within one Business Day of invoking the referee testing.

The Contractor shall remove one 100 mm diameter and 200 mm long core for referee testing at a location no more than 1 meter from the location from which the disputed acceptance core was removed. Referee testing shall be carried out on two 50 mm samples obtained from this core and the results shall be averaged.

For overlays, patches and refacing, the Contractor shall remove two 100 mm diameter and 70-100 mm long cores for referee testing, at locations no more than 1 meter from the locations from which the disputed acceptance cores were removed. Referee testing shall be carried out on two 50 mm samples cut from the two cores and the results shall be averaged.

The core extraction and timing of delivery to the referee laboratory shall be according to the "Concrete Cores" clause of this specification.

When acceptance testing is based on concrete cylinders, the referee testing shall be carried out on duplicate concrete cylinders cast at the same time as the acceptance cylinder.

The referee testing shall be according to LS 433.

When the referee result is greater than the acceptance test result or no more than 200 Coulombs below the acceptance test result, then the acceptance test result is confirmed and shall remain valid. When the referee test result for the sublot is more than 200 Coulombs below the acceptance test result, the acceptance test result is not confirmed, and the referee test result shall replace the acceptance test result in the acceptance requirements of this specification.

1350.08.01.05 Calculation of Penalty

If the Contract Administrator permits unacceptable components to remain in the work in accordance with the General clause of 1350.08 of this specification, the penalty shall be calculated as follows:

1350.08.01.05.01 28-Day Compressive Strength

For the purpose of calculating penalty based on compressive strength, the average strength of the sublot shall be rounded to one decimal place. The penalty for compressive strength shall be calculated according to Table 5DB.

1350.08.01.05.02 Air Void System Parameters

For the purpose of calculating penalty based on air void system parameters, the Contract Administrator shall round-off spacing factor test data to two decimal places and air content test data to one decimal place according to LS-100.

Penalty for unacceptable components shall be calculated by averaging penalties corresponding to individual sample results. The penalty values in $/m^3$ of concrete for individual samples are given in Table 6DB and 7DB. Any samples in an unacceptable component, that meet the specified requirements for air void system parameters, shall be assigned a penalty of $ 0/m^3 of concrete.

Penalty for unacceptable component shall be calculated according to the following:

$$PA = (P1 + P2 ... + Pn)/n$$

Where:

PA = penalty in dollars per cubic metre of concrete ($/m^3$)

P1, P2… Pn = penalties for individual samples from Tables 6DB and 7DB as applicable, in dollars per cubic metre of concrete ($/m^3$)

1350.08.01.05.03 Rapid Chloride Permeability

For the purpose of calculating penalty based on rapid chloride permeability, the Contract Administrator shall calculate the average rapid chloride permeability value per component. The penalty for rapid chloride permeability shall be calculated in accordance with Tables 8DB and 9DB.

1350.08.01.05.04 Calculation of Penalty for a Component

Combined penalty in $/m³ for a component shall be calculated by adding penalties based on compressive strength, air void system parameters and rapid chloride permeability for that component.

$$P = PC+PA+PR \ (\$/m^3)$$

Where:

P = combined penalty in dollars per cubic metre of concrete ($/m³)
PC = penalty based on compressive strength ($/m³)
PA = penalty based on air void system parameters ($/m³)
PR = penalty based on rapid chloride permeability ($/m³)

For the purpose of calculating the penalty, the quantity of concrete in each component shall be calculated by the Contract Administrator based on the neat lines called for in the Engineering Documents, and the penalty in dollars for a component shall be calculated as follows:

Penalty for a component ($) = component quantity (m³) x P ($/m³)

TABLES:

Tables 3, 4, 5, 6 and 7 of OPSS 1350 are deleted in their entirety and replaced with the following:

TABLE 4DB
Frequency of Sampling for Compressive Strength, Air Void System Parameters and Rapid Chloride Permeability (Note 4, 5)

Component	Sublot	Core Size	Number of Acceptance Cores	Number of Acceptance and Referee Cylinders 100 diameter and 200 mm long
Sidewalk on structure	500 lineal metres per stage	100 mm diameter and 200 mm long	5 (1 AVS, 1 RCP, 3 Strength)	Not applicable
Curb on structure	500 lineal metres per stage			
Median on structure	500 lineal metres per stage			
Parapet or barrier wall on structure	500 lineal metres per structure per stage			
Bridge deck-thin slab deck	500 m² per stage			

Component	Sublot	Core Size	Number of Acceptance Cores	Number of Acceptance and Referee Cylinders 100 diameter and 200 mm long
Abutment	1 abutment or a stage thereof			
Pier	1 pier (Note 1)			
Arches and spandrels	Between piers or between pier and abutment			
Bridge deck-post-tensioned deck	300 m2 per stage	100 mm diameter and 200 mm long	5 (1 AVS, 1 RCP, 3 Strength)	Not applicable
Culvert	1,000 m² of floor area of cast-in-place concrete culvert (Note 2)			
Toe wall	500 lineal metres per stage			
Approach slab	500 m² per stage			
Concrete barrier	Slipformed: 1,000 lineal metres (Note 3) Cast-in- place, including transitions: 250 lineal metres (Note 3)	100 mm diameter and 200 mm long	5 (1 AVS, 1 RCP, 3 Strength)	Not applicable
Silica fume overlays	300 m² per placement per individual structure	150 mm diameter and 100 mm long	1 AVS	3 strength, 3 referee
		100 mm diameter and 70-100 mm long	2 RCP	
Overlays	300 m² per placement per individual structure	150 mm diameter and 100 mm long	1 AVS	3 strength, 3 referee
		100 mm diameter and 70-100 mm long	2 RCP	
Sidewalk	500 lineal metres (Note 3)	100 mm diameter and a minimum of 125 mm long	2 (1 AVS, 1 RCP)	3 strength, 3 strength referee
Curb with gutter	500 lineal metres (Note 3)			
Concrete patches and refacing	a) Approximately equal in size and not greater than 100 m², for each individual structure.	150 mm diameter and 100 mm long	1 AVS	3 strength, 3 strength referee
		100 mm diameter and 70-100 mm long	2 RCP	
	b) Where the total area of patches or refacing on a structure is less than 20 m².	-	No cores	1 AVS, 1 RCP, 1 RCP referee, 3 strength, 3 strength referee
Footings	Each footing	100 mm diameter and 200 mm long	3 strength	No cylinders

Notes for Table 4DB:
1. A pier consists of columns and a pier cap.
2. The total floor area of a component shall be added together and then divided into sublots of specified size. Where a culvert has no floor, the area of the upper surface shall be used as the basis of determining sublots.
3. The total length of a component shall be added together and then divided into sublots of specified size.
4. For components not listed in the table, sampling shall be as directed by the Contract Administrator.
5. Sampling frequency can be adjusted by the Owner to suit specific contract details.

Table 5DB
Penalty for 28-Day Compressive Strength

28 Day Compressive Strength of a Component (MPa)	Penalty ($/m³)
Individual strength more than 4 MPa below specified strength and average ≥ specified strength	25
Average up to 1 MPa less than specified strength	50
Average up to 2 MPa less than specified strength	100
Average up to 3 MPa less than specified strength	150
Average up to 4 MPa less than specified strength	200
Average >4MPa less than specified strength	400

Table 6DB
Penalty for Air Void System Parameters of Hardened Concrete in Structure and Substructure including Overlays, Refacing and Patches
$/m³

Spacing Factor, mm	Air Content, %				
	1.0-1.4	1.5-1.9	2.0- 2.4	2.5-2.9	>2.9
<0.100 to 0.230	200	100	70	30	0
0.240 to 0.340	300	300	200	100	70
0.350 to 0.390	400	300	200	100	100
0.400 to >0.450	400	400	300	150	100

Note:
When a sample in an unacceptable component has an air content of 3% or higher and a spacing factor lower than 0.250 mm in silica fume overlays and HPC or lower than 0.230 mm in concrete other than silica fume overlays and HPC, the sample shall be assigned a value of 0 $/m³ for the purpose of calculating a penalty.

Table 7DB
Penalty for Air Void System Parameters of Hardened Concrete in All Other Concrete
$/m³

Spacing Factor, mm	Air Content, %				
	1.0-1.4	1.5-1.9	2.0-2.4	2.5-2.9	>2.9
<0.100 to 0.230	130	100	70	30	0
0.240 to 0.340	200	200	130	100	70
0.350 to 0.390	270	200	130	100	70
0.400 to >0.450	270	270	200	130	100

Note:
When a sample in an unacceptable component has an air content of 3% or higher and a spacing factor lower than 0.250 mm in silica fume overlays and HPC or lower than 0.230 mm in concrete other than silica fume overlays and HPC, the sample shall be assigned a value of 0 $/m³ for the purpose of calculating a penalty.

Table 8DB
Penalty for Rapid Chloride Permeability in Components Other than SF Overlays and HPC

Rapid Chloride Permeability of a Component (coulombs)	Penalty ($/m³)
Individual RCP >3000 coulombs, average ≤ 2500 coulombs	10
Average 2600-3000	30
Average 3100-3500	70
Average 3600-4000	150
Average 4100-4500	200
Average 4600-5000	300
Average >5000	400

Table 9DB
Penalty for Rapid Chloride Permeability in Silica Fume (SF) Overlays and HPC

Components

Rapid Chloride Permeability of a Component (coulombs)	**Penalty ($/m³)**
Individual RCP >1250 coulombs, average ≤ 1000 coulombs	10
Average 1100-1500	70
Average 1600-2000	200
Average >2000	400

Subsection GC 6.01, Protection of Work, Persons, and Property of the MTO General Conditions of Contract is amended by the addition of the following paragraph:

.06 For the purpose of subsection GC 6.02, Indemnification, and GC 6.03, Contractor's Insurance, the following definitions apply:

Affiliate means as defined in the Canada Business Corporations Act, as amended, and replaced from time to time or in any statute or statutes passed in substitution therefor.

Canadian Pacific Operational Special Provision means the Special Provision incorporated by the Contract Documents related to the means and methods by which the Contractor is to perform the Work on the Railway Lands.

CP means Canadian Pacific Railway Company.

CP Indemnified Group means the Canadian Pacific Railway Company, its Affiliates, officers, directors, employees and agents.

Losses means any and all claims, suits, demands, awards, actions, proceedings, losses, costs, damages, expenses, charges (including all penalties, loss of profit, loss of income or consequential losses) which a person suffers, sustains, pays or incurs and includes reasonable costs of legal counsel (on a solicitor client basis) and other professional advisors and consultants incurred in connection therewith.

Personnel means the servants, employees and agents of the Contractor and all individual persons engaged or retained by the Contractor, whether directly or indirectly, in connection with the Contract, including its subcontractors.

Railway Lands means the portion of the lands owned by the Canadian Pacific Railway Company shown in the Contract Documents, and includes all improvements, railway lines and structures situated thereon.

GC 6.02 Indemnification

Subsection GC 6.02 of the MTO General Conditions of Contract is amended by the addition of the following:

.06 Notwithstanding GC 6.02.01 and GC6.02.03, the Contractor also agrees to indemnify and hold harmless the Owner and the CP Indemnified Group from and against any and all Losses, suffered or incurred by the CP Indemnified Group to the extent that such arise out

of, results from, are based upon or are in any way connected with:

a) the Contractor's breach of its obligations under the Canadian Pacific Operational Special Provision of this Contract, including anything required to be done or maintained by the Contractor thereunder or anything not done or maintained by the Contractor as required thereunder;

b) any negligent acts or omissions or wilful misconduct by any Personnel (including, for certainty, any and all Subcontractors); and,

c) the Contractor's breach of the timing or conditions of any track block approved by CP with respect to the Contract.

.07 The Contractor shall make no claim or demand against the CP Indemnified Group for any Losses, injury (including death), or damage to property suffered or sustained by the Contractor, Personnel or any other person which arises out of, or is connected with:

a) the Canadian Pacific Operational Special Provision of this Contract;

b) the Work on the Railway Lands;

c) anything required to be done or maintained thereunder; or

d) anything not done or maintained as required thereunder;

and hereby waives as against the CP Indemnified Group all such claims and demands.

.08 Without limiting the generality of the foregoing, the Contractor shall indemnify and save harmless the Owner or CP Indemnified Group from and against any Losses which the Owner or CP Indemnified Group may suffer or incur resulting from inadequate or faulty construction of the Work for the Contract.

.09 If the Contractor's Work is disrupted or delayed at any time for any cause, including the occurrence of an event of force majeure, expiration of a track block, or maintenance required by CP, the Contractor shall not have a claim against the Owner or the CP Indemnified Group for any Losses resulting from any such interruption or delay, and the Contractor hereby waives and releases the Owner or the CP Indemnified Group from any such claim.

.10 The provisions of subsection 6.02 shall survive the contract completion or termination of the Contract.

GC 6.03 Contractor's Insurance

Subsection GC 6.03 of the MTO General Conditions of Contract is deleted in its entirety and replaced by the following:

.01 The Contractor shall at its sole cost and expense, obtain and maintain until Contract Completion with an insurer licensed under the *Insurance Act* (Ontario), the following policies of insurance:

a) *"Wrap-Up" Commercial General Liability* insurance covering the Owner, the CP Indemnified Group and all agents, contractors and sub-contractors who perform Work upon the lands identified in the Contract Documents, including the Railway Lands, and including all architects and engineers (but not for professional liability) with a limit of not less than fifty million dollars ($50,000,000) or subject to such coverage amount as determined by the CP Indemnified Group that shall be determined on a case-by-case basis for any one loss or occurrence for personal injury, bodily injury, or damage to property including loss of use thereof arising out of the Work. This insurance policy shall by its wording or by endorsement include but not be limited to the following:

i. the CP Indemnified Group as additional insured;
ii. "cross liability" or "severability of interest" clause which shall have the effect of insuring each entity named in the policy as an insured in the same manner and to the same extent as if a separate policy had been issued to each;
iii. blanket contractual liability;
iv. broad form products and completed operations, not less than twenty-four (24) months completed operations coverage;
v. shall not exclude operations on or in the vicinity of the railway right-of-way, if applicable;
vi. non-owned auto liability;
vii. employer's liability;
viii. broad form property damage;
ix. landowner's and Contractor's protective liability;
x. employees as additional insured;
xi. property damage due to explosion, collapse and underground property damage; and
xii. sudden and accidental pollution liability.

b) Automobile *Liability* insurance with the Contractor ensuring that its Subcontractors shall also be independently maintaining such automobile liability insurance so that both the Contractor and its Subcontractors are covering bodily injury and property damage in an amount not less than five million dollars ($5,000,000) per accident, covering the ownership, use and operation of any motor vehicles and trailers which are owned, leased or controlled by the Contractor and/or its Subcontractors, and used in connection with the Contract.

c) Contractor's *Pollution Liability* insurance, including naming the CP Indemnified Group as an additional insured, with a limit of not less than five million dollars ($5,000,000) for any one loss or pollution event. Coverage shall include, but not be limited to, claims for bodily injury, death, damage to property including the loss of use thereof, clean-up costs and associated legal defense expenses arising from pollution conditions caused by, and/or exacerbated by, work performed by the Owner

and/or the Contractor. The policy shall be endorsed to contain a blanket contractual liability endorsement. If this policy is written on a "claims-made" basis it shall remain in effect for no less than twelve (12) months after Contract Completion or termination of the Contract.

d) For operations not covered by the *"Wrap-Up" Commercial General Liability* insurance set forth, the Contractor shall obtain and maintain until Contract Completion, a *Commercial General Liability (CGL)* policy with a limit of not less than ten million dollars ($10,000,000) any one loss or occurrence for personal injury, bodily injury, or damage to property including loss of use thereof. This policy shall by its wording or by endorsement include but not be limited to the following:

   i. the CP Indemnified Group as an additional insured with respect to obligations of the Contractor under the Contract;
   ii. "cross liability" or "severability of interest" clause which shall have the effect of insuring each entity named in the policy as an insured in the same manner and to the same extent as if a separate policy had been issued to each;
   iii. blanket contractual liability, including the insurable liabilities assumed by the Contractor under this Agreement;
   iv. products and completed operations;
   v. shall not exclude operations on or in the vicinity of the railway right of way;
   vi. non-owned auto liability;
   vii. sudden and accidental pollution liability; and
   viii. employer's liability, if applicable.

.02 Upon request, the Contractor shall provide the Owner with written confirmation from the Ontario Workplace Safety and Insurance Board that the Contractor is registered under and in compliance with the requirements of the *Workplace Safety and Insurance Act, 1997* (Ontario), as amended and replaced from time to time or any statute or statutes passed in substitution therefor, together with all regulations made from time to time under such act.

.03 The Contractor shall provide the Owner with a copy of certificates of insurance evidencing the above insurance to the satisfaction of the Owner prior to the Contractor accessing the Railway Lands and the commencement of the Work, whichever first occurs. The Owner may at its option require the Contractor to annually provide the Owner with a copy of updated certificates of insurance evidencing the renewal of the above insurance. The Owner shall have no obligation to examine such certificates or to advise the Contractor in the event its insurance is not in compliance herewith. Acceptance of such certificates which are not compliant with the stipulated coverage shall in no way whatsoever imply that the Owner has waived the insurance requirements of the Contract.

.04 The Contractor agrees that the insurance coverage required to be obtained and maintained by it under these provisions shall not limit or restrict its liabilities under this Contract, including these provisions.

.05 Unless otherwise specified, all insurance coverage shall take place in the form of an occurrence basis policy and not a claims made policy.

.06 The Contractor agrees that the insurance coverage is primary and not excess of any other insurance that may be available.

.07 The Contractor shall provide the Owner and CP with written notice and all reasonable particulars and documents related to any damages, losses, incidents, claims and potential claims as soon as practicable after the damage, loss, incident or claim has been discovered.

.08 The insurance policies shall be endorsed to provide CP with not less than thirty (30) Days written notice in advance of cancellation, material change or amendments restricting coverage (with the exception of the automobile policies). Such notice shall be sent to:

Canadian Pacific Railway Company
7550 Ogden Dale Road SE
Calgary, AB, T2C 4X9
Attention: Director of Risk Management

.09 If at any time the Contractor fails to obtain and maintain any of the insurance required under this provision, on notice from the Owner or CP, the Contractor shall immediately stop all activities on the Railway Lands and the Contractor shall not access (whether directly or indirectly) the Railway Lands until it has received written approval from CP or the Owner.

AMENDMENT TO MTO GENERAL CONDITIONS OF CONTRACT, NOVEMBER 2016 - Approvals and Permits, and Water Taking

Special Provision No. 100S59 November 2016

Subsection GC7.10, Approvals and Permits, is deleted in its entirety and replaced by the following:

7.10 Approvals and Permits

7.10.01 General

.01 Except as specified in paragraph GC 7.10.01.02, the Contractor shall obtain any permits, licenses, certificates, and registrations required for the performance of the Work that are in force at the date of tender closing.

.02 The Owner shall obtain and pay for the necessary plumbing and building permits.

.03 The Contractor shall arrange for all necessary inspections.

7.10.02 Water Taking

.01 The Owner has obtained from the Ministry of the Environment and Climate Change (MOECC) one or more draft Permits to Take Water required by the *Ontario Water Resources Act*, R.S.O 1990, c O.40, and these shall be posted under "Contract Attachments" in the Registry, Appraisal and Qualification System (RAQS) listing of the Contract, as applicable.

.02 When water taking activities are eligible for registration on the MOECC Environmental Activity and Sector Registry (EASR) in accordance with O. Reg. 63/16 - Registrations under Part II.2 of the Environmental Protection Act - Water Taking, required supporting technical reports shall also be posted under "Contract Attachments" in the RAQS listing of the Contract, as applicable. Some water taking activities eligible for registration on the MOECC EASR may have been included in draft permit(s) and as such no supporting technical reports shall be required or provided.

.03 No later than 5 Business Days after the pre-work meeting, the Contractor shall submit all information required by MOECC according to the cover letter attached to draft permit(s) to the attention of the applicable MOECC Regional Office Water Resources Supervisor.

.04 MOECC will issue the permit(s) and Director's Orders under the *Environmental Protection Act*, R.S.O. 1990, c. E.19, exempting water taking activities from registration when they have been included in a permit, as applicable, within 15 Business Days of receipt of all required information from the Contractor.

.05 The Contractor shall be responsible for the registration of any other water taking activities on the EASR, the acquisition of additional Permits to Take Water, and any required supporting technical reports not provided by the Owner, except when required due to a Change in the Work.

.06 No later than 2 Business Days prior to the commencement of water taking, the Contractor shall submit a copy of the appropriate Permits to Take Water and Director's Orders, as applicable, and shall provide confirmation of registration of any water taking activities, to the Contract Administrator.

OCCUPATIONAL HEALTH AND SAFETY ACT COMPLIANCE

Special Provision No. 101F21 November 2014

List of Designated Substances

In accordance with the *Occupational Health and Safety Act, R.S.O. 1990, c. 0.1*, the Contractor is advised of the presence of the following Designated Substance(s):

Substance	Location
Arsenic	• **Samples obtained from guiderail posts at culvert 34-65/2 on the north side indicated concentrations of arsenic (2.8 mg/kg).** If future construction activities affect the integrity of materials containing arsenic, standard demolition dust control measures should be implemented where practical to ensure airborne dusts are controlled as per *O. Reg. 490/09*, as amended.
Asbestos on Construction Projects and in Buildings and Repair Operations (O. Reg. 278/05)	• **Drawings reviewed from structures 34-65/1&2 indicated embedded electrical conduits.** **Materials which support the suspicion of ACM encountered during bridge rehabilitation should be sampled at that time to confirm the presence or absence of Designated Substances and determine appropriate abatement and/or management options.** **In accordance with *Ontario Regulation 490/09* all necessary measures and procedures should be taken to ensure the time-weighted average exposure of a worker to any form of airborne asbestos does not exceed 0.1 fibres per cubic centimeter of air, averaged over an 8-hour work period.**

Substance	Location
Lead	• **Samples taken from the girders from structure 34-65/1 (northbound) indicated lead-based paint (11% wt and 12% wt).** • **Samples taken from the girder and abutment walls beneath 34-65/2 (southbound) indicated the grey material was considered lead-containing paint (0.028% wt and 0.038 % wt).** **In general, the following procedures are recommended if/when removing lead-containing materials, coatings and paint applications:** • **Follow Type 1 – if the coating is to be removed with a chemical gel or paste;** • **Follow Type 2a – if the coating is to be removed by scraping or sanding using non-powered hand tools, or manual demolition of lead-painted building components by striking with sledgehammer or similar tool;** • **Follow Type 3a – if the coating is to be removed using power tools; or,** • **Follow Type 3b – if the coating is to be removed by abrasive blasting.** **If lead-containing paint applications and surface coatings are not removed prior to demolition, ensure that demolition waste complies with the requirements of General – Waste Management Regulation, R.R.O. 1990, Regulation 347.** **If future construction activities affect the integrity of materials containing lead, standard demolition dust control measures should be implemented where practical to ensure airborne dusts are controlled as per the Ministry of Labour's (MOL) Guideline for Lead on Construction Projects.**
Silica	**Silica is assumed to be present in concrete and mortar.** Standard dust control measures should be implemented where practical to ensure airborne dusts are controlled during construction activities as per the *Guideline for Silica on Construction Projects* (MOL, September 2004, as amended);
Benzene	None identified.
Vinyl Chloride, Coke Oven Emissions, Ethylene Oxide, Acrylonitrile and Isocyanates	None identified.
Mercury	None identified.

Timing of In-Water Works, Oversight Requirements, and Measures to Avoid Harm to Fish

182.07.08.01 Timing of In-Water Works

Clause 182.07.08.01 of OPSS 182 is amended by deleting the first paragraph in its entirety and replacing it with the following:

In-water work where fish and/or fish habitat are present is permitted during times specified in Table A for each waterbody and station listed.

Table A
Timing of In-Water Work

Waterbody	Station	Timing Window For When In-Water Work Can Occur
Welland River	Site 34-65-1/2	July 1 – February 28/29
Warren Creek	Site 34-312/C	July 1 – February 28/29
Ussher's Creek	Site 34-315/C	July 1 – February 28/29
Grassy Brook	Site 34-313/C	July 1 – February 28/29

182.07.08.05 Fisheries Specialist Services

Clause 182.07.08.05 of OPSS 182 is amended by deleting bullet d) and replacing it with the following:

d) Be on-site to inspect and confirm the proper installation, functioning and decommissioning (as appropriate) of all temporary and permanent mitigation measures and, where applicable, overall benefit measures required by an Endangered Species Act permit and offsetting measures required by a Fisheries Act Authorization as specified in Table B, including providing field fit advice and necessary corrective actions for issues of non-compliance;

Table B
Qualified Fisheries Contracts Specialist - Oversight Requirements

Waterbody	Mitigation / Offsetting / Overall Benefit Measures	Measures to Protect Fish and Fish Habitat - Item Title and Code	Minimum Frequency
Welland River Bridges Site 34-65-1/2 Warren Creek Culvert Site 34-312/C	In-water works completed between July 1st and February 28/29th	• OPSS182 • Table A - Special Provision No. 101F23	Weekly during in-water work, bi-weekly following construction and until site is stabalized
	All instream work will be completed in the dry by isolating and dewatering the work area.	• OPSS 182 • OPSS 517 • OPSD 221.020 • OPSD 219.240 • OPSD 219.150	Daily during installation and decommissioning; Weekly monitoring otherwise.
	All dewatering and flow diversion will be done in a manner which prevents sedimentation.		
	The duration of soil exposure will be limited to the minimum required to complete the work.	• OPERATIONAL CONSTRAINT: Sediment and Erosion Control - General • OPSS 805 • Topsoil From Stockpiles - Item No. • Seed and Mulch - Item No. • Seed and Erosion Control Blanket - Item No.	During each site visit and, at a minimum, weekly.
	The size of disturbed areas will be limited by minimizing nonessential clearing and grading.		
	Reinstate and re-establish any portion of watercourse disturbed during construction to pre-construction (or better) condition.		
	Appropriate sediment and erosion control measures (i.e. silt fencing, straw bales, etc.) to isolate the work area.	• OPSS 805	During each site visit and, at a minimum, weekly.
	Sediment and erosion controls will remain in place and maintained until vegetation has taken sufficiently to provide adequate protection for the watercourse.		

Waterbody	Mitigation / Offsetting / Overall Benefit Measures	Measures to Protect Fish and Fish Habitat - Item Title and Code	Minimum Frequency
	All fish and mussels stranded within the containment measures (i.e., behind sheet piles or cofferdams) will be removed and relocated to suitable habitat downstream of the construction areas prior to in-water works. If mussel relocation is required, it will be conducted in accordance with the DFO Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario-Great Lakes Area (2008). Fish salvage will be conducted under a License to Collect Fish for Scientific Purposes.	• OPSS 182 • SARA Permit (DFO) if deemed required by DFO through review of project.	Initial relocation required after installation of isolation measures and prior to dewatering or commencement of in-water work. Follow up relocations/rescues will be conducted if there are issues with the isolation measures being over-topped or damaged during storm events.

182.07.08 Fish Protection

Subsection 182.07.08 of OPSS 182 is amended by the addition of the following clause:

182.07.08.06 Additional Measures to Avoid Harm to Fish

Measures listed in Table C shall be implemented at the specified locations.

Table C
Additional Measures to Avoid Harm to Fish

Waterbody	Type of Work	Additional Measures to Avoid Harm
Warren Creek Site 34-312/C	Rock Protection Redistribution	The existing rock protection is currently acting as a barrier to fish movement through the crossing during low flow periods. Re-distribute the rock to the margins of the channel for consideration of a “low flow” design to address this barrier concern.

706.07 CONSTRUCTION

Section 706.07 of OPSS 706 is amended by the addition of the following subsection:

706.07.06 Freeway Paving Operations

When paving on a freeway within 3 m of a travelled lane open to traffic with no barrier designed to restrain errant vehicles between the paving operation and traffic, the following protection measures shall be applied:

a) A temporary regulatory speed reduction of 20 km/hr less than the normal posted regulatory speed (NPRS) shall be implemented during the paving operation. All signing shall be according to OTM Book 7. All existing NPRS signs within the reduced speed zone shall be covered while the temporary regulatory speed reduction signs are in use. The existing NPRS signs shall be restored when the reduced speed zone is not required and the temporary regulatory speed reduction signs shall be covered.

b) When a temporary regulatory speed reduction is in effect, a portable variable message sign (PVMS) shall be placed in advance of the first Maximum Speed Ahead signs at a location to be provided by the CA. If the Contract is in a bilingual area, an additional PVMS sign shall be deployed for the approved equivalent French message at least 150 m after the English PVMS. PVMS locations shall be verified to be legible to approaching motorists for at least 300 m and not be obstructed by existing signing or other obstructions. PVMS message details shall be as directed by the Contract Administrator.

When there is only a single lane open to traffic that is adjacent to the paving operation, the use of pace
vehicles is permitted to limit the speed of traffic to that of the temporary regulatory speed reduction. The use
of pace vehicles shall be according to OTM Book 7.

706.10 BASIS OF PAYMENT

Section 706.10 of OPSS 706 is amended by the addition of the following subsection:

706.10.05 Freeway Paving Operations

The protection measures specified for freeway paving operations shall be at no additional cost to the Owner.

PLACING HOT MIX ASPHALT BEFORE SEASONAL SHUTDOWN

Special Provision 199F03 May 2016

This Special Provision shall apply to:

the entire Contract limits.

Before seasonal shutdown or by December 24th, whichever is earlier, the following work shall be completed on the above roadways on which construction operations have commenced and which are to remain open to public traffic:

a) The roadbed shall be completed to the specified grade and cross section of the granular base;

b) The roadbed shall be paved with at minimum the first two binder courses. At least the first two layers of binder course mix as designed for the roadway shall be completed, including ramping at curb and gutter, manholes and catch basins. Surface course paving may proceed, in conformance with OPSS 313, as amended by this contract provided that the underlying work conforms to the contract requirements; and

c) The shoulders shall be completed to the corresponding elevation of the top of the hot mix.

When, in order to comply with a) above, the Contractor does not comply with the restrictions on placing earth, rock or granular materials over frozen ground, ice or snow, the Contractor shall be responsible for the costs of removal and replacement of the pavement, granular and subgrade materials, subdrains, pavement markings, temporary traffic barriers, signs and other associated work and the provision of traffic control where removal and replacement is deemed necessary by the Contract Administrator.

When, in order to comply with b) above, the Contractor paves over a frozen roadbed or in violation of the temperature restrictions for paving, the Contractor shall be responsible for the costs of removal and replacement of the hot mix pavement, granular base and shouldering materials, pavement markings, temporary traffic barriers and the provision of traffic control.

The removal and replacement work shall conform to the Contract requirements and the Contractor shall comply with any other terms and conditions for carrying out the work as the Contract Administrator may declare in writing at that time.

When the Contractor has performed work which did not comply with the restrictions on placing earth, rock or granular materials over frozen ground, ice or snow, or paves over a frozen roadbed or in violation of the temperature restrictions for paving:

a) The Contractor shall be responsible for the costs incurred by the Owner in maintaining the roadway in a condition satisfactory for the travelling public during seasonal shutdown, excluding the costs of applying de-icing salts, abrasives and snow-plowing operations; and

b) Payment at the contract prices for the work will be withheld until any necessary removal and replacement of the roadway has been completed after it has thawed in the spring.

ENVIRONMENTALLY SENSITIVE AREAS

Special Provision No. 199F12 April 2017

The areas formed by a line joining the points in the table below are environmentally sensitive. Entry onto or use of these areas for any purpose is prohibited, except for the specific, limited purposes specified below.

Area No.	Highway	Points				Description	Exceptions
		No.	Township	Station	Offset		
1	QEW	1	City of Niagara Falls	Welland River Bridge Centreline (Sites 34-65-1/2)	35 m north/south from centreline	Welland River East Wetland Complex (PSW)	None
2	QEW	1	City of Niagara Falls	Warren Creek Culvert Centreline	15 m north/south on SBL	Warren's Creek Wetland Complex (PSW)	None
3	QEW	1	City of Niagara Falls	Usshers Creek Culvert Centreline	15 m north/south on NBL	Usshers Creek Wetland Complex (PSW)	None
4	QEW	1	City of Niagara Falls	Grassy Brook Creek Culvert Centreline	15 m north/south on NBL	Welland River East Wetland Complex (PSW)	None
		2	City of Niagara Falls	Grassy Brook Creek Culvert Centreline	15 m north/south on SBL	Lower Grassy Brook Creek Wetland Complex (PSW)	None

Areas may extend and other areas may be present beyond the Highway right-of-way, and may be subject to regulation.

ENVIRONMENTAL EXEMPTIONS AND PERMITS

Special Provision No. 199F31 April 2016

The following environmental exemptions and permits are provided for the Work.

Exemption and Permit Identification
Registration under the *Ontario Regulation Reg. 242/08* (Threats to health and safety: not imminent) under the *Endangered Species Act*, 2007 for Barn Swallow at Culvert 34-315/C

The exemptions and permits provided above do not relieve the Contractor of other obligations imposed by statute or by municipal bylaw.

Pending Environmental Exemptions and Permits

The following environmental exemptions and permits are pending for the Work. The areas formed by a line joining the points in the table(s) below, where each point enclosing an area is in a separate row in the table, are prohibited from entry until Contract Administrator notification that the pending exemptions and permits listed have been obtained. The pending exemptions and permits are expected to be obtained by the date shown.

No.	Highway	Pending Exemption and Permit Identification	Date Expected
1	QEW	MECP Draft Permit-to-take-Water (Category 3)	Dec. 31-18
2	QEW	Permit under *Species-at-Risk Act* for mussel relocation at the Welland River Bridges and Site 34-312/C	Dec. 31-18
3	QEW	MTO Project Notification Forms for culvert rehabilitations at Site 34-313/C and Site 34-315/C	Dec. 31-18

CONSTRUCTION NOISE CONSTRAINTS

Special Provision No. 199F33 June 2013

Noise Sensitive Areas

This Special Provision covers the requirements for control of construction noise produced by the Contractor's operations. With the exception of any exemptions from municipal noise control bylaws that may be specified in the Contract Documents, these requirements do not relieve the Contractor of other obligations imposed by statute or by municipal bylaw.

Noise Sensitive Area Limits	
Entire Study Area	
Constraint	**Constraint Details**
Equipment Maintenance	Equipment shall be maintained in an operating condition that prevents unnecessary noise, including but not limited to non-defective muffler systems, properly secured components, and the lubrication of moving parts.
Equipment Operation	Idling of equipment shall be restricted to the minimum necessary to perform the specified work.
All Construction Operations	The Ministry of Transportation is exempt from the City of Niagara Falls' noise by-law. The City of Niagara Falls and the Regional Municipality of Niagara shall be notified of the start of construction, and any night construction work requirements.

AMENDMENT TO MTO GENERAL CONDITIONS OF CONTRACT, NOVEMBER 2016

Special Provision No. CMO 0001 January 23, 2018

Use of WBCMS for Administering the Contract

GC 1.07 Definitions

Subsection GC 1.07 of the MTO General Conditions of Contract is amended by the addition of the following definition:

Web-Based Contract Management Services (WBCMS) means a browser based solution that provides an electronic means to record, collect, transmit and store Contract data.

GC 1.09 Interpretation of Certain Words

Subsection GC 1.09 of the MTO General Conditions of Contract is amended by the addition of the following:

03. Any reference in the Contract Documents to "Owner Standard Form" or "PH-CC" shall be deemed to mean the electronic equivalent of that form within WBCMS.

.04 The words “write”, “notify”, “submit”, “issue”, “provide”, “execute”, “report”, “give”, “furnish”, “return”, “apply” and their variations, and other words referring to a communication from the Contractor to the Contract Administrator, or from the Contract Administrator to the Contractor, shall mean the word “electronically using WBCMS” (e.g., “writing electronically using WBCMS”, “notify electronically using WBCMS”).

.05 When administering Contract data, references to the term “Service Provider” in WBCMS shall mean the “Contractor”.

GC 3.0 ADMINISTRATION OF THE CONTRACT

Section GC 3.0 of the MTO General Conditions of Contract, is amended by the addition of the following subsection:

GC 3.15 Use of WBCMS

.01 WBCMS shall be used to administer Contract data. After Contract award, submissions shall only be accepted by the Ministry through WBCMS.

.02 WBCMS is replacing paper copies therefore it is mandatory to fill the electronic records with all necessary data and attaching a scanned paper version is not acceptable.

.03 The Owner shall provide subscription information to the Contractor, including purchasing instructions, at the time of Contract award. The following requirements shall apply:

a) The Work shall not commence until WBCMS subscriptions have been purchased.

b) The Contractor shall ensure that a subscription is in place for each role within 5 Business Days of notification and maintained until issuance of the Contract Completion Certificate.

c) The Contractor shall agree to the WBCMS terms of service at the time of purchasing subscriptions, and abide by the terms and conditions for the duration of the Contract.

d) The Contractor shall purchase an annual subscription for each user in a role for each awarded Contract.

e) The Contractor shall maintain 1 Approval Role subscription until receipt of the Release from Warranty Certificate.

f) Subscriptions cost $1350 plus HST per user, per role, per year, and are valid for one year from the date of purchase. There shall be no additional costs to the Owner for using or accessing WBCMS.

g) It is the sole responsibility of the Contractor to ensure that internet access is continuously available to all their users at the work location during construction operations. There shall be no additional costs to the Owner for ensuring internet

services are available at the work location.

h) The Contractor shall use Microsoft Internet Explorer 11 (IE11) as this is the Ministry supported browser.

i) The Contractor shall record all activities using WBCMS and the information must be entered on a daily basis. There shall be no additional costs to the Owner for using or accessing WBCMS.

.04 The roles and responsibilities within WBCMS are defined as;

a) Company User Administrator - Administers subscriptions, user profiles and assigns staff roles. This role does not require an annual subscription and cannot enter or review Contract data.

b) Field Role - Enters Contract data at the work location.

c) Office Role - Enters and reviews Contract data.

d) Approval Role - Reviews and approves field and office data. Any user in this role has the ability to bind the Contractor.

.05 When the Contract Documents require the submission of multiple copies of a document, and the document is to be submitted using WBCMS, then only the electronic submission is required.

.06 A document signed and sealed by one or more Engineer, Ontario Land Surveyor, Professional Geoscientist, or other professional licenced according to federal or provincial legislation shall be submitted electronically using WBCMS. In addition to the electronic submission, within 5 Business Days of the electronic submission using WBCMS, an original signed and sealed copy of the document shall be submitted by hand or by mail to the Contract Administrator.

.07 Submission of records using WBCMS shall be the legal equivalent of a delivery of original signed documents or information by hand by an authorized representative of the Contractor or the Contract Administrator.

NOTICE TO CONTRACTOR - Fairness in Procurement

Special Provision No. CMOB 0007 April 26, 2018

Fairness in Procurement

Contractors shall adhere to the Fairness in Procurement Act, 2018 and Suppliers from New York Regulation which set out specific mandatory requirements related to the Fairness in Procurement

regulation.

Any structural iron used or supplied in the performance of this Contract and permanently incorporated in the surface road or bridge shall be fabricated in a jurisdiction other than New York.

Structural Iron means a product that is made of either wrought iron or cast iron or both and that is designed to carry a load, but does not include a product that contains any form of steel.

AMENDMENT TO MTO GENERAL CONDITIONS OF CONTRACT, NOVEMBER 2016

Special Provision No. CMOB 0008M June 29, 2018

GC 1.07 Definitions

Subsection GC 1.07 of the MTO General Conditions of Contract is amended by the addition of the following definitions:

Bonds means both the Contract Bonds and the Statutory Bonds prescribed in the Tender Documents.

Construction Act means the *Construction Act*, R.S.O. 1990, c.C.30, as amended.

Contract Bonds means the surety bonds executed by the Contractor and its Surety prescribed in the Tender Documents, but does not include Statutory Bonds.

Finishing Holdback means the 10% statutory holdback related to Finishing Work required to be retained pursuant to the *Construction Act*.

Finishing Work means the Work to be completed after submission of Form 9 of Ontario Regulation 303/18 of the *Construction Act* and prior to and necessary to be supplied or performed to complete the Contract.

Finishing Work Deficiency List means a list of deficiencies and Work yet to be completed identified, independently, by the Contractor and the Contract Administrator.

Statutory Bonds means the surety bonds executed by the Contactor and its Surety and required to be furnished by Part XI.1 of the *Construction Act*.

Total Bid Price means the price submitted by the Contractor at close of the tender.

Written Notice of Lien means a written notice of lien in the prescribed form pursuant to the *Construction Act*, R.S.O. 1990, c.30, as amended, given by a person with a lien that identifies the payer and identifies the premises, and states the amount that the person has not been paid and is

owed to the person by the payer.

GC 1.08 Substantial Performance

Paragraph GC 1.08.01 of the MTO General Conditions of Contract is amended by deleting point b) in its entirety and replacing it with the following:

b) When the Work to be performed under the Contract is capable of completion or, where there is a known defect, correction, at a cost of not more than:

i. 3% of the first $1,000,000 of the Contract price,
ii. 2% of the next $1,000,000 of the Contract price, and
iii. 1% of the balance of the Contract price

Paragraph GC 1.08.02 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

.02 For the purposes of this Contract, when the Work or a substantial part thereof is ready for use or is being used for the purposes intended and the Owner and the Contractor agree not to complete the Work expeditiously, the price of the services or materials remaining to be supplied and required to complete the Work shall be deducted from the Contract price in determining substantial performance.

GC 1.10 Liens

Subsection GC 1.10 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

.01 A lien is preserved when the claimant has given the Owner a copy of the claim for lien before the lien has expired pursuant to the *Construction Act*.

.02 A preserved lien is perfected when the claimant commences an action in the courts to enforce the lien prior to the end of the period specified in Section 36 of the *Construction Act*.

.03 A preserved lien becomes a perfected lien by sheltering under a perfected lien in accordance with the rules of sheltering specified in Subsection 36(4) of the *Construction Act*.

.04 The Owner shall retain an amount sufficient to satisfy the amount of a lien set out in a written notice of lien Form 1 of Ontario Regulation 303/18 of the *Construction Act* in accordance with Subsection 24(2) of the *Construction Act*.

GC 4.10 Termination of the Contract

Subsection GC 4.10 of the MTO General Conditions of Contract is amended by the addition of the following paragraph:

.03 If the Contract is terminated, the Owner shall publish the statutory notice of termination prescribed by Form 8 of Ontario Regulation 303/18 of the *Construction Act*, in a construction trade newspaper, and the date of the termination of the Contract shall be the date specified in the statutory notice of termination for the Contract.

GC 4.12 Use of Performance Bond

Subsection GC 4.12 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

GC 4.12 Use of Performance Bonds

.01 If the Contractor is in default of the Contract and the Contractor has provided a performance bond, the Owner may rely upon the performance bond and its conditions along with the Contract Documents.

GC 6.02 Indemnification

Paragraph GC 6.02.01 of the MTO General Conditions of Contract is amended by deleting point c) in its entirety and replacing it with the following:

c) Made in writing within a period of 6 years from the date of Substantial Performance of the Work as set out in Certificate of Substantial Performance of Contract, being Form 9 of Ontario Regulation 303/18 of the *Construction Act* for the Work or, where so specified in the Contract from the date of the Contract Completion Certificate.

GC 6.04 Bonding

Subsection GC 6.04 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

GC 6.04.01 General

.01 If the Total Bid Price exceeds $500,000.00, the Contractor shall furnish the Owner with Statutory Bonds, being a performance bond and labour and material payment bond in accordance with the *Construction Act*.

.02 Such Statutory Bonds shall be obtained from a surety company or companies that is an insurer licenced under the *Insurance Act* to write surety and fidelity insurance.

GC 6.04.02 Performance Bond

.01 With respect to the Statutory Bond for a performance bond, the Contractor shall furnish a Performance Bond using Form 32 of Ontario Regulation 303/18 of the *Construction Act* that is conditioned on the due performance of the terms of the Contract for the amount of 50% of the Total Bid Price.

.02 With respect to the Contract Bond, the Contractor shall furnish a Performance Bond satisfactory to the Owner.

GC 6.04.03 Labour and Material Payment Bond

.01 With respect to the Statutory Bond, the Contractor shall furnish a Labour and Material Payment Bond using Form 31 of Ontario Regulation 303/18 of the *Construction Act* that extends or guarantees payment protections to the Subcontractor and persons supplying labour and Material to the Contract for the amount of 50% of the Total Bid Price.

.02 With respect to the Contract Bond, the Contractor shall furnish a Material and Labour Payment Bond satisfactory to the Owner.

GC 8.02.04.03 Certification of Subcontract Completion

Clause GC 8.02.04.03 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

.01 Before the Work has reached the stage of Substantial Performance, the Contractor shall notify the Contract Administrator using Form 7 of Ontario Regulation 303/18 of the *Construction Act* that a subcontract is completed satisfactorily and request the Contract Administrator to certify the completion of the subcontract.

.02 The Contract Administrator shall investigate to determine if the subcontract has been satisfactorily completed with all required inspections and testing required for the subcontract work and, if the Contract Administrator so determines, shall certify completion using Form 10 of Ontario Regulation 303/18 of the *Construction Act*.

.03 Within 7 Days of the date the subcontract is certified complete, the Contract Administrator shall give a copy of the certificate to the Contractor and to the Subcontractor concerned.

GC 8.02.04.04 Subcontract Statutory Holdback Release Certificate and Payment

Paragraph GC 8.02.04.04.01 of the MTO General Conditions of Contract is amended by deleting point b) in its entirety and replacing it with the following:

b) Mail to the Contractor, the subcontract completion payment certificate within 10 Days of the date the subcontract was certified complete, for the Contractor to sign and return within 5 further Days. The Contract Administrator shall pay the Contractor the amount of the 10% holdback retained by the Owner in respect of the subcontract work after being certified completed and providing that all lien claims that may be claimed against the holdback for the subcontract work have been expired or been satisfied or discharged, or otherwise provided for under the *Construction Act*, and providing that the Contractor has furnished to the Contract Administrator a statutory declaration in a form supplied by the Owner that the said Subcontractor has discharged all liabilities incurred by the Subcontractor in carrying out the said subcontract.

Paragraph GC 8.02.04.04 of the MTO General Conditions of Contract is amended by the addition of the following:

.05 Payment for subcontracts certified complete pursuant to the Contract and the *Construction Act*, including the payment of the statutory holdback shall be made when all the liens have been satisfied in accordance with Section 25 of the *Construction Act*.

GC 8.02.04.05 Certificate of Substantial Performance

Paragraph GC 8.02.04.05.02 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

.02 Upon written application by the Contractor for Substantial Performance using Form 9 of Ontario Regulation 303/18 of the *Construction Act*, the Contract Administrator shall conduct an inspection of the Work to determine if the Work is substantially performed and the date for Substantial Performance. The Contractor's application shall detail non-conformances, defects to be rectified, and Work yet to be completed. After inspection, the Contract Administrator shall provide a list of deficiencies and Work yet to be completed in addition to the Contractor's list. The Contractor's list of non-conformances, defects, and Work yet to be completed together with the Contract Administrator's list of same shall be combined and referred to as Finishing Work. All deficiencies and Work to be completed from the Finishing Work Deficiency List shall be completed prior to Contract Completion. Any additional defects and deficiencies for Work previously accepted as substantially performed shall be completed within 60 Days of Contract Completion, unless prevented by winter weather conditions; in such case, the defects and deficiencies shall be corrected by June 15th of the following year. Defects and deficiencies on Work completed after Substantial Performance shall be completed prior to Contract Completion.

Paragraph GC 8.02.04.05.04 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

.04 Upon receipt of a copy of the Certificate of Substantial Performance using Form 9 of Ontario Regulation 303/18 of the *Construction Act*, the Contractor shall arrange to have the certificate published in a construction trade newspaper and the Contractor shall provide to the Contract Administrator proof that the certificate was published. Where the Contractor fails to publish a Certificate of Substantial Performance within 7 Days of receiving the certificate, the Owner shall publish the certificate in a construction trade newspaper and charge the Contractor $1,000 for the costs of advertising and administration. Subject to the *Construction Act*, the 60-Day lien period shall start on the date the Certificate of Substantial Performance is published in a construction trade newspaper.

Paragraph GC 8.02.04.05.05 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

.05 Except as otherwise provided for in Section 31 of the *Construction Act*, the 60-Day lien period prior to the payment of statutory holdback shall commence from the date of

publication of the Certificate of Substantial Performance as provided for in paragraph GC 8.02.04.05.04.

GC 8.02.04.06 Substantial Performance Payment and Statutory Holdback Release Payment Certificates

Clause GC 8.02.04.06 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

.01 Upon receipt of the application for payment at Substantial Performance, the Contract Administrator shall check the invoice and advise the Contractor of any discrepancies. Any of these discrepancies that are unresolved prior to the expiry of the lien period shall be treated as set-offs.

.02 Subject to any outstanding liens and permissible set-offs, the Owner shall issue payment, including the release of the holdback on the Work done, within 28 Days after the expiration of the 60-Day lien period.

.03 In addition to any permissible set-offs, holdback shall continue at the rate of 10%, on all Work performed after the date of the Certificate of Substantial Performance.

.04 If this Contract extends over more than one construction season and there are no outstanding liens, the Owner may issue payment to reduce the holdback

.05 The holdback may not be released to the Contractor within the timeline under GC 8.02.04.06 when Form 6 of Ontario Regulation 303/18 of the *Construction Act* is provided to the Contractor and published by the Owner in a construction trade newspaper as provided in Section 27.1 of the *Construction Act*. The Contract Administrator shall notify the Contractor, in writing, of its publication no later than 3 days after the publication of the notice of non-payment.

.06 Within 3 days after receiving Form 6 of Ontario Regulation 303/18 of the *Construction Act* from the Contract Administrator, the Contractor shall notify the affected Subcontractor(s) providing a copy of the notice.

.07 Payments for Work certified as substantially performed, including release of holdback, shall be made within 120 Days of the date of publication of substantial performance. The Owner shall release the holdback at the end of the 60-Day lien period providing all liens are expired or been satisfied, discharged or otherwise provided under the *Construction Act*. This payment shall be made within 28 Days of the expiry of the 60-Day lien period and subject to Subsection 26.1 of the *Construction Act*.

GC 8.02.04.07 Certificate of Contract Completion

Paragraph GC 8.02.04.07.02 of the MTO General Conditions of Contract is deleted in its entirety.

Paragraph GC 8.02.04.07.03 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

.03 Upon receipt of a copy of the Certificate of Contract Completion, the Contractor shall arrange to have the Certificate of Contract Completion published in a construction trade newspaper and the Contractor shall provide to the Contract Administrator proof that the certificate was published. Where the Contractor fails to publish a Certificate of Contract Completion within 7 Days of receiving the certificate, the Owner shall publish the certificate in a construction trade newspaper and charge the Contractor $1,000 for the costs of advertising and administration. Subject to the *Construction Act*, the 60-Day lien period shall start on the date the certificate is published in a construction trade newspaper.

Paragraph GC 8.02.04.07.04 of the MTO General Conditions of Contract is deleted in its entirety

Paragraph GC 8.02.04.07.05 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

.05 Upon receipt of the application for payment at Contract Completion, the Contract Administrator shall check the invoice and advise the Contractor of any discrepancies. Any of these discrepancies that are unresolved prior to the expiry of the 60-Day lien period shall be treated as a set-off.

Paragraph GC 8.02.04.07.06 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

.06 Upon conclusion of the 60-Day lien period, and provided no liens have been received, all remaining holdback, exclusive of set-offs, shall be paid by the Owner, within 28 Days.

GC 8.02.04.11 Owner's Set-Off

Clause GC 8.02.04.11 of the MTO General Conditions of Contract is deleted in its entirety and replaced with the following:

.01 Subject to Section 26 and Subsection 27.1 of the *Construction Act* and pursuant to Section 12 of the *Construction Act*, the Owner shall retain from monies owing to the Contractor under the Contract an amount sufficient to cover all debts, claims or damages related to the Contract, any outstanding or disputed liabilities the cost to remedy deficiencies, the reduction in value of substandard portions of the Work, claims for damages by third parties that have not been determined in writing by the Contractor's insurer, undetermined claims by the Owner under paragraph GC 8.01.02, a), and any assessment due the Workplace Safety and Insurance Board.

.02 Under these circumstances the Owner shall give the Contractor notice.

GC 8.02.04.12 Contract Completion and Statutory Holdback Release Payments

Clause GC 8.02.04.12 of the MTO General Conditions of Contract is deleted in its entirety and

replaced with the following:

.01 Final payment including payment of statutory holdback shall be made upon the expiry of all liens or upon the liens being satisfied, discharged or otherwise provided for pursuant to the *Construction Act*.

.02 If the contract holdback is required to be paid prior to the time periods stated in clause GC 8.02.04 or the *Construction Act*, upon the Contractor's request in writing, the holdback may be paid with letter of credit in Form 4 of Ontario Regulation 303/18 of the *Construction Act* or with a purchase of holdback repayment bond in lieu of completing Form 5 of Ontario Regulation 303/18 of the *Construction Act*. The early payment of holdback does not relieve the Contractor from any liabilities under the Contract.

.03 If the contract schedule is longer than one year and the Total Bid Price is greater than ten million dollars ($10,000,000), the holdback may be paid in accordance with Section 26.1 of the *Construction Act*, provided that the conditions prescribed in either Subsection 26.1 or Subsection 26.2 of the *Construction Act* are met.

.04 The Owner shall release the Finishing Holdback so as to discharge all claims in respect of the Finishing Holdback where all liens that may be claimed against the Finishing Holdback have expired or been satisfied, discharged or otherwise provided under the *Construction Act*.

GC 8.02.04.13 Liens Filed Late

Clause GC 8.02.04.13 of the MTO General Conditions of Contract is deleted in its entirety.

OPERATIONAL CONSTRAINT (ENVIRONMENTAL) - CONTROL OF ASIAN LONG-HORNED BEETLE INFESTATION AND MANAGEMENT OF HOST TREES

Special Provision

SCOPE

This special provision describes the requirements for the acquisition, planting, management and disposal of trees that could host the Asian Long-horned Beetle (ALHB) which is known to infest trees within certain areas of the City of Toronto and the City of Mississauga in the Province of Ontario. This provision applies where the Contractor's operations will include the planting and/or moving, the pruning or removal, including clearing and grubbing, of deciduous trees.

These requirements are in addition to those which may be specified elsewhere in the Contract and do not relieve the Contractor of responsibilities imposed by statute and/or obligations imposed by the Contractor's Environmental Compliance Approvals.

DEFINITIONS

Host Tree: means a deciduous tree that is a suitable host for the Asian Long-horned Beetle (ALHB). Host tree species are the following deciduous trees: Maple, Horsechestnut, Birch, Willow, Elm, Mountain Ash, Poplar, Sycamore or London Plane Tree, Goldenrain tree, Katsura, Hackberry and Silk Tree.

Plant Material: means all material from deciduous trees including trees, branches, lumber, wood, firewood, nursery stock, logs, bark, wood and bark chips.

Regulated Area for ALHB: **means the area designated by the Canadian Food Inspection Agency (CFIA) as a Regulated Area due to infestation by the Asian Long-horned Beetle and is the area specified under the Asian Long-horned Beetle Infested Place Order as noted on the CFIA website (under plant protection/insects/Asian Long-horned Beetle).**

CFIA WEBSITE: ***http://www.inspection.gc.ca/plants/plant-protection/insects/asian-long-horned-beetle/order/eng/1386095262010/1388532690960***

SUBMISSION AND DESIGN REQUIREMENTS

1. A minimum of two weeks prior to commencement of the work, the Contractor shall provide the Contract Administrator with a written statement confirming that the Contractor has checked the CFIA website and identified the current ALHB Regulated Area and indicating whether or not any work will be conducted in or in proximity to a Regulated Area for the ALHB.

2. Within the **Regulated Area for ALHB,** a minimum of two weeks prior to commencement of the work, the Contractor shall provide the Contract Administrator with an ALHB Plan that details how work will be conducted in accordance with CFIA removal Orders, and other requirements; identifies disposal sites to be used, and demonstrates that the Contractor's Plan is acceptable to the CFIA. The Contractor shall notify the Contract Administrator of any required changes to the ALHB Plan prior to implementation.

3. At the completion of any disposal of host tree/plant material from the Regulated Area for ALHB, the Contractor shall provide the Contract Administrator with a completed "Contractor's Release to ALHB Disposal Site – Control of Asian Long-horned Beetle (AHLB) and Management of Host Trees" Form.

4. At the completion of all host tree work within the **Regulated Area for ALHB,** the Contractor shall provide the Contract Administrator with an ALHB Summary Report documenting the implementation of the ALHB Plan, detailing all work conducted, disposal sites used and confirming that work completed complied with CFIA ALHB removal Orders and other requirements.

5. Outside the **Regulated area for ALHB** the Contractor shall provide the following information to the Contract Administrator a minimum of two weeks prior to commencement of the work:

a) The Name, Address and Location of the Nursery that will be supplying trees for the contract; and

b) A copy of the completed "Nursery Stock Supplier's Release Form – Control of Asian Long-horned Beetle (AHLB) and Management of Host Trees" for any host trees to be planted on the

Contract.

CONSTRUCTION

General

Prior to the work, the Contractor shall check the CFIA website to identify the current location and extent of the ALHB Regulated Area and to determine whether or not any work will be conducted in or in proximity to a Regulated Area for the ALHB.

Where the contractor has parked a vehicle or other machinery within or proximate to the **Regulated Area for ALHB**, for any period of time; prior to moving the vehicle outside the area, the contractor shall inspect its exterior surfaces and ensure that there are no beetles present. The transport of live beetles out of the Regulated Area must be prevented.

Any sightings of the beetle shall be immediately reported to the CFIA at 647-790-1012 (or 1-800-442-2342) and reported to the Contract Administrator.

Within the Regulated Area for ALHB

The Regulated Area is as specified under the Asian Long-horned Beetle Infested Place Order as noted on the CFIA website and is the area:

a) Bordered in the north by Finch Ave., in the east by Martin Grove Rd., in the south by Highway 401, and west by Dixie Rd.; and
b) Identified as a Regulated Area on the CFIA website - (under plant protection/insects/Asian Long-horned Beetle/Order):
http://www.inspection.gc.ca/plants/plant-protection/insects/asian-long-horned-beetle/order/eng/1386095262010/1388532690960

Federal regulations and CFIA Ministerial Orders restrict the movement of wood and plant material from Regulated Areas. When working within the Regulated Area, the Contractor shall comply with all CFIA requirements. No host tree related work shall be done by the Contractor without first receiving concurrence from the CFIA.

The Contractor shall follow the direction provided by the CFIA and facilitate safe access to the R-O-W when required for CFIA staff, inspectors or other CFIA - designated staff to conduct inspections or other work related to the ALHB/Regulated Area.

The Contractor shall ensure that host trees are not planted within the Regulated Area. The Contractor shall ensure that all firewood and host tree plant material is managed to ensure that it remains within the boundaries of the Regulated Area and is not moved to sites located outside of the Regulated Area.

For any removal work including pruning and clearing and grubbing of **host trees** the Contractor shall ensure that:

a) the Toronto Area Office (647-790-1012) of the Canadian Food Inspection Agency is notified at least two weeks prior to the proposed removal so that the CFIA has the opportunity to inspect the host trees for evidence of Asian Long-horned Beetle infestation; and
b) unless specified otherwise by the CFIA, host trees and plant material are not to be removed from

the immediate work area but are to be chipped to a size not greater than 5/8th inch, at the work area the same working day and transported directly to a designated disposal site.

The designated sites are currently identified as:
For the City of Toronto: 120 Disco Rd.;
For the City of Mississauga: 2699 Drew Rd.;
or as otherwise specified by the CFIA and/or the municipality. and

a) At the completion of any host tree plant material disposal**,** the Contractor shall provide the Contract Administrator with a completed "Contractor's Release to ALHB Disposal Site – Control of Asian Long-horned Beetle (AHLB) and Management of Host Trees" Form.

ALHB Plan
Prior to commencement of the work the Contractor shall prepare an ALHB Plan that ensures that work will be conducted in accordance with CFIA removal Orders and other requirements and which includes the following information:

a) A description of the host tree work to be conducted including equipment and removal methodology to be used, parties conducting the work, traffic control, disposal sites, etc.
b) Confirmation that the Contractor has contacted the municipality within which the host trees to be removed are located and has identified any additional restrictions or conditions on management and disposal of host material imposed by the municipality;
c) Where additional restrictions or conditions are imposed by the municipality, the Contractor shall detail how these conditions are to be carried out; and
d) Confirmation that the Contractor's Plan is acceptable to the CFIA.

The Contractor shall modify the Plan as required and inform the Contract Administrator of any changes.

At the completion of any host tree work the Contractor shall prepare an ALHB Summary Report documenting the implementation of the ALHB Plan and detailing all work completed including how and where host plant materials were managed, approvals obtained, confirming disposal in accordance with CFIA requirements and noting any beetle sightings and CFIA notifications and other relevant information.

Where clearing and grubbing materials and/or other host tree residue is to be disposed outside the municipality within which the host tree was located, the Contractor shall conform to any additional restrictions on such material that the municipality has in place.

Where the contractor has parked a vehicle or other machinery within the **Regulated Area for ALHB,** for any period of time; prior to moving the vehicle outside the regulated area, the contractor shall inspect its exterior and interior surfaces and ensure that there are no beetles present prior to moving the vehicle out of the Area (to prevent the transport of live beetles out of the Regulated Area).

Outside the Regulated Area for ALHB

Outside the **Regulated Area for ALHB,** prior to acquiring any host trees, the Contractor shall ensure that all host trees to be planted on the Contract have never been located within the **Regulated Area for ALHB** and show no evidence of infestation with the ALHB. A release shall be obtained from the Nursery Stock Supplier.

NURSERY STOCK SUPPLIER'S RELEASE FORM May, 2014

Control of Asian Long-horned Beetle (ALHB) and Management of Host Trees

MTO Contract#_____ Location:_____
Work Description: _____

_____

I/We _____ being the Owner(s) and/or Operator (s) of the Nursery Stock Supply Company named _____

Located at the following Address:
_____
And legal description (if available): Lot ____ ,Concession _____ Township:_____
County/Region/District:_____ **verify that the deciduous trees (i.e. Host trees) to be provided to the ministry's Contractor for planting on the Contract noted above:**

Have never been grown, planted or otherwise placed for any length of time at a site located within the area identified as a **Regulated Area for ALHB:** which means the area designated by the Canadian Food Inspection Agency (CFIA) as a Regulated Area due to infestation by the ALHB and is the area:
Bordered in the north by Finch Ave., in the east by Martin Grove Rd., in the south by Highway 401, and west by Dixie Rd.; and
Identified as a Regulated area on the CFIA website - (under plant protection/insects/Asian Long-horned Beetle/Order):
http://www.inspection.gc.ca/plants/plant-protection/insects/asian-long-horned-beetle/order/eng/1386095262010/1388532690960 and

Do not exhibit any visible signs of infestation by the Asian Long-horned Beetle (ALHB).

Dated this___ day of_____, 201__

_____
Print Name of NURSERY STOCK SUPPLIER'S Representative

_____
NURSERY STOCK SUPPLIER REPRESENTATIVE'S Signature

CONTRACTOR'S RELEASE TO ALHB DISPOSAL SITE (May, 2014)

Control of Asian Long-horned Beetle (ALHB) and Management of Host Trees

MTO Contract#_____ Location:_____

Work Description: _____

_____

The Contractor verifies that for the noted work the following quantity of chipped ALHB host tree/ material has been disposed and accepted at the following designated disposal site:
120 I Rd. in the City of Toronto; or

269 w Rd. in the City of Mississauga.

Quantity (Volume) of Chipped Material: _____

Other: _____

Dated this___ day of_____, 201___

_____
Print Contractor's Name and Field Representative's Name

_____
Contractor's Signature

OPERATIONAL CONSTRAINT (ENVIRONMENTAL) - Migratory Bird Protection

Special Provision (March 2 2010)

Migratory Bird Protection – General

The contractor shall adhere to the following;

Site Preparation:

- Prior to and during construction the Contractor shall inspect the construction area for nests and eggs/young and advise the Contract Administrator and Environmental Office of these locations immediately;

Site Preparation/Maintenance:

- To prevent the nesting of birds during construction the contractor shall establish preventative measures within the project limits;
- The Contractor shall adjust the preventative measures as needed during construction and maintain the integrity/function of the preventative measures until no longer needed or at the end of the contract;
- If adjustments to the preventative measures are required to facilitate construction staging operations, the adjustments shall be effective in preventing nesting of migratory birds;
- The Contractor shall document and report all preventative measures to the Contract Administrator;
- If nests with eggs and/or young are found the Contractor shall retain an avian biologist to confirm they belong to a migratory bird species;

If Active Nests (nests with eggs or young birds) are found:

- The contractor shall immediately notify the Contract Administrator who shall contact the Environmental Office and the environmental consultant/avian biologist for direction;
- The Contractor shall monitor the area daily for nesting activity and notify the Contract Administrator immediately if a nest (re)appears

The contractor shall remove nests only during specific situations as identified below;

Location	During the Migratory Bird Nesting Season	Outside the Migratory Bird Nesting Season
Durham Region York Region Peel Region Halton Region Niagara Region City of Hamilton	The contractor shall not destroy nests during the migratory bird nesting season (April 1 to August 15)	The contractor shall remove (inactive) nests only outside the migratory bird nesting season (August 16 to March 31)

City of Toronto		
Simcoe Region	The contractor shall not destroy nests during the migratory bird nesting season (April 1 to August 31)	The contractor shall remove (inactive) nests only outside the migratory bird nesting season (September 1 to March 31)

In certain circumstances a Canadian Wildlife Services (CWS) permit may be obtained for the removal of nest and eggs of migratory birds. The contractor shall notify the CA, the Consultant and the Environmental Office if a CWS permit is required.

OPERATIONAL CONSTRAINT (ENVIRONMENTAL)

Special Provision No. ENVR 0001 January 12, 2017

Management of Excess Earth with Salt Impacts

The Contractor shall note that excess earth from highway construction projects may contain elevated concentrations of chloride and sodium and may have elevated values for Electrical Conductivity and Sodium Adsorption Ratio. For the purpose of this Contract, excess earth with salt impacts is not considered to be "contaminated" within the meaning of Table 1 in OPSS 180.

Where the Contractor manages excess earth as disposable fill, the Contractor shall take into account the possibility of salt impacts and ensure that the material is managed responsibly and in an environmentally appropriate manner. Where the Contractor intends to manage the excess earth that may be salt impacted on private property, the Contractor shall make the Property Owner aware that it may be salt impacted by using the attached Property Owner's Release in place of MTO form PH-CC-183.

The Contractor is responsible for conducting such sampling and testing as may be necessary to comply with any requirements imposed by the Property Owner as a condition of accepting the excess earth.

PROPERTY OWNER'S RELEASE

Contract No: _____

Work Description:
_____
_____

I/We being the owner(s) of Lot _____, Concession _____, Township of _____, and County/Region/District of
_____, verify that the Contractor for the above noted work has placed excess material from the above noted Contract on my/our property with my/our permission. I/We have signed together with the Contractor MTO forms PH-CC-181, Site Selection Notification for Stockpiling Materials Managed Through Re-Use, or PH-CC-182, Site Selection Notification for Material Managed as Disposable Fill, or both, that describe Conditions on Management, and have been assured by the Contractor that these conditions have been met.

Where materials are managed as disposable fill, I/we understand that excess earth from a highway project may contain elevated concentrations of chloride and sodium and may have elevated values for Electrical Conductivity and Sodium Adsorption Ratio and I/we agree to be responsible for any subsequent relocation and management of the material so placed.

Where materials are to be stockpiled, I/we agree that the stockpile(s) will be removed by the date(s) herein noted.

I/We hereby release the Owner and the Contractor in respect of the activities of the Contractor carried out in accordance with this release.

Dated this _____ day of _____ 20____

_____
_____
Property Owner's Signature

_____
_____
Print Contractor's Name & Field Representative's Name

_____
_____
Contractor's Field Representative Signature

cc: Contract Administrator, Property Owner(s), Contractor

Protection of Species at Risk

Species at Risk (SAR) listed as endangered or threatened under the provincial Endangered Species Act, 2007 or the federal Species at Risk Act, 2002 and identified in Table A to be present within the contract limits shall be protected by implementing the corresponding mitigation measures specified in Table A.

Table A

SAR	Mitigation Measures	Related OPSS/SP/ Tender Item Code	Location of Mitigation Measures
Lake Sturgeon	Timing constraint – In-water work is permitted between July 1st and February 28/29th.	OPSS 182 SSP 101F23	Welland River (Site 34-65-1/2)
Mapleleaf Mussel	Timing constraint – In-water work is permitted between July 1st and February 28/29th.	OPSS 182 SSP 101F23	Welland River (Site 34-65-1/2) Warren Creek (Site 34-312/C)
Mapleleaf Mussel	RAQS Fisheries Contracts Specialist to be on-site to inspect and confirm the proper installation, functioning and decommissioning (as appropriate) of all temporary and permanent mitigation measures pertaining to work in and around water, as well as measures specified within the SARA Permit (if required).	OPSS 182 SSP 101F23 SARA Permit (if required)	Welland River (Site 34-65-1/2) Warren Creek (Site 34-312/C)

Mapleleaf Mussel	All mussels stranded within the containment measures (i.e., behind sheet piles or cofferdams) will be removed and relocated to suitable habitat downstream of the construction areas prior to in-water works. Fish/mussel salvage will be conducted under a License to Collect Fish for Scientific Purposes and/or SARA Permit (pending DFO confirmation of need). Relocation to follow the Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario-Great Lakes Area (OGLA) (DFO, 2008) as well as any additional directions/measures as provided by DFO.	OPSS 182 SSP 101F23 SARA Permit (if required) DFO Protocol (2008)	Welland River (Site 34-65-1/2) Warren Creek (Site 34-312/C)
Eastern Pondmussel	Timing constraint – In-water work is permitted between July 1st and February 28/29th.	OPSS 182 SSP 101F23	Welland River (Site 34-65-1/2) Warren Creek (Site 34-312/C)
Eastern Pondmussel	RAQS Fisheries Contracts Specialist to be on-site to inspect and confirm the proper installation, functioning and decommissioning (as appropriate) of all temporary and permanent mitigation measures pertaining to work in and around water, as well as measures specified within the SARA Permit (pending DFO confirmation of need).	OPSS 182 SSP 101F23 SARA Permit (if required)	Welland River (Site 34-65-1/2) Warren Creek (Site 34-312/C)
Eastern Pondmussel	All mussels stranded within the containment measures (i.e., behind sheet piles or cofferdams) will be removed and relocated to suitable habitat downstream of the construction areas prior to in-water works. Fish/mussel salvage will be conducted under a License to Collect Fish for Scientific Purposes and/or SARA Permit (pending DFO confirmation of need).. Relocation to follow the Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario-Great Lakes Area (OGLA) (DFO, 2008) as well as any additional directions/measures as provided by DFO.	OPSS 182 SSP 101F23 SARA Permit DFO Protocol (2008)	Welland River (Site 34-65-1/2) Warren Creek (Site 34-312/C)

Barn Swallow	Timing constraint – no harm/disturbance to active nest between April 1 and September 30.	NSSP ENV00031	Welland River (Site 34-65-1/2) Usshers Creek (Site 34-315/C)
Little Brown Myotis, Northern Myotis, Eastern Small-footed Myotis, and Tri-colored Bat	Timing constraint – Vegetation/tree/shrub removal to occur between September 30 and March 31 to prevent harm to bats.		Welland River (Site 34-65-1/2) Usshers Creek (Site 34-315/C)
Snapping Turtle	Installation of turtle exclusion fencing by April 1. Fencing to remain in place until construction is completed.		Welland River (Site 34-65-1/2) Usshers Creek (Site 34-315/C)

Where Table A specifies that a Qualified Person is required, the name of the person shall be provided to the Contract Administrator a minimum of 10 Business Days prior to the commencement of work.

Unless specified elsewhere in the Contract Documents, a record shall be kept of all encounters with SAR that includes the date, location (GPS coordinates preferred), species, a photo of the species encountered, if possible, and any actions taken to protect SAR including but not limited to measures identified in Table A. A copy of the record shall be provided to the Contract Administrator upon contract completion.

OPERATIONAL CONSTRAINT – Roadway Drainage

Special Provision

The Contractor shall ensure that positive roadway surface drainage is provided for when the pavement removal operation leaves the surface pavement below the adjacent existing lanes, shoulders or curb and gutter.

The Contractor shall ensure that all existing drainage facilities remain operational and free of construction debris during the progress of the work until the completion of construction.

All costs associated with roadway drainage shall be borne by the Contractor, at no additional cost to the Owner.

RIGID EXPANDED POLYSTYRENE EMBANKMENT FILL

Special Provision

1.0 SCOPE

This special provision covers the requirements for the supply and installation of the Rigid Expanded Polystyrene embankment fill and associated works as shown on the contract drawings.

2.0 REFERENCES

This special provision refers to the following standards, specifications or publications.

Ontario Provincial Standard Specifications, Construction

OPSS.PROV 212	Earth Borrow
OPSS.PORV 501	Compacting
OPSS.PROV 517	Dewatering
OPSS.PROV 904	Concrete Structures

Ontario Provincial Standard Specifications, Materials

OPSS.PROV 1010	Aggregates – Base, Subbase, Select Subgrade, and Backfill Material

National Standards of Canada

CAN/ULC-S102-10	Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
CAN/ULC-S701-97	Thermal Insulation, Polystyrene, Boards and Pipe Covering

ASTM International

ASTM C177	Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of Guarded-Hot-Plate Apparatus
ASTM C203	Standard Test Method for Breaking Load and Flexural Properties of Block-Type Thermal Insulation
ASTM C518	Standard Test Method for Steady-State Thermal Transmission Properties by

	Means of the Heat Flow Meter Apparatus
ASTM D1621	Standard Test Method for Compressive Properties of Rigid Cellular Plastics
ASTM D2842	Standard Test Method for Water Absorption by Rigid Cellular Plastics
ASTM D2863	Standard Test Method for Measuring the Minimum Oxygen Content
ASTM D6817	Standard Specification for Rigid Cellular Polystyrene Geofoam

3.0 DEFINITIONS

For the purpose of this special provision, the following definitions apply:

Production Lot: means the quantity of rigid polystyrene blocks produced in a continuous period of manufacturing the same grade and thickness of product within the same production day.

Project Superintendent: means the Contractor's authorized representative in responsible charge of the construction of the installation of the expanded polystyrene embankment. The representative shall have a minmum of 5 years experience in installation of expanded polystyrene on projects of similar size and scope.

Manufacturer: means the firm who supplies the Rigid Expanded Polystyrene

Manufacturer's Representative: means an individual with continuous full-time employment with the manufacturer for a period of at least three (3) years, and who is knowledgeable in the design and construction of the Rigid Expanded Polystyrene as embankment fills

Rigid Expanded Polystyrene: means moulded rigid blocks produced by a process of pre-expansion, aging and forming of petroleum based raw material.

4.0 DESIGN AND SUBMISSION REQUIREMENTS

4.01 Design

4.01.01 Foundation Investigation Report

The subsurface conditions at the site are described in the Foundation Investigation Report for this Contract.

The Owner warrants the data in the Foundation Investigation Report, except that interpretations of the data and opinions expressed in the Foundation Investigation Report are not warranted.

4.02 Submissionss

4.02.01 Working Drawings

At least three (3) weeks before the commencement of work, the Contractor shall submit to the Contract Administrator six copies of the Working Drawings and method statement signed and sealed by the Contractors Engineer that provides full details of materials and construction

procedure.

The contractor shall submit full details of the following.

a) The method of foundation excavation and preparation.

b) The method of construction of the levelling pad.

c) The method of placement of Rigid Expanded Polystyrene blocks including temporary ballasting and protection of blocks during installation. The shop drawings shall indicate laying pattern and block dimensions on a layer-by-layer basis.

d) The method and limits of placement of polyethylene sheeting.

e) The method of placement of reinforced concrete top slab.

f) The method of placement of subbase material.

g) The method of placement of side slope cover.

4.02.02 Delivery, Storage, Handling, and Protection Procedure

At least three (3) weeks before the commencement of work, the Contractor shall submit to the Contract Administrator the method of delivery, storage, handling and protection from damage by weather, traffic, construction staging and other causes as per the Rigid Expanded Polystyrene manufacturers requirement.

4.02.04 Project Superintendent

At least two (2) weeks prior to commencement of installed of the Rigid Expanded Polystyrene blocks, the name(s) of the superintendent responsible for the installation in the Contract shall be submitted in writing to the Contract Administrator.

During construction of an Rigid Expanded Polystyrene blocks, the superintendent shall not change without written permission from the Contract Administrator. A proposal for a change in the superintendent shall be submitted at least one week prior to the actual change in superintendent.

4.02.05 Manufacturer's Representative

At least two (2) weeks prior to commencement of the installation of the Rigid Expanded Polystyrene blocks, the name(s) of the manufacturer's representative shall be submitted in writing to the Contract Administrator.

At least 48 hours written advance notice shall be provided to the Contract Administrator prior to each visit to the site by the manufacturer's representative. The advance notice shall include the dates and locations the manufacturer's representative will be on site.

4.02.06 Rigid Expanded Polystyrene

At least two (2) weeks prior to commencement of the installation of the Rigid Expanded Polystyrene blocks, the following details shall be submitted in writing to the Contract Administrator:

1. A general statement as to the type, composition, and method of production of the material.

2. The manufacturer's name, address, phone number, identification of a contact person and description of experience background in the manufacturing of the Rigid Expanded Polystyrene.

3. An identification of the laboratory accredited by the Standards Council of Canada to conduct the testing of the physical and mechanical properties of the Rigid Expanded Polystyrene.

4. The physical and mechanical properties of the Rigid Expanded Polystyrene including:

    a) Geometry
    b) Nominal Density
    c) Compressive Strength
    d) Flexural Strength
    e) Thermal Resistance
    f) Flammability
    g) Water Absorption

5. Aging and durability characteristics of the Rigid Expanded Polystyrene including the chemical, biological and ultra-violet degradation resistance of the rigid polystyrene.

6. A sample of the Rigid Expanded Polystyrene material to the Contract Administrator for review.

4.02.06 Quality Test Certificates

Prior to installation of the Rigid Expanded Polystyrene embankment Quality test certificates, from the laboratory accredited by the Standards Council, for each production lot supplied, showing compliance with all requirements of this special provision shall be obtained by the Contractor and submitted to the Contract Administrator prior.

4.02.06 Inspection Report

For each Rigid Expanded Polystyrene embankment, an inspection report shall be submitted to the Contract Administrator following an inspection by the Contractor's Engineer, who shall be knowledgable in the design and construction of Rigid Expanded Polystyrene embankments, at each of the following milestones, and prior to commencement of subsequent operations on that embankment:

a) Following foundation excavation and preparation and prior to installation of the leveling pad;

b) Following placement of the leveling pad and Rigid Expanded Polystyrene blocks and prior to construction of the polyethylene sheeting and concrete top slab;

The inspections and inspection reports in no way supersede the inspection and testing intervals required for the construction of the Rigid Expanded Polystyrene embankment, as specified in the Working Drawings.

4.02.07 Certificates of Conformance

A Certificate of Conformance, upon completion of each Rigid Expanded Polystyrene embankment, shall be sumitted to the Contract Administrator.

5.0 MATERIALS

5.01 Granular Levelling Pad

The levelling pad shall be as specified elsewhere in the contract documents and consist of a Granular "A" material with gradation and physical requirements as specified in OPSS 1010.

5.02 Rigid Expanded Polystyrene

5.02.01 Production Lots

Each block of the same production lot shall be stamped with the same production code showing plant identification, type and date of production. The Rigid Expanded Polystyrene shall be free from defects affecting serviceability.

5.02.02 Detail Requirements

The Rigid Expanded Polystyrene shall meet the physical and mechanical properties requirements shown in Table 1 and as described below.

Table 1 – Material Properties

PROPERTY	UNIT	REQUIREMENTS	TEST PROCEDURE
Geometry - Linear Dimensions - Flatness - Squareness	mm (min)	*	--
Compressive	kPa (min)	*	ASTM D1621

Strength at 5% Deformation			(Procedure A)
Flexural Strength	kPa (min)	*	ASTM C203 (Method 1, Procedure B.2.7.4)
Thermal Resistance	$m^2.^oC/W$ (min for 25 mm thickness)	*	ASTM C177 or C518
Flammability	Limiting Oxygen Index (min)	*	ASTM D2863
Water Absorption	% by Volume (max)	*	ASTM D2842

5.03 Polyethylene Sheeting

The protective sheeting shall be at a minimum 6 mil polyethylene sheeting or better if specified elsewhere in the Contract Package.

5.04 Concrete Top Slab

The reinforced concrete top slab shall be as specified elsewhere in the contract documents.

6.0 EQUIPMENT

All cutting of Rigid Expanded Polystyrene materials shall be by electric equipment or by hand.

Heavy equipment shall be limited in weight and size and restricted in operation to avoid damaging the Rigid Expanded Polystyrene as per the manufacturer's requirement.

7.0 CONSTRUCTION

7.01 General

7.01.02 Project Superintendent

The Rigid Expanded Polystyrene installed shall be scheduled such that it is at all times under the responsible charge of the project superintendent.

7.01.03 Manufacturer's Representative

The manufacturer's representative shall be on site to oversee installation of the Rigid Expanded Polystyrene blocks at the commencement of the installation, for a time period of three (3) Working Days per operation or until the operation is complete, whichever is less.

7.02 Delivery, Storage And Handling

The product shall be suitably marked to identify its type, number and the manufacturer's name or trademark.

The Contractor shall protect the Rigid Expanded Polystyrene from exposure to sunlight to avoid ultraviolet degradation as per manufacturer's recommendation.

Protection of materials and works from damage by weather, traffic, construction staging, fire or vandalism and other causes shall be the responsibility of the Contractor.

Rigid Expanded Polystyrene shall not be exposed to open flame or other ignition source. The contractor shall protect the Rigid Expanded Polystyrene blocks from petroleum based products such as gasoline and diesel fuel and organic solvents such as acetone, benzene and paint thinner.

7.02 Foundation Excavation

Foundation excavation shall be carried out to the design elevations shown on the drawings. Any softened, loosened or deleterious materials at the foundation footing elevation shall be subexcavated and replaced with Granular 'A' or Granular 'B' material.

7.03 Leveling Pad

Place, level and compact a layer of Granular 'A' or Granular 'B' material in accordance with OPSS PROV 501 to within ± 30 mm of the design elevation. The leveling pad shall not deviate by more than 10 mm at any place on a 3 m straight edge over the limits of the bottom course of blocks. The levelling pad shall not be placed on standing water, accumulated snow or ice or frozen ground. The levelling pad must be placed in-the-dry.

7.04 Installation of Blocks

The Contractor shall have on site at the commencement of the work, a representative of the supplier of the Rigid Expanded Polystyrene to advise on recommended construction procedure.

The Contractor shall maintain liaison with the supplier throughout the construction of the embankment for advice and guidance as required. Periodic site visits by the supplier should be coordinated as required.

The Rigid Expanded Polystyrene embankment shall be installed to ensure that:

1. The individually marked blocks shall be placed on the prepared leveling pad. The top surface of the first layer of blocks is to be set plane and level. Local trimming of the blocks may be necessary.

2. Subsequent successive layers shall be oriented with the long axis of blocks positioned at 90º to the previous layer in order to avoid continuous joints. Block joints shall be offset and staggered between layers.

3. A continuous check shall be kept to ensure the evenness of the blocks is satisfactory in each layer. Blocks shall be laid with joints with maximum opening of 10 mm between

blocks. Differences in heights between adjacent blocks in the same layer should not exceed 5 mm.

4. Sloping end adjustments at the abutments shall be accomplished by leveling terraces in the subsoil in accordance with the block thickness.

5. Temporary ballast shall be provided as necessary to prevent movement of Rigid Expanded Polystyrene both in storage and as placed due to windy conditions. Timber fasteners or equivalent shall be used as necessary.

6. The Rigid Expanded Polystyrene embankment shall be protected from accidental ignition due to welding, smoking, grinding or cutting tools, etc. The Contractor shall take all necessary precautions to prevent ignition of the Rigid Expanded Polystyrene.

7. The Rigid Expanded Polystyrene shall be protected from organic solvents and other aggressive, harmful chemicals during construction.

8. Exposed blocks shall be covered immediately to avoid possible burrowing by animals.

9. Individually marked blocks shall be fabricated and placed to ensure the top surface matches the elevation and crossfall shown on the drawings.

10. The top surface and side surfaces of the Rigid Expanded Polystyrene shall be covered with 6 mil polyethylene sheeting extending onto adjacent work at the longitudinal ends of the embankment. All joints shall be lapped a minimum of 300 mm to provide a fully sealed enclosure.

7.05 Side Slope Cover

The side slopes of the Rigid Expanded Polystyrene embankment shall be covered with granular fill as detailed elsewhere in the Contract drawings.

8.0 MEASUREMENT FOR PAYMENT – NOT USED

9.0 PAYMENT – NOT USED

Chapter 4: Amendment to MTO General Conditions of Contract

Introduction

OPSS.PROV 100, November 2016, MTO General Conditions of Contract as amended by the special provision included below shall form part of this Design-Build Request for Proposals.

AMENDMENT TO OPSS.PROV 100, NOVEMBER 2016, MTO GENERAL CONDITIONS OF CONTRACT

Special Provision

GC 1.02 Abbreviations

Subsection GC 1.02, Abbreviations, is amended by the addition of the following to clause 1.02.01:

DFO	-	Department of Fisheries and Oceans
MNR	-	Ministry of Natural Resources
MOL	-	Ministry of Labour
OHSA	-	Occupational Health and Safety Act

GC 1.04 Ontario Provincial Standards

Subsection GC 1.04, Ontario Provincial Standards, is amended as follows:

Paragraph .01 is deleted and replaced with the following:

.01 Regardless of the publishing date on OPSSs and OPSDs contained in the OPS manuals and on a MTO website, the Standards applicable to this Contract shall be according to chapters two and three of the Contract Documents with following exception:

p) Reference to OPSS 127 means the version that is current at the time the work is carried out shall apply.

GC 1.07 Definitions

Subsection GC 1.07, Definitions, is amended by the modification of the existing definitions as follows:

Contract Documents means the Agreement, RFP, proposal, MTO General Conditions of Contract, Standard Specifications and Drawings, Special Provisions, Issued for Construction Drawings, Addenda incorporated into any aforementioned document, documents referenced in the aforementioned documents, and subsequent amendments

to any of these documents made pursuant to the provisions of the Agreement.

Contractor - "Also means Design-Builder" is added to the end of the definition.

Record Drawings means marked-up drawings prepared by the Contractor that show all differences, design changes, and deviations from the Issued for Construction Drawings**.**

Superintendent – "Also means the Design-Builders Project Manager" is added to the end of the definition.

Work means the total services required by the Contract Documents.

SECTION GC 2.0 - CONTRACT DOCUMENTS

Section GC 2.01 Reliance on Contract Documents

GC Subsection GC 2.01, Reliance on Contract Documents, is amended by deleting paragraph .02 and replacing it with the following:

.02 The Owner does not warrant interpretations of data, omissions, recommendations or opinions expressed in any subsurface report provided by the Owner.

GC 2.02 Order of Precedence

Subsection GC 2.02, Order of Precedence, is amended by deleting paragraph .01 and replacing it with the following:

.01 In the event of any inconsistency or conflict in the contents of the following documents, such documents shall take precedence and govern in the following order:

4. RFP Appendix B - Agreement

5. Addenda

6. RFP Chapter 2 - Project Requirements

7. Design-Build General Specification

8. Performance Specifications

9. Design-Build Special Provisions

10. Special Provisions

11. OPSSs

12. Issued for Construction (IFC) Drawings

13. Standard Drawings

14. RFP (excluding chapters/ appendices referenced in this list)

15. RFP Chapter 4 - Amendment to OPSS.PROV 100, November 2016, MTO General Conditions of Contract

16. OPSS.PROV 100, November 2016, MTO General Conditions of Contract

17. Proposal

18. Working Drawings

Later dates shall govern within each of the above categories of documents. Notwithstanding the above, in the event that the Design-Builders proposal exceeds the requirements of the RFP, the Design-Builder shall be held to their proposal.

Section GC 2.0, CONTRACT DOCUMENTS, is further amended by the addition of the following subsection:

GC 2.03 Ownership and Copyright

a) The Contractor agrees that all Intellectual Property and every other right, title and interest in and to all concepts, techniques, ideas, information and materials, however recorded, (including images and data) provided by the Owner to the Contractor in the performance of the Work shall remain the sole property of Her Majesty the Queen in right of Ontario at all times.

b) The Contractor shall not use any insignia or logo of Her Majesty the Queen in right of Ontario except where required to provide the Work, and only if it has received the prior written permission of the Owner to do so.

c) The Owner shall be the sole owner of any Newly Created Intellectual Property. The Contractor irrevocably assigns to and in favour of the Owner and the Owner accepts every right, title and interest in and to all Newly Created Intellectual Property in the Work, immediately following the creation thereof, for all time. To the extent that any of the Work includes, in whole or in part, the Contractor's Intellectual Property, the Contractor grants to the Owner a licence to use that Contractor Intellectual Property in the manner contemplated in this Article. The Contractor shall provide the Work to the Owner: (a) at the point of completion of the services; or (b) upon termination of this Contract; or (c) at any time upon the request of the Owner.

d) The presumption governing this Contract shall be that the Owner shall be the sole owner of any Intellectual Property in any form contained in any of the Work. If the Contractor's Intellectual Property forms any part of the Work, the Contractor shall notify the Owner as such prior to the delivery of the particular Deliverable containing any such Contractor Intellectual Property. In the absence of any such notice the presumption shall remain that the Owner is the sole owner of any Intellectual Property contained in the Work.

e) For those parts of the Work that are Contractor Intellectual Property, the Contractor grants to the Owner, a perpetual, world-wide, non-exclusive, irrevocable, transferable, royalty-free, fully paid-up right and licence: (a) to use, execute, display, distribute, perform and reproduce, in any form, copies of those Work and to practice and have practiced any process or method (or both) associated with such Work; and (b) to use, execute, make, have made, have used, display, distribute, perform, reproduce and prepare, in any form, Derivative Work based on those Work and to practice and have practiced any process or method (or both) associated with such Derivative Work; and (c) authorize other Persons including agents, contractors or subcontractors to do any of the former on behalf of the Owner.

f) The Contractor shall not incorporate into any Work anything that would restrict the right of the Owner to modify, further develop or otherwise use the Work in any way that the Owner deems necessary, or that would prevent the Owner from entering into any contract with any contractor other than the Contractor for the modification, further development of or other use of the Work.

g) The Contractor represents and warrants that the provision of the Work shall not infringe or induce the infringement of any Third-Party Intellectual Property rights. The Contractor further represents and warrants that it has obtained assurances with respect to any Third-Party Intellectual Property that any rights of integrity or any other moral rights associated therewith have been waived.

h) The Contractor shall obtain waivers of all rights of integrity and any other moral rights in relation to the Work from its employees, volunteers, agents and subcontractors and from any other party in the position to assert such rights in relation to any of the Work, which waivers may be invoked without restriction by any person authorized by the Owner to use the Work.

i) The Contractor shall place a copyright notice on all recorded Work it provides to the Owner under this Contract in the following form:

"© Queen's Printer for Ontario, 2010"

j) For the purposes of the *Copyright Act* (Canada), the Contractor acknowledges that the copyright for all Intellectual Property shall belong to the Owner. At the request of the Owner, at any time or from time to time, the Contractor shall execute and agrees to cause anyone in the position to assert rights of integrity or any other moral right (including its employees, volunteers, agents and subcontractors) to

execute a written assignment of copyright and waiver of moral rights in the applicable Deliverable to the Owner. The Contractor shall assist the Owner in preparing any Canadian copyright registration that the Owner considers appropriate. The Contractor shall obtain or execute any other document reasonably required by the Owner to protect the Intellectual Property of the Owner.

k) The Owner reserves the right to prescribe the specific manner in which the Contractor shall perform its obligations relating to this General Condition.

l) The Owner acknowledges that there shall be no implied warranty of fitness by the Contractor for any agreements, materials, studies, reports, requests, approvals, notices or other documents which:

- Have not been given or prepared by the Contractor or its subcontractors or agents;
- Are incomplete due to early termination or suspension of this Contract;
- Have been altered or revised without the prior participation or consent of the Contractor; and/or
- Are used or applied for any purpose outside of the express limitations set out therein.

m) The Contractor may retain one copy of each such document solely for record-keeping purposes.

n) All software or software media (**"Software"**) provided to the Owner by the Contractor or vice versa, directly or by way of a third party, shall be free of software viruses. In the event that a virus is found in the Software and without prejudice to any other rights or remedies of either party the relevant party shall at its own expense either immediately remove such virus from the Software to the satisfaction of the other party and replace the infected Software and remedy the resulting damage.

With respect to any access to or use of Government Systems, as may be permitted under this Contract, the Contractor shall ensure that no software viruses are introduced to the Government Systems by the Contractor.

o) The obligations contained in this Article shall survive the termination or expiry of this Contract.

SECTION GC 3.0 – ADMINISTRATION OF THE CONTRACT

GC 3.01 Contract Administrator's Authority

Subsection GC 3.01, Contract Administrator's Authority, is amended as follows:

Paragraph .01 – 1st sentence is deleted and replaced with the following:

The Contract Administrator shall be the Owner's representative during the Contract and until the issuance of the Release from Warranty Certificate.

Paragraph .03 is deleted and replaced with the following:

The Contract Administrator may inspect the Work for its conformity with the Contract Documents and to record the necessary data to establish payment quantities under the schedule of tender quantities and unit price or to make an assessment of the value of the work completed in the case of a lump sum price Contract.

GC 3.07 Delays

Subsection GC 3.07, Delays, is amended by the addition of the following to clause GC 3.07.01.

h) The presence of Species at Risk as defined under the federal Species at Risk Act, 2002 and/or the provincial Endangered Species Act, 2007 not otherwise identified in the Contract Documents.

Subsection GC 3.07 is further amended by the addition of the following clause:

.06 If the Contractor encounters Species at Risk as defined in clause GC 3.07.01 not otherwise identified in the Contract Documents within the Contract limits that are likely to be impacted by the Contractor's operations:

a) The Contractor shall immediately notify the Contract Administrator and suspend operations within the area identified by the Contract Administrator.

b) Work shall remain suspended within that area until otherwise directed by the Contract Administrator in writing, according to subsection GC 7.11, Suspension of Work.

c) Any delay in the completion date of the Contract that is caused by such a cessation of construction operations shall be considered to be beyond the Contractor's control according to clause GC 3.07.01.

d) Any increases in the cost of the work to be done that are caused by such a cessation of construction operations shall be considered as a Change in the Work according to clause GC 3.10.01.01.

e) Any work directed or authorized in connection with the unexpected presence of Species at Risk shall be considered as Changes in the Work according to clause GC 3.10.01, Changes in the Work.

GC 3.09 Subcontracting by the Contractor

Subsection GC 3.09, Subcontracting by the Contractor, is amended as follows:

Paragraph .01 is deleted and replaced by the following:

The Contractor may subcontract any portion of the Work.

Paragraph .05 – 1st sentence is deleted and replaced with the following:

The Contractor shall not subcontract any part of the Work to a Subcontractor that was identified as the Preferred Proponent in the RFP stage and subsequently failed to enter into a Contract with the Owner.

GC 3.11.02 Sharing of Cost Savings

Paragraph .01 a) is deleted in its entirety

SECTION GC 4.0 - OWNER'S RIGHTS AND RESPONSIBILITIES

GC 4.01 Working Area

Subsection GC 4.01, Working Area, is amended by deleted paragraph .01 and replacing it with the following:

.01 The Owner shall acquire all property rights which are deemed necessary by the Owner for the construction of the Work, including temporary working easements, and shall indicate the full extent of the Working Area in the Contract Documents.

GC 4.02 Management of Excess Materials

Subsection GC 4.02, Management of Excess Materials, is amended by deleting paragraph .01 and replacing it with the following:

c) The Owner may identify in the Contract Documents the materials to be moved within or removed from the Working Area, and any characteristics of those materials which shall necessitate special materials management and disposition.

GC 4.13 Owner Audit

Subsection GC 4.13, Owner Audit, is amended by deleting paragraph .01 and replacing it with the following:

.01 The Owner may inspect, review, and audit all Records associated with the Contract, including the Contractor's and Subcontractor's Records relating to the Work and Changes in the Work and Claims, at any time up to 12 months after the expiry of the warranty period. The Contractor shall complete and submit to the Contract Administrator, the Owner's standard form PH-CC-762, Subcontractor's Consent to Audit, for each Subcontractor employed by the Contractor.

SECTION GC 5.0 – MATERIAL

GC 5.02 Quality of Material

Subsection GC 5.02, Quality of Material, is amended by deleting paragraph .02 and replacing it with the following:

.02 **Where specified in the Contract Documents**, material shall be supplied from sources identified in the MTO DSM available on TRA website http://www.roadauthority.com that is current at the time of supply of the product. If there are revisions to the DSM, these shall be posted on TRA website on the first Business Day of the months of February, April, June, August, October, and December. Material for which there is no category in the DSM shall be supplied according to the Contract Documents. Material which is not specified shall be of a quality best suited to the purpose required.

Sources in the DSM have demonstrated their ability to produce material according to specified material specifications. However, the MTO does not warrant that these sources shall produce acceptable or sufficient Material for any contract. The Contractor shall make such independent investigation and examination as the Contractor deems necessary, to satisfy the Contractor as to the quality and quantity of the Material available from these sources, and to ensure that all Material supplied by them satisfies the requirements of the Contract Documents.

SECTION GC 6.0 - INSURANCE, PROTECTION, AND DAMAGE

GC 6.02 Indemnification

Subsection GC 6.02, Indemnification, is amended by the addition of the following clauses:

- The Contractor shall pay all copyright or patent royalties or both, if any, to any third party in respect of the use of the Contractor's Intellectual Property. The Contractor shall defend, at its own expense, in the name and on behalf of the Owner, any Claim brought against the Owner, its officers, personnel or agents, and any negotiations for their settlement, to the extent that any such Claim is based on a claim that the Contractor's Proprietary Information, or any part thereof, infringe on any patent or copyright or any other industrial or intellectual property right, including trade secrets, provided the Contractor is notified promptly in writing and given authority, information and assistance (at the Contractor's expense) sufficient to permit the

Contractor to defend same. The Contractor shall pay all damages and costs awarded against the Owner, its officers, personnel and agents, in any such suit or proceeding; but the Contractor shall not be responsible for any damages, costs or expense where a settlement has been incurred by or on behalf of the Owner without the Contractor's prior written consent or where the Owner's conduct in any way compromises the defence of such suit or proceeding.

- The Contractor shall promptly discharge all settlement expenditures, if any, and all liabilities, damages, monetary awards and costs awarded against the Owner by a court or tribunal of competent jurisdiction, arising out of or in connection with such alleged infringement or misappropriation, together with all related legal fees and expenses; provided however, that the Contractor shall not be responsible for any such liabilities, damages, monetary awards, costs and expenses (including any related legal fees and expenses) where a settlement has been incurred by or on behalf of the Owner without the Contractor's prior written consent or where the Owner's conduct in any way compromises the defence of such suit or proceeding.

- In the event that the Contractor's Intellectual Property or part thereof constitutes an infringement or violation and the use thereof is enjoined, the Contractor shall be in breach of this Contract and, without prejudice to such other legal rights and remedies that may be available to the Owner, the Contractor shall, at its expense:

  a) Procure for the Owner the right to continue using either the Contractor's Intellectual Property or part thereof;
  b) Replace same with a non-infringing substitute or part thereof; or
  c) Modify either the Contractor's Intellectual Property or part thereof to the Owner's satisfaction so it becomes non-infringing.

- If the Contractor is unable to make available any of the remedies specified above, the Contractor shall, at its sole expense, promptly upon the Owner's demand de-install and remove the Contractor's Intellectual Property and refund all amounts paid by the Owner to the Contractor with respect to such Contractor's Intellectual Property without prejudice to such other legal rights and remedies as may be available to the Owner. In such event any financial obligations of the Owner with respect to further support, maintenance and services relating to the Contractor's Intellectual Property cease at the date the Owner ceases to use the Contractor's Intellectual Property.

SECTION GC 7.0 - CONTRACTOR'S RESPONSIBILITIES AND CONTROL OF THE WORK

GC 7.01.07 Critical Path Schedule

Paragraph .01 of Subsection GC 7.01.07, Critical Path Schedule, is deleted and replaced with the following:

.01 Initial and updated critical path schedules shall be prepared and submitted as detailed below:

19. 2 paper copies and 1 electronic copy in the format of the scheduling software and readable by the scheduling software of the initial construction schedule shall be submitted to the Regional Contracts Office within 7 Business Days of receipt of the Notice of Selection.

20. 1 hard copy of the initial construction schedule shall also be submitted to the Contract Management Office, St. Catharines, with the executed copies of the Contract.

21. Where the Contractor has revised the initial construction schedule prior to the first site meeting, the revised construction schedule shall be submitted to the Contract Administrator at least 3 Business Days prior to the meeting.

22. 2 paper copies and 1 electronic copy in the format of the scheduling software and readable by the scheduling software of an updated schedule shall be prepared and submitted to the Contract Administrator not less than 3 Business Days prior to all regularly scheduled site meetings. All revisions shall be highlighted on the updated schedule. Updated schedules submitted shall reflect actual progress of the Work and any additions, deletions, or revisions to the Work that have arisen since the previous update. At regularly scheduled site meetings, the Contractor shall explain the revisions and any increase or decrease in resources required to complete the Work on time. At the Contract Administrator's request, and at no additional cost to the Owner, the Contractor shall submit an updated schedule within 7 Business Days of any major increase or decrease in quantities, or major change in the staging or perceived change in character of the Work.

23. All copies shall be legible and shall show the date the schedule was prepared.

GC 7.02 Layout

Subsection GC 7.02, Layout, is amended as follows:

Paragraphs .01 and .02 are deleted and replaced with the following:

.01 Prior to commencement of construction, the Contractor shall locate on site those property bars and benchmarks that are necessary to delineate the Work Area and to lay out the Work.

.02 The Contractor shall be responsible for the preservation of all property bars, reference points or survey monuments while the Work is in progress, except those property bars that require removal to facilitate the Work. Any property bars disturbed, damaged, or removed by the Contractor's operations shall be replaced under the supervision of an Ontario Land Surveyor, at no cost to the Owner.

Paragraphs .06 and .09 are deleted in their entirety.

GC 7.05 Use of Construction Equipment and Unlicensed Vehicles

Subsection GC 7.05, Use of Construction Equipment and Unlicensed Vehicles, is amended by the addition of the following clause:

.03 The use of unlicensed vehicles and construction equipment on bridges under construction and bridges within the contract limits shall be subject to the following requirements:

a) Loading shall not exceed the limits specified elsewhere in the Contract.

b) Unlicensed vehicles and construction equipment that comply with the legal load limits specified in the Highway Traffic Act may be used. Except as noted in “c” below, the Contractor shall not cause or permit such vehicles to be loaded beyond the legal limit specified in the Highway Traffic Act, including bridge postings and load restrictions. The Contractor shall provide proof of load weight to the Contract Administrator for any disputed loads.

c) Unlicensed vehicles and construction equipment that is overloaded in terms of the Highway Traffic Act or track propelled equipment greater than 30 tonnes, which the Contractor proposes to drive over bridges under construction and bridges within the contract limits shall be subject to approval. The Contractor shall submit to the Contract Administrator a description and detailed configuration of every such equipment and a certificate, signed and sealed by an Engineer. The certificate shall list the site numbers of every bridge that may be traversed by the subject equipment and state that each Engineer has evaluated, according to the requirements of CAN/CSA-S6-06, every bridge listed, and that each bridge can safely support all loads.

.04 Unless permitted elsewhere in the contract, pile-driving equipment shall not be permitted to operate on bridges.

GC 7.08 Maintaining Roadways and Detours

Paragraph .02 of Subsection 7.08, Maintaining Roadways and Detours, is amended by deleting the 1st two sentences and replacing them with the following:

.02 The Contractor shall not be required to maintain a Roadway through the Working Area before the Contractor has commenced the Work, or during seasonal shutdown or within any sections of the Roadway where the general warranty period has commenced. Responsibility for maintenance shall be transferred between the Contractor and the Owner at the commencement of the Work, the start and end of each seasonal shutdown period, and the start of the general warranty period.

GC 7.10 Approvals and Permits

Subsection GC 7.10, Approvals and Permits, is amended by deleting paragraph .01 and replacing it with the following:

.01 Except as specified in paragraph GC 7.10.02, the Contractor shall obtain any permits, licenses, and certificates required for the performance of the Work that are in force at the date of RFP Closing.

GC 7.13.02 Environmental Incident Management under Legislation Protecting the Environment and Natural Resources

Clause GC 7.13.02, Environmental Incident Management under Legislation Protecting the Environment and Natural Resources, is amended by the addition of the following at the end of paragraph .01.

g) Gasoline Handling Act, RSO 1990.

GC 7.18 General Warranty

Subsection GC 7.18, General Warranty, is amended by deleting paragraph .02 and replacing it with the following:

.02 Subject to the previous paragraph, the Contractor shall correct promptly at no cost to the Owner, defects or deficiencies in the Work that appear during the period of 24 months after the date of Contract Completion as set out in the Contract Completion Certificate or such longer periods as may be specified for certain Materials or components of the Work or longer general warranty periods specified elsewhere in the Contract Documents. The Owner shall promptly give the Contractor written notice of observed defects or deficiencies. The Contractor shall submit a comprehensive repair proposal, including traffic control measures, to the Owner within 15 Days of receiving written notification of the defects or deficiencies.

Notwithstanding the above, on Contracts lasting more than 1 construction season, the Owner shall allow the general warranty period (24 months unless otherwise specified elsewhere in the Contract Documents) to commence prior to the date of Contract Completion for complete sections of Roadways that have been completed in their entirety, have a value of greater than $5,000,000, and are in use by public traffic. In such cases, the Contractor shall apply in writing to the Owner for approval of the start dates of the general warranty for the selected sections of completed Roadways. The written request shall be submitted to Contract Administrator no later than 10 Days prior to the proposed general warranty start dates and include details as to the limits, location, and start date requested. If a request is granted, the Contractor shall correct promptly at no cost to the Owner, defects or deficiencies in the completed section of Roadway, which appear during the warranty period.

Section GC 7.0, CONTRACTOR'S RESPONSIBILITIES AND CONTROL OF THE WORK, of the MTO General Conditions of Contract is amended by the addition of the following subsection:

GC 7.20 Stockpiling of Material

Stockpiling of materials on bridges shall be restricted as follows:

.01 The Contractor shall not stockpile material weighing more than 1.5 kPa on spans of bridges in which concrete removal has commenced for rehabilitation.

.02 In cases other than stipulated in .01 above, the Contractor shall not stockpile material weighing more than:

6. 5 kPa on decks of highway bridges unless specified otherwise elsewhere in the contract;
7. 2 kPa on decks of pedestrian bridges unless specified otherwise elsewhere in the contract.

SECTION GC 8.0 - MEASUREMENT AND PAYMENT

GC 8.01 Measurement

GC 8.01.01 Quantities

Clause GC 8.01.01, Quantities, is amended as follows:

Paragraph .02 is deleting and replaced it with the following:

1. Measurement of the quantities of the Work shall be by percent completion of the items.

Paragraph .03 is added to the end of the clause:

.03 Measurement of Mobilization shall be according to the following schedule:

a) Upon commencement of mobilization for construction, 25% of the total amount bid for mobilization or 2.5% of the total construction value (excluding mobilization), whichever is less.

.01 Upon completion of 5% of total construction value, 37.5% of the total amount bid for mobilization or 5% of the total construction value (excluding mobilization), whichever is less.

.02 Upon completion of 10% of total construction value, 37.5% of the total amount bid for mobilization or 10% of the total construction value (excluding mobilization), whichever is less.

.03 Upon substantial performance – the remaining amount of the item.

This item shall consist of all preparatory work necessary for the movement of personnel and equipment to the project site. This item shall be exclusive of all labour, equipment, and material to be paid under other items.

GC 8.02.04.01 Progress Payment Certificate

Subsection GC 8.02.04.01, Progress Payment Certificate, is amended by deleting paragraph .01 and replacing it with the following:

a) The Contractor shall submit an application for progress payment monthly after starting the Work on this Contract. This application for progress payment shall be for work completed at the agreed to monthly cut-off date.

Within 5 Business Days following the agreed to monthly cut-off dates, the Contractor shall submit an updated application to the Contract Administrator.

The application shall be made by supplying the Contract Administrator with an invoice detailing the progress of each item at the agreed monthly cut-off date. The invoice shall be submitted on Owner's Standard Form PH-CC-882.

a) Subtotals shall be detailed for tender items to match the Itemized Bid Form, and a subtotal for Change Orders.

b) The item information appearing on the invoice shall agree exactly with those as shown in the Itemized Bid Form.

Invoices shall be submitted in hard-copy and digital format. The Contract Administrator shall review the invoice for completeness and subsequent approval for payment within 5 Business Days.

The Contract Administrator shall notify the Contractor immediately if there are any discrepancies with the invoice. The Contractor shall be requested to resubmit the invoice, with any noted correction made, within 3 Business Days.

In the event the Contractor disagrees with the Contract Administrator's assessment, the Contractor shall notify the Contract Administrator of their disagreement within 3 Business Days. The Contract Administrator shall review and provide the Contractor with a final response within 5 Business Days.

The Owner shall pay the approved invoice within 30 Days after the application for progress payment date or after the date of receipt of any invoice that had to be

resubmitted due to deficiencies, errors, or non-compliance with the Owner's request in the preceding paragraphs.

The Owner shall not process for payment any changes less than $1,000 from the amount shown on the previous payment certificate.

GC 8.02.04.02 Payment Adjustment for Changes in the Fuel Price Index

Clause GC 8.02.04.02, Payment Adjustment for Changes in the Fuel Price Index, is deleted in its entirety.

GC 8.06 Taxes and Duties

Subsection GC 8.06, Taxes and Duties, is amended by deleting paragraph .05 and replacing it with the following:

.05 The Owner shall issue a statement certifying that the goods and services provided under this Contract are for the sole use of the Ontario Government. Tender prices shall account for the implementation of the Harmonized Sales Tax (HST). Subsequent to June 30, 2010, the Contractor shall exclude taxes from the Tender prices. HST shall be added to all invoices.

DESIGN-BUILD
REQUEST FOR PROPOSALS

APPENDIX A - Submission Forms

Conflict of Interest - Certification

PART 1

1. a) I/We hereby confirm that there is not nor was there any actual or perceived conflict of interest in our submitting the proposal or performing the Work required by the Contract.

[*or if applicable, strike out the above and include the following:*]

(b) The following is a list of situations, each of which may be a conflict of interest, or appears as potentially a conflict of interest in our company submitting the proposal or the contractual obligations of the Design-Builder under the Contract.

(add attachments if required)

2. a) In submitting the proposal, our company has no knowledge of or the ability to avail ourselves of confidential information of the Crown (other than confidential information which may have been disclosed by the Minister to the proponents in the normal Request For Proposal).

[*or if applicable, strike out the above and include the following:*]

b) In submitting the proposal, our company has knowledge of or the ability to avail ourselves of confidential information of the Crown (other than confidential information which may have been disclosed by the Minister to the proponents in the normal Request For Proposal) and the confidential information was relevant to the Work, its pricing or the Request For Proposal evaluation process.

_____	_____
Name	Proponent's Signature
_____	_____
Position	Date

Conflict of Interest - Disclosure

PART 2

The following people participated in the preparation of our proposal:

	Name	Address	Telephone Number	Contribution or % of Work
1.	_____		_____	_____
2.	_____		_____	_____
3.	_____		_____	_____
4.	_____		_____	_____
5.	_____		_____	_____

The following is a list of individuals who are former employees of the Ontario Public Service (OPS) and have ceased that employment prior to the proposal Submission Deadline:

	Name	Job Classification of Last Position within OPS	Ministry/Agency of OPS Where Last Employed
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

_____ _____

Name Proponent's Signature

_____ _____

Position Date

Form of Offer

1. Proponent Information

a. The full legal name of the proponent is:

_____
_____
_____
_____

b. Any other relevant name under which the proponent carries on business is:

_____
_____
_____
_____

c. The jurisdiction under which the proponent is governed is:

_____
_____
_____

d. The name, address, telephone, facsimile number and e-mail address of the contact person for the proponent is:

_____
_____
_____
_____
_____
_____
_____

e. Whether the proponent is an individual, a sole proprietorship, a corporation, a partnership, a joint venture, an incorporated consortium or a consortium that is a partnership or other legally recognized entity:

_____
_____
_____
_____

2. Mandatory Submission Requirements

(a) The proponent encloses herewith as part of the proposal, the mandatory submissions set out below:

	Yes	Page
Technical Proposal		
Transmittal Letter		

	Yes	Page
Conflict of Interest – Certification		
Conflict of Interest – Disclosure		
Form of Offer		
Commitments Report		

3. The Proponent:

Has carefully examined the RFP documents and has a clear and comprehensive knowledge of the Deliverables required under the RFP. By submitting the proposal, the proponent agrees and consents to the terms, conditions and provisions of the RFP, and offers to provide the Deliverables in accordance therewith at the price set out in the price proposal.

Confirms that by submitting a proposal they agree to conduct the work according to the commitments made in their DB-Expression of Interest submitted in response to the DB-Expression of Interests for this project.

Is deemed to have read and accepted all Addenda issued by the Ministry. The onus remains on proponents to make any necessary amendments to their proposal based on the Addenda. The proponent is requested to confirm that it has received all Addenda by listing the Addenda numbers or, if no Addenda were issued, “None”:

_____

Agrees that any information provided in this proposal, even if it is identified as being supplied in confidence, may be disclosed where required by law or if required by order of a court or tribunal. The proponent hereby consents to the disclosure, on a confidential basis, of this proposal by the Ministry to the Ministry advisers retained for the purpose of evaluating or participating in the evaluation of this proposal.

Agrees that by signing the Form of Offer, the proponent agrees, if selected, to provide proof of insurance coverage as required in Chapter 4 of the RFP. If selected, the proponent shall provide proof of insurance coverage in the form of a valid certificate of insurance prior to the execution of the Agreement by the Ministry.

Understands that in the event its proposal is selected by the Ministry, in whole or in part, the proponent agrees to finalize and execute the Agreement in the form set out in Appendix B to the RFP according to the terms of the RFP.

Signature of Witness	Signature of Proponent Representative
Name of Witness	Name and Title Date: I have authority to bind the proponent.

Itemized Bid and Evaluation Form

Proponent Name: _____

Date: _____

Item #	Tender Item #	Description of Item	Detailed Price	Total Price
		Design Services		
1	**9998-010**	**Design Services**		**$0.00**
		General		
2	**9998-0012**	**Project Administration/Management**		**$0.00**
		General Administration & Management		
		Warranty Administration		
		Warranty Repair		
		Stipend (DB Major projects ONLY)		
		Other		
		Highway/Road Construction		
3	**9998-0020**	**General Grading**		**$0.00**
4	**9998-0030**	**Pavement**		**$0.00**
		Concrete		
		Hot Mix		
		Granular "A"		
		Granular "B"		
		Other		
5	**9998-0040**	**Drainage, Watermain & Utility**		**$0.00**
		Removals		
		New		
		Other		
6	**9998-0060**	**Electrical**		**$0.00**
		Removals		
		Temporary		
		New		
		ATMS		
		Other		
7	**9998-0070**	**Traffic Safety**		**$0.00**
		Temporary		
		New		
		Other		
8	**9998-0080**	**Environmental & Landscape**		**$0.00**

		Temporary		
		New		
		Other		
		Structural		
9	**9998-0090**	**Bridge Foundations**		**$0.00**
10	**9998-0091**	**Bridge Substructure**		**$0.00**
11	**9998-0092**	**Bridge Superstructure**		**$0.00**
12	**9998-0093**	**Culverts > 3M**		**$0.00**
13	**9998-0095**	**Other Structures**		**$0.00**
		Other		
14	**9998-0014**	**Mobilization**		**$0.00**
Total				**$0.00**

NOTES:
1. Please fill in all "Blue" areas of the sheet.
2. The Total Bid Price is the sum of all Item Prices and shall equal the Summary Bid previously submitted.
3. The Item Prices shall reflect a distribution of costs similar to what would be expected in a conventional item listing.
4. The Item Prices are to be determined by following the Item Price Guidelines attached.

Item Price Guidelines

The following definitions are provided to assist in determining the Item Prices to be entered on the Itemized Bid Form. The contents of the definitions are not intended to be an exhaustive list of all work that could be included in each item. Costs shall include removal, installation, replacement, and/or adjustment of the defined works. The definitions apply to both permanent and temporary work.

Project Administration/Management - All costs associated with the administration and/or management of the design and construction of the Work, including management of: material quality, safety, human resources, and warranties. For DB Major projects, include the total stipend value according to section 1.14.6 of the RFP on the line under Item 2 titled "Stipend".

Design Services - All costs associated with completing the design of the project, including: field investigations, specification selection/development, drawing production, and redesigns due to field conditions.

General Grading - All costs associated with site grading work, including: earth and rock excavation, clearing and grubbing, and ditching.

Pavement - All costs associated with the pavement structure, including: granular base and sub-base, asphalt, concrete and composite pavements, tack coating, sidewalks, curb and gutter, and surface treatment.

Drainage, Watermain and Utilities - All costs associated with sewers, watermains, and other non-electrical utilities, including: pipes and culverts, sub-drains, jacking and boring, tunnelling, structures (i.e. manholes, chambers, and maintenance holes), appurtenances (i.e. valves, hydrants, services, and thrust blocks), bedding and backfill, and cathodic protection.

Electrical - All costs associated with electrical equipment, including: cables, ducts, grounding, poles, structures (i.e. hand holes, maintenance holes, cabinets, and chambers), traffic signals, vehicle detection equipment, and power supply equipment.

Traffic Safety - All costs associated with traffic safety, including: traffic control signing, delineation, end treatments, arrestors and roadway protection systems.

Environmental & Landscaping - All costs associated with environmental and landscaping, including: tree protection, erosion and sedimentation control measures, noise barriers, watercourse and fisheries protection, natural habitat protection, topsoil, seed and cover, and sodding.

Bridge Foundations: All costs associated with the portion of a bridge structure that transfers the weight of the bridge into the founding strata and include such elements as footings, piles, caissons etc.

Bridge Substructure: All costs associated with that part of a bridge, including abutments and piers, that support the superstructure but excluding bridge foundations.

Bridge Superstructure: All costs associated with that part of a bridge that spans water, roadway or railway or other obstruction and is supported by the substructure including main load carrying members, deck, sidewalks, barriers, light pole bases etc. Where the contract requires the replacement of certain elements of the superstructure, the costs shall be associated with these components only.

Culverts > 3.0m - All costs associated with large culverts (width, height, or diameter is greater than 3.0m), including: footings, bedding, and backfill.

Other Structures - All costs associated with structures not listed above, including: sign footings, and sign support structures.

Mobilization - All costs associated the preparatory work necessary for the movement of personnel, equipment, and supplies to the project site.

DESIGN-BUILD
REQUEST FOR PROPOSALS

APPENDIX B
Agreement & Design-Build Guarantee

Agreement

DESIGN-BUILD CONTRACT –2018-2013

This Contract is made in duplicate as of the day of , 20XX,

B E T W E E N:

Her Majesty the Queen in right of Ontario as represented by the Minister of Transportation

(the "**Ministry**")

- and -

[enter Design-Builder name]

(the "**Design-Builder**")

WHEREAS the Ministry issued a Request for Proposals for design and construction services in the [name] Area under Contract Number [enter number (s)] (the "RFP", as herein defined);

AND WHEREAS the design and construction services (the "Work", as herein defined) are required from [enter beginning and end dates]

AND WHEREAS the Design-Builder has represented that it has the knowledge, ability, and expertise to carry out the design and construction services and supervise and manage the Work as required by the Ministry and as contemplated in this Contract;

AND WHEREAS the Ministry has negotiated with the Design-Builder to provide such design and construction services in the [name of area] Area from [beginning and end dates] under the terms and conditions provided herein;

AND WHEREAS the Design-Builder shall provide the Contract services (the Work) for a Lump Sum price of $ [enter price proposal price]

IN CONSIDERATION OF the covenants and agreements herein contained and for other good and valuable consideration (the receipt and sufficiency of which are hereby contained and acknowledged), the parties hereto covenant and agree to carry out the terms and conditions of this Contract;

NOW THEREFORE THIS AGREEMENT WITNESSES that the parties agree as follows:

TERMS AND CONDITIONS

1.0 AGREEMENT

1.1 That Design-Build Contract 2018-2013 (the "Contract") is comprised of the following documents:

(a) this Design-Build Agreement (and any future amendments made according to the RFP);

(b) the Request For Proposals for Contract 2018-2013, including, all Appendices, Addenda [enter #1,2,3,4 as appropriate], forms and information provided therewith, and all documents referred therein, unless otherwise specified (the "RFP");

(c) the Design-Builder's proposal for Contract 2018-2013; including any correspondence

(d) (if applicable) the Guarantee, as required by Subsection 1.8.4., Joint Ventures or Joint Bids, of the RFP, herein attached as Schedule 2**;**

(e) any specifications or standards as referenced in the above documents; and

(f) the Design-Builder's insurance as required by Chapter 4 General Conditions

1.2 The parties agree that the recitals are true and shall form part of this Contract.

IN WITNESS WHEREOF the parties hereto have executed this Contract.

Her Majesty the Queen in right of the Province of Ontario as represented by the Ministry of Transportation	[Design-Builder name] (Corporate Seal)
Name:	**Name:**
Title:	**Title:**
Signature:	**Signature:**
Date:	**Date:**

Schedule 2 - Design-Build Guarantee

1.1 Definitions

"Contract", "the Contract", "this Contract" means the Design-Build Contract for 2018-2013 to which this Design-Build Guarantee is attached and of which this Design-Build Guarantee forms a part.

"Design-Build Guarantee", "this Design-Build Guarantee", "the Design-Build Guarantee", "whereto", "hereof", "herein", hereby", "hereunder", and similar expressions mean this guarantee of all of the undersigned of the performance by the Design-Builder of all of its obligations under the Contract.

"Guarantor" and "Guarantors" means all of the undersigned, collectively, and their respective permitted successors and assigns.

1.2 Guarantee

Each of the Guarantors, on a joint and several basis, does hereby absolutely, unconditionally and irrevocably guarantee, as a direct obligation, and as principal obligor and not as a surety, the full and prompt performance and observance by the Design-Builder of each and every covenant, agreement, undertaking and obligation of the Design-Builder contained in the Contract as same may be amended or waived according to the provisions of this Contract (collectively, the "Liabilities").

1.3 General Provisions Relating to the Guarantee

(a) Each and every default in performance, observance or payment of any of the Liabilities by the Design-Builder shall give rise to a separate claim and cause of action hereunder, and separate claims or suits may be made and brought, as the case may be, hereunder as each such default occurs.

(b) The Design-Build Guarantee herein provided for shall be a continuing, absolute and unconditional guarantee of performance, observance and payment as aforesaid and shall remain in full force and effect until each and all of the Liabilities shall have been fully and satisfactorily discharged according to the terms and provisions of the Contract and the Guarantors shall have fully and satisfactorily discharged all of their obligations under this Design-Build Guarantee.

(c) The liability of the Guarantors hereunder shall remain in full force and effect irrespective of:

(i) the legality, validity, regularity or enforceability of the Contract and shall in no way be affected or impaired by (and no notice of the Guarantors shall be required in respect of) any compromise, waiver, renewal, extension, indulgence, amendment, addition, deletion, change or modification with

respect to the Liabilities or any of them or any release of any security (including any other guarantee, letter of credit or bond) for or in respect of the Liabilities or any of them; or

(ii) any failure, neglect or omission on the part of the Ministry or any other person to give the Guarantors (or any of them) notice of the occurrence of any default by the Design-Builder under or with respect to the Liabilities, or to realize upon any obligations or liabilities of the Design-Builder; or

(iii) any amalgamation, merger or consolidation of the Design-Builder or the Guarantors (or any of them) or any sale, lease or transfer of any of the assets of the Design-Builder or any of the Guarantors; or

(iv) any change in the ownership of any shares of the capital stock of the Design-Builder or the Guarantors (or any of them); or

(v) any other occurrence or circumstance whatsoever, whether similar or dissimilar to the foregoing and any other circumstance that might otherwise constitute a legal or equitable defense or discharge of the liabilities of a guarantor or surety that might otherwise limit recourse against the Guarantors or any of them.

(d) The obligations and liabilities of the Guarantors hereunder shall not be impaired, diminished, abated or otherwise affected by (i) any set-off, defense or counterclaim that the Design-Builder or any of the Guarantors may have or claim to have, at any time or from time to time, or (ii) the commencement by or against the Design-Builder or any of the Guarantors of any proceedings under any bankruptcy or insolvency law or laws relating to the relief of debtors, readjustment of indebtedness, reorganizations, arrangements, compositions or extension or other similar laws.

(e) The Ministry shall not be bound to exhaust its recourse against the Design-Builder or others or any securities (including, any letter of credit and/or bond) or other guarantees it may at any time hold before being entitled to performance of payment of the Liabilities from the Guarantors and the Guarantors renounce all benefits of discussion and division.

(f) It is the intent and purpose hereof that the Guarantors shall not be entitled to and do hereby waive any and all defenses available to guarantors, sureties and other secondary parties at law or in equity. Without limiting the generality of the foregoing, each of the Guarantors hereby waives notice of acceptance of this Contract and of the non-performance by the Design-Builder, diligence, presentment, protest, dishonour, demand for payment from the Design-Builder and notice of non-payment or failure to perform on the part of the Design-Builder and all other notices whatsoever. The Design-Build Guarantee hereunder is a guarantee of payment, performance and compliance. In order to hold the Guarantors liable hereunder, there shall be no obligation on the part of the

Ministry at any time to demand or resort for payment of performance to the Design-Builder, its properties or assets or to any security, property or other rights or remedies whatsoever, nor shall there be any requirement that the Design-Builder be joined as a party to any proceeding for the enforcement of any provision of this Design-Build Guarantee and the Ministry shall have the right to enforce the provisions of this Design-Build Guarantee irrespective of whether or not legal proceedings or other enforcement efforts against the Design-Builder are pending, or the Ministry is seeking resort to or realization upon of from any of the foregoing. Without limiting the foregoing, it is understood that repeated and successive demands may be made and recoveries may be had hereunder as and when from time to time, the Design-Builder shall default under or with respect to any of the Liabilities, and that, notwithstanding recovery hereunder for or in respect of any such default, the guarantee herein shall remain in force and effect and shall apply to each and every subsequent default.

(g) Without prejudice to and without releasing, discharging, limiting or otherwise affecting in whole or in part the obligations and liabilities of the Guarantors under this Design-Build Guarantee and without in any way requiring the consent of or giving notice to the Guarantors or any of them, the Ministry may grant time, renewals, extensions, indulgences, releases and discharges to and accept compositions from or otherwise deal with the Design-Builder and/or the Guarantors (or any of them) or others, including any other guarantors, as the Ministry may see fit and the Ministry may take, abstain from taking or perfecting, vary, exchange, renew, discharge, give up, realize on or otherwise deal with security and guarantees in such manner as the Ministry may see fit.

(h) The Design-Build Guarantee hereunder shall continue to be effective, or be reinstated, as the case may be, if at any time payment, or any part thereof, of any of the obligations hereunder is rescinded or shall otherwise be restored or returned by the Ministry upon the insolvency, bankruptcy or reorganization of the Design-Builder, or otherwise, all as though such payment had not been made.

(i) The liability of the Guarantors under the Design-Build Guarantee herein shall arise forthwith after demand has been made in writing on the Guarantors, and the liability of the Guarantors shall bear interest from the date of such demand at the Rate of Interest.

(j) The Guarantors jointly and severally agree to pay to the Ministry any and all reasonable out-of-pocket costs and expenses, including legal fees, incurred by the Ministry in connection with enforcing any of its rights hereunder.

(k) A waiver by the Ministry of any right or remedy hereunder on any one occasion shall not be construed as a bar to any right or remedy which the Ministry would otherwise have had on any future occasion with regard to any subsequent breach. No failure to exercise nor any delay in exercising on the part of the Ministry any right, power or privilege hereunder shall operate as a waiver thereof;

nor shall any single or partial exercise of any right, power or privilege hereunder preclude any other or further exercise thereof or the exercise of any other right, power or privilege. The rights and remedies herein provided are cumulative and may be exercised singly or concurrently, and are not exclusive of any other rights and remedies provided under this Contract or otherwise by law.

(Company Name)	(Company Name)
By:_____	By:_____
An Authorized Signing Officer:	An Authorized Signing Officer:
Name:_____	Name:_____
Position:_____	Position:_____
Date:_____	Date:_____

Insert additional Companies as required

APPENDIX C

Index of Ministry Supplied Information

The following is a listing of information available to proponents as part of this RFP. Files listed in Table C-1 can be accessed on the RAQS/MERX website at: www.raqs.merx.com.

Reliance on the information is according to Section 1.7 Ministry Supplied Information.

All requirements, designs, documentation, plans and information viewed or obtained by the proponents in connection with this RFP are the property of the Ministry and shall be treated as confidential and not used for any purpose other than replying to this RFP and the fulfillment of the Work. Upon request of the Ministry, all such designs, documents, plans and information shall be returned to the Ministry.

Table C-1 – Information available on RAQS/MERX

Document #	Document File Name	Document Description
Canadian Pacific Railway Documents		
1	1_CPRFlagProtectionProtocl	CPR Flag Protection Protocol
2	2_CPRMinimum_Safety_Requirements_for_Contractors_in Canada	CPR Minimum Safety Requirements for Contractors in Canada
3	3_CPR Operational Constraints	CPR Operational Constraints
4	4_CPR Overtime Policy	CPR Overtime Policy
5	5_CP Overhead Clearance Diagram STDCLR-001 Jan 5_15	CPR Clearance Diagram
6	6_Protection of Structures Adjacent to Railroad Tracks	CPR Protection of Structures Adjacent to Railroad Tracks
Reports and Supporting Documents		
7	07_Welland PDR Final 2018-10-19	Final Preliminary Design Report (PDR)
8	8_Appendix A - Recommended-Plan and Profile (Combined)	PDR Appendix A – Recommended Preliminary Plan
9	9_Appendix B - Correspondence	PDR Appendix B – Correspondence Record
10	10_Appendix C - Staging Plan	PDR Appendix C – Preliminary Staging Plans
11	11_Appendix D - Illumination, RWIS, FAST Drawings	PDR Appendix E – Illumination & RWIS Plans
12	12_Appendix E - Structural Design Reports	Appendix F – Structural Design Reports
13	13_Appendix F - Utility Composite Plan	Appendix G – Utility Composite Plan (Amended since EOI)
14	14_Appendix G - Design Criteria	Appendix H – Design Criteria
15	15_FinalDBDwgs-24Oct2018	DB Ready Contract Drawings

16	16_QEW Welland River Bridges - ESD (Final Oct 4 18)	Environmental Screening Document
17	17_Welland River Twin_Drainage Rpt_FINAL_09Oct2018	Preliminary Drainage and Hydrology Report
18	18_Roadside safety Guide Rail Eval Rpt Oct 11 2018	Roadside Safety Report
19	19_QEW-WellandRiver_PavDR_Final	Preliminary Pavement Investigation and Design Report
20	20_Welland River Bridges FIDR oct 18-FINAL	Preliminary Foundations Investigation and Design Report
21	21_ Welland Traffic Op Report-FINAL-19-Oct-2018	Traffic Operations Report
22	22_Welland River_FINAL Fish Impact Assessment Report_24 Sept 2018	Fish and Fish Habitat Impact Assessment Report
23	23_Welland Terrestrial IA Report August 2018	Terrestrial Ecosystem Impact Assessment Report
24	24_Welland_River_Cat3PTTW_Oct 2, 2018	Hydrogeological Report in Support of PTTW Application
25	25_ Welland HIA 20September2018	Heritage Impact Assessment
26	26_Welland River GA - 10 Oct 2018	General Arrangement – Welland River Bridge
27	27_34-312C-Warren Creek Culvert GA-10 Oct 2018	General Arrangement – Warren Creek Culvert
28	28_34-313C-Grassy Brook Culvert GA-10 Oct 2018	General Arrangement – Grassy Brook Culvert
29	29_34-315C-Usshers Creek Culvert GA-10 Oct 2018	General Arrangement – Usshers Creek Culvert
30	30_Structural_Eval_Report_QEW Welland River_Grassy Brook	Structural Evaluation Report – Grassy Brook Culvert
31	31_PCM 2016-02 Attachment 1 - OSCLIS Restrictions Form	Ontario Structure Clearance and Load Information System Form
32	32_PCM 2016-02 Attachment 2 - OSCLIS Contact info	Ontario Structure Clearance and Load Information System Contact Information
33	33_Welland - Final ECR - 23-Oct-2018	Highways Existing Conditions Report

Table C-2 – Additional Information

Document #	Document File Name	Document Description
C1	C1_Engineering Survey Files	Available Survey Information including: • Engineering Survey Highway Alignment Data
C2	C2_InRoads	InRoads Data Files
C3	C3_WellandBrPrelimGA-10Oct2018	Proposed Bridge General Arrangement Drawings (CAD)
C4	C4_Welland Final Vissim Files 8-29-2018	Vissim (traffic) Modelling Files
C5	C5_Welland Final Synchro Files 8-29-2018	Synchro (traffic) Modelling Files