THE REGIONAL MUNICIPALITY OF NIAGARA

CONTRACT DOCUMENTS

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Jim Bradley
Regional Chair

Catherine Habermebl
Acting Commissioner of Public Works

April 2019

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

TABLE OF CONTENTS

- Title Page
- Table of Contents
- Special Instructions to Bidders
- Instructions to Bidders
  - *(Refer to Niagara Peninsula Standard Contract Documents, NPSCD)*
- Form of Tender
  - Form of Tender
  - Schedule of Quantities
  - Schedule of Quantities Summary Sheet
  - Statement A – Tenderer's Experience in Similar Work
  - Statement B – Harmonized Sales Tax
  - Statement C – Accessibility Regulations for Contracted Services
  - Statement D – List of Sub-Contractors
- Agreement to Bond
- Form of Contract Agreement
- Special Provisions - General *(Refer to NPSCD)*
- Special Provisions - Contract Items *(Refer to NPSCD)*
- Special Provisions - Supplementary Special Provisions
- Schedule of Drawings
- Standard Drawings *(Refer to NPSCD)*
- Supplementary General Conditions of Contract *(Refer to NPSCD)*
- OPS General Conditions of Contract *(Refer to NPSCD)*
- Appendix A - Geotechnical Investigation Report, Genivar Inc., May 2012
- Appendix B - Geotechnical Investigation and Pavement Design Report, Temporary Detour on Highway 406, AMEC, March 2015
- Appendix C – Revised Pavement Design for Highway 406 Detour Memo, Wood, February 2019
- Appendix D – Martindale Road Test Pit Investigation, Wood, February 2019
- Appendix E – Roadway Design Cross Section

_____ _____

Contractor's Signature *Date*

NOTICE

This contract utilizes the Niagara Peninsula Standard Contract Document (Revision 19). This document constitutes the specification for this project and must be utilized in preparing bids for tenders or quotations.

The Niagara Peninsula Standard Contract Document is available on-line at the “Bid Opportunities” section of the Regional Municipality of Niagara website (www.niagararegion.ca).

Contracts issued through tender calls and quotations will reference the Standard Document and the responsibility for obtaining or having access to the Document will rest with the bidder. The Standard Document can be utilized on all projects which clearly indicate reference and use of the Niagara Peninsula Contract Document.

SPECIAL INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

(Refer to Niagara Peninsula Standard Contract Documents)

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SPECIAL INSTRUCTIONS TO BIDDERS

INDEX

No.	Description	Page
1.	Named Parties	SIB 3
2.	Tender Procedure	SIB 3
3.	Estimated Tender Value	SIB 4
4.	Tender Award	SIB 5
5.	Maintenance Holdback	SIB 5
6.	Liquidated Damage	SIB 5
7.	Additional Insured	SIB 5
8.	Confidentiality	SIB 5
9.	Procurement By-Law	SIB 6
10.	Bidding System Registration	SIB 6
11.	Dispute Resolution	SIB 6
12.	Lobbying	SIB 7
13.	Bidder Performance	SIB 7
14.	Tender Deposit	SIB 8
15.	Insurance Certificate	SIB 8
16.	Exclusion	SIB 9

17. Maintenance of Traffic ..... SIB 9

18. Additions and Deletions ..... SIB 9

19. Construction Schedule ..... SIB 9

20. Examination of Plans, Specifications, and Site of Work ..... SIB 9

21. Geotechnical Investigation ..... SIB 10

22. Accessibility Regulations for Contracted Services ..... SIB 10

23. Contractor Safety Program ..... SIB 11

24 Tender Enquiries ..... SIB 11

25. Insurance Requirements ..... SIB 11

26. Prompt Payment..... SIB 13

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SPECIAL INSTRUCTIONS TO BIDDERS

1. Named Parties

For the purposes of this contract the following parties are identified:

Owner:	**The Regional Municipality of Niagara**
Engineer:	**Wood Environment & Infrastructure Solutions**
Contract Administrator:	**Wood Environment & Infrastructure Solutions**
Inspector:	**Wood Environment & Infrastructure Solutions**
Contact for Enquiries:	Procurement Agent Jayan Perera Niagara Region Telephone: 905-980-6000, extension 3656 Email: Jayan.Perera@niagararegion.ca

2. Tender Procedure

The following policy regarding the submission of tenders and the tender opening procedures will be applicable for this project. Bidders are requested to adhere strictly to the instructions concerning submission.

(a) **All tenders must be submitted in a sealed envelope to:**

Title: **Jayan Perera, Purchasing Agent**
Address: **Purchasing Services Office**
First Level (Upstairs)
1815 Sir Isaac Brock Way, P.O. Box 1042, Thorold, ON
L2V 4T7

By the following time, as determined on the clock located at the location receiving bids:

Time: **2:00 p.m.**
Date: **THURSDAY, MAY 09, 2019**

(b) Submissions received after this deadline will not be accepted and will be returned unopened to the bidder. Please note that bidders are solely responsible to ensure that their submissions are received by the office of the Purchasing Agent on or before the deadline. The Purchasing Agent will not accept any submission after this deadline notwithstanding the reason for its late receipt.

Please also note that, in the event of any question regarding the timely receipt of any submission, the time on the clock designated by the Purchasing Agent will absolutely prevail over any other time piece regardless of any discrepancies between the time on the Purchasing Agent's designated clock and actual time.

(c) Tenders shall be submitted in the one envelope, as follows:

i) The envelope shall contain:

* "Agreement to Bond", duly signed and sealed (no copies or facsimiles will be accepted).

* Tender deposit in the form of a Certified Cheque, Bank Draft or Bid Bond and in the amount of **$200,000.00** made payable to The Regional Municipality of Niagara.

* Form of Tender (including addenda if applicable).

(d) Tenders will be opened the same day that tenders close.

Time: **2:15 p.m.**

Location: **Niagara Region Headquarters, Campbell West**
1815 Sir Isaac Brock Way, P.O. Box 1042, Thorold, ON L2V 4T7

Firms submitting tenders will be permitted to attend the tender opening.

(e) The total tender price will be announced for each tender opened, (excluding H.S.T.).

3. Estimated Tender Value

The estimated tender value of the project is as follows (excluding H.S.T.).

Estimated Tender Value **$9,000,000.00**

4. Tender Award

The award of this tender is subject to the Owner obtaining approval from:

The Regional Municipality of Niagara Council

Ministry of Transportation

Ministry of the Environment, Conservation and Parks

Tentatively, construction may commence, but is not guaranteed, by:

July 1, 2019

5. Maintenance Holdback

This contract will be subject to a Maintenance Holdback of two percent (2%) of the final contract value (excluding HST). The holdback will be released as specified in Special Provisions – General.

6. Liquidated Damages

The liquidated damages for this contract shall be One Thousand Five Hundred Dollars ($1,500.00) for each and every day's delay as outlined in Special Provisions – General G16.

7. Additional Insured

The following parties are identified to be included as additional insured for this project:

The Regional Municipality of Niagara

Ministry of Transportation

The Corporation of the City of St. Catharines

Wood Environment & Infrastructure Solutions

Genivar Inc.

8. Confidentiality

The Region will treat all bids as confidential. The Region will comply with the *Municipal Freedom of Information and Protection of Privacy Act,* and its retention by-law pursuant to the *Municipal Act*, in respect of all bids. All Public Reports approved by the Council of the Region will become public information. Such Public Reports will not include bid documents. The Region will not return or destroy any copies of any unsuccessful bid.

9. Procurement By-Law

Submissions will be solicited, received, evaluated, accepted, and processed in accordance with the latest version of The Region's Procurement By-Law as amended from time to time. In submitting a bid, in response to this solicitation, the Bidder agrees and acknowledges that it has read and will be bound by the terms and conditions of the Procurement By-Law.

The Procurement By-Law can be viewed on the Region's website, www.niagararegion.ca

10. Bidding System Registration

Niagara Region will only consider bids received from bidders who have registered with Niagara Region's electronic bidding system at https://niagararegion.bidsandtenders.ca (the "Bidding System") and have obtained the RFT directly from the Procurement Office.

All bidders must establish a Bidding System account and be registered as a Plan Taker for the bid opportunity, which will enable the bidder to receive addenda email notifications and download addenda.

11. Dispute Resolution

(a) The Corporation encourages competitive bidding and an open, accountable and transparent process for the Purchase of Goods and/or Services.

(b) To maintain the integrity of the Bid Solicitation process, Suppliers who believe they have been treated unfairly in a Bid Solicitation process shall submit a Substantive Objection to the Director of Procurement and Strategic Acquisitions providing sufficient detail regarding their complaint within:

(i) 7 days from the conclusion of the Bid opening process for Request for Quotations or Request for Tenders.

(ii) 7 days of the Supplier being notified of the results of a Request for Pre-Qualification or Request for Expressions of Interest or Request for Proposals.

(c) The Director of Procurement and Strategic Acquisitions will arrange a debriefing with the Supplier to explain the Bid Solicitation process that led to the selection of the successful Supplier.

(d) The Director of Procurement and Strategic Acquisitions will investigate the complaint and will make a recommendation to the Commissioner of Corporate Services/Treasurer, CAO or Council, as appropriate.

(e) To ensure that the Dispute Resolution process for the particular Bid Solicitation process is seen to be fair and impartial, elected officials shall not advocate on behalf of Suppliers who have submitted a Substantive Objection.

(f) Should a Supplier continue to have concerns respecting the Award and the decision, the Supplier may then request, in writing to the Commissioner of Corporate Services/Treasurer, a mediator, to assist in resolving any outstanding issues between the Supplier and the Corporation.

(g) The recommended mediator will be approved by both the Supplier and the Corporation.

(h) The mediator shall make his/her best efforts to assist the parties to reach a mutually acceptable solution.

(i) Costs for the mediator shall be equally shared by the Supplier and the Corporation.

(j) Any resolution reached through the mediation process shall remain confidential if requested by either of the parties.

12. Lobbying Restrictions

(a) Lobbying restrictions shall apply to Suppliers, their staff members, or anyone involved in preparing a Bid, shall not engage in any form of political or other Lobbying whatsoever or seek to influence the outcome of the Bid Solicitation process or subsequent Award. This restriction extends to all of the Corporation's staff and anyone involved in preparing a Bid Solicitation or participating in a Bid evaluation process, and members of Council.

(b) The Corporation may reject any Bid by a Supplier that engages in such Lobbying, without further consideration, and may terminate that Supplier's right to continue in the Bid Solicitation process.

(c) During a Bid Solicitation process, all communications shall be made through Procurement and Strategic Acquisitions. No Supplier or person acting on behalf of a Supplier or group of Suppliers, shall contact any elected official, consultant or any employee of the Corporation to attempt to seek information or to influence the Award.

(d) Elected officials shall refer any inquiries about a Bid Solicitation process to the Commissioner of Corporate Services/Treasurer.

13. Bidder Performance (Litigation)

The Corporation may, in its sole discretion, reject a Bid if a bidder:

(i) has, at any time, threatened, commenced or engaged in legal claims or litigation against the Corporation;

(ii) is involved in a claim or litigation initiated by the Corporation;

(iii) previously provided goods or services to the Corporation in an unsatisfactory manner;

(iv) has failed to satisfy an outstanding debt to the Corporation;

(v) has a history of illegitimate, frivolous, unreasonable or invalid claims;

(vi) provides incomplete, unrepresentative or unsatisfactory references; or

(vii) has engaged in conduct that leads the Corporation to determine that it would not be in the Corporation's best interests to accept the Bid.

14. Tender Deposit

Tender deposits, with the exception of those from the two lowest Bidders will be returned within fifteen (15) days after the tenders are opened.

The Tender Deposit of the two lowest Bidders will be held until all necessary documentation has been provided by the successful Bidder (i.e. – Insurance, W.S.I.B. Certificate of Clearance, Bonding, etc.), the Agreement has been duly executed and the Bidder has provided evidence, satisfactory to the Region, that all arrangements have been made for commencement of the services to be provided, on the Contract start date.

No interest will be paid for deposits retained and/or cashed by The Regional Municipality of Niagara. Bidders are deemed to have made due allowances for this requirement in their total contract tender price, including contingency items and excluding HST.

15. Insurance Certificate

Immediately upon Award, the successful Bidder shall provide the Region with a Certificate of Insurance acceptable to the Region and, if requested by the Region, certified copies of the insurance policies. The Certificate of Insurance must comply with the insurance requirements outlined in this Bid Solicitation and must be on the Region's form of Certificate of Insurance, which can be found on the Region's website – www.niagararegion.ca/business/fpr/cert-insurance.aspx. If the Certificate of Insurance is provided in a non-original form (e.g. a facsimile, photocopy or scanned electronic copy), the Bidder acknowledges and agrees that the Region is fully entitled to treat any such Certificate as an original and that the Bidder will be responsible for the accuracy and validity of the information contained therein.

16. Exclusion

Except as expressly and specifically permitted herein, no Bidder shall have any claim for any compensation of any kind whatsoever, as a result of participating in this Tender, and by submitting a tender each Bidder shall be deemed to have agreed that it has no claim.

17. Maintenance of Traffic

Tenderers are advised that it will be essential that local traffic flow be maintained during the entire construction period. Allowance for one lane of traffic flow at all times will be mandatory during working hours. It is also mandatory that both traffic lanes shall be open in non-working hours unless otherwise directed.

The successful Tender shall submit a construction schedule and Traffic Management Plan (Item A8) to the Contract Administrator within seven (7) days of the contract award. The schedule shall show in a clear critical path diagram the proposed progress of all activity for the main items and site development of the contract, including key milestones and completion of work within the specified time allowed. Construction will not be allowed to commence until these documents are received and accepted.

Contractor shall refer to and adhere to the requirements as specified in the specifications as detailed for Item A8

18. Additions and Deletions

The Regional Municipality of Niagara reserves the right to add to or delete from any portion or portions of the Schedule of Work. These changes under this contract shall **NOT** be subject to the unit price adjustment provisions in the General Conditions of Contract.

19. Construction Schedule

The successful Tenderer shall submit a construction schedule to the Contract Administrator within seven (7) days of the contract award. The schedule shall show in a clear critical path diagram the proposed progress of all activity for the main items and site development of the contract, including key milestones and completion of work within the specified time allowed.

20. Examination of Plans, Specifications, and Site of Work

Tenderers shall carefully examine and study all of the Contract Specifications and the site of work in order to satisfy themselves by examination as to all conditions affecting the contract and as to the detailed requirements of the construction.

21. Geotechnical Investigation

A copy of the soil investigation report is appended to these specifications.

The geotechnical investigation and supporting data is provided for information only and represents the considered opinion and findings of the firm which undertook the work. The Owner does not take responsibility for the accuracy of the information and provides it for consideration by tenderers. Tenderers are to make further investigation as they deem necessary, and at their own expense, to accurately assess the subsurface conditions to be encountered.

22. Accessibility Regulations for Contracted Services

Contracted employees, third party employees, agents and others that provide customer service on behalf of Owner are legally responsible to be in compliance with the provisions outlined in Section 6 of the Ontario Regulation 429/07 with respect to training under the Customer Service Standard of the *Accessibility for Ontarians with Disabilities Act (2005).* The Contractor shall ensure that such training includes, without limitation, a review of the purposes of the Act and the requirements of the Regulation, as well as instructions regarding all matters set out in Section 6 of the Regulation. By signing Statement "C" the bidder has agreed to be in full compliance with this regulation. The successful bidder will be expected to complete the confirmation form, prior to the issue of the agreement or purchase order. For any further information please contact accessibility@niagararegion.ca

Contractors shall be responsible for notifying the general public when planning/implementing a disruption to any transportation walkway, pathway, driveway, roadway, etc. It shall be the Contractor's responsibility to notify the general public of any disruption to regular service; prior to the commencement of the disruption. In the case where construction activities will cause a disruption to normal service appropriate signage shall be installed. At the Owner's request, information relating to the disruption shall be supplied to allow for the posting of disruption notices on the Owner's web page of choice.

The posted signage shall – as a minimum - include the headings listed below (or format supplied by the Owner) and shall be filled out by the contractor and installed in advance of the service disruption.

NOTICE OF SERVICE DISRUPTION
Please be advised of a disruption to:
Reason for disruption:
This service will be unavailable for the period of:
Alternative facilities or services:
For more information or service accommodation, please contact:

WE APOLOGIZE FOR THE INCONVENIENCE.
THANK YOU

23. Contractor Safety Program

The successful contractor must comply with the Region's Contractor Safety Policy #C3-H17. The policy and forms can be found on the Region's website at:

http://www.niagararegion.ca/business/tenders/compliance-with-standards.aspx.

Failure to comply with this policy will result in disqualification of the contractor.

24. Tender Enquiries

The deadline for tender enquiries is the **Thursday May 2, 2019 at noon**.

Prior to the Deadline for Questions, bidders may ask questions or seek additional information in relation to this RFT through the Bidding System using the "Submit a Question" link associated with this bid opportunity. Niagara Region will not accept any bidder's questions or requests for information by any other means, except as specifically stated in this RFT.

25. Insurance Requirements

The Successful Contractor shall purchase and maintain or cause to purchase and maintain at all times during the term of this Tender, or as otherwise set out in this Tender, the insurance coverage listed below:

Commercial General Liability Insurance ("CGL")

The Contractor shall be required to provide, maintain, and pay for General Liability Insurance (as described under General Condition Clause GC 6.03.02) to a limit of no less than five million dollars total with a property damage deductible of no more than $5,000 (five thousand dollars).

Automobile Insurance

The Contractor shall be required to provide, maintain, and pay for Automobile Liability Insurance (as described under General Condition Clause GC 6.03.03) for owned and non-owned auto to a limit of no less than five million dollars. Coverage must also apply in the event the operations of the insured resulted in a pollution condition including remediation costs.

XCU Endorsement

The CGL policy must include coverage for Explosion, Collapse or Underground (XCU Endorsement) or not contain an exclusion.

Pollution Liability

The Contractor shall be required to provide, maintain, and pay for Contractor's Pollution Liability Insurance to a limit of no less than two million dollars per claim insuring all services and operations of the Contractor for third party losses arising from a pollution event performed by or on behalf of the Contractor and shall include coverage for but not limited to, bodily injury including death, property damage and remediation costs which are reasonable and necessary to investigate, neutralize, remove, remediate (including associated monitoring) or dispose of soil, surface water, groundwater or other contamination. The policy shall be endorsed to:

a. Include the Owner as an additional insured;

b. Contain an undertaking by the insurers to give thirty (30) days prior written notice in the event that there is a material change in the foregoing policies or coverage affecting the additional insured or cancellation of coverage before the expiration date of any of the foregoing policies; and

c. The policy shall be maintained continuously during the term of this Contract and for two (2) years after the termination or expiration of this Contract and shall cover insurable losses arising out of or in association with an error or omission in the rendering of or failure to render the Services. If coverage under the policy is cancelled within the two (2) year period after the termination or expiration of this Contract the Contractor shall provide the Owner with notice within thirty (30) days of cancellation and shall be required to purchase an extended reporting endorsement to confirm that coverage is maintained.

Wrap Up Liability

Wrap-Up Liability policy in the amount of TEN MILLION DOLLARS ($10,000,000) that covers Niagara Region and the Bidder (which includes General Contractor, Consultants, and all Sub-contractors and Sub-consultants) involved in the deliverable. The term for this policy should be from the date of commencement of the deliverable/work until 24 Months from the date of Substantial Performance of the Work.

Hook and Crane Liability

Hook/Crane liability in an amount of $ 40,000.

Broad Form Contractor's Equipment

The Contractor shall be required to provide, maintain, and pay for Contractor's Equipment Insurance (as described under General Condition Clause GC 6.03.06) and also covering performance of the Work including costs to cleanup and restore property damaged by sudden and accidental escape of pollutants and shall not allow subrogation claims by the Insurer against the Owner.

FORM OF TENDER

Contract No. 2019-T-157
(RN 19-57)

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FORM OF TENDER

We, the undersigned Contractor(s) have carefully examined the attached documents as herein listed and forming part of this Tender

DOCUMENTS INCLUDED IN CONTRACT

Special Provisions
Special Instructions to Bidders
Instructions to Bidders
General Conditions
Supplementary General Conditions
Standard Specifications (as noted)
Supplementary Specifications (as noted)
Plans (as noted)
Addenda (if applicable)

and have carefully examined the site and location of the work to be done under this Contract. We, the undersigned Contractor(s), understand and accept the said drawings and contract documents, and, for the prices set forth in this Tender, hereby offer to furnish all machinery, labour, tools, apparatus, and other means of construction, furnish all materials except as otherwise specified in the Contract, and to complete the work in strict accordance with the drawings and contract documents referred to above, for the total tender price of: _____

_____ Dollars ($_____) including contingency and *excluding H.S.T.*.

ADDENDA

We acknowledge that we have received Addendum/Addenda No. inclusive, and that all changes specified in the Addendum/Addenda have been included in the prices submitted.

COMMENCEMENT AND COMPLETION

We agree to commence work as specified to proceed continuously to completion within **200** working days.

All work on Highway 406 shall be completed prior to **November 15, 2019.**

TENDER IS OPEN TO ACCEPTANCE & IRREVOCABLE

We agree that his tender is to continue open to acceptance and irrevocable until the formal contract has been executed by the successful tenderer for the said work, and the bond or bonds as specified have been executed by the approved surety or sureties, and that the Corporation may, at any time, within 45 (forty-five) calendar days of the closing date, accept this tender without notice, whether any tender has been previously accepted or not.

** to be filled in by the Tenderer.*

OFFERED ON BEHALF
OF THE CONTRACTOR

Insert Workplace & Insurance Board Account No.

_____
Signature

_____
Signature

_____
Company Name

_____
Address

Contractor's Seal

_____
Witness

_____
Date

_____
Witness

NOTE:

(a) If the Tenderer is a Corporation, the Corporate Seal must be affixed under the signature of a duly authorized officer or officers of the Corporation.

(b) If the Tenderer is not a Corporation or a Partnership, the Tenderer must sign in the presence of a witness who must also sign.

(c) If the Tenderer is a Partnership, each member of the Partnership must sign in the presence of a witness who must also sign.

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SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
Section A - General							
1	A1		Bonding	LS	1		$
2	A2	SSP 25	Preconstruction Survey	LS	1		$
3	A3	SSP 26	Site Office	LS	1		$
4	A4		Construction Layout	LS	1		$
5	A5		Clearing and Grubbing				
			a) Remove and dispose of bushes, including hedges and roots	LS	1		$
			b) Tree and stump removal (< 500mm)	each	11	$	$
			c) Tree and stump removal (> 500mm)	each	2	$	$
			d) Stump removal (< 500mm)	each	11	$	$
			e) Stump removal (> 500mm)	each	2	$	$
6	A7 OPSS 805		Install, maintain and remove Siltation Control Devices				
			a) Temporary Silt Fence	m	100	$	$
			b) Light Duty Fibre Roll Barriers	m	50	$	$
		SSP 27	c) Catchbasin Sediment Traps	each	25	$	$
7	A8	SSP 28	Construction Signs, Traffic Control and Traffic Management Plan	LS	1		$
8	A9		Contingency Allowance	LS	1		$ 800,000.00
			Subtotal Section A				**$**

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Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
Section B - Roadwork							
9	B2 OPSS 206	SSP 29	Earth Excavation (Grading) (not including asphalt removal)	m3	18,000	$	$
10	B35	SSP 30	Disposal of Excavated Contaminated Soils (Provisional)	t	500	$	$
11	B19		Regrading of Ditches and Swales	m	150	$	$
12	B27 OPSS 510	SSP 31	Removals				
			a) Removal of Asphalt Pavement, Full Depth (All thicknesses)	m2	11,900	$	$
	B11		b) Asphalt Milling (All areas)	m2	10,060	$	$
			c) Removal of Asphalt Pavement from Concrete Surface	m2	606	$	$
			d) Removal of Asphalt Pavement, Driveway	m2	360	$	$
			e) Removal of Concrete Curb and Gutter, All Types	m	1,793	$	$
		SSP 32	f) Removal of Concrete Sidewalk and Concrete Driveways	m2	1,104	$	$
		SSP 33	g) Removal of Catchbasins, Ditch Inlets and Manholes, Including Plug where Required	each	13	$	$
			h) Removal of Culverts, All Sizes	m	25	$	$
			i) Removal of Sewers, All Sizes	m	267	$	$
			j) Removal of Watermain, All Sizes	m	15	$	$
			k) Remove, ,store, and reinstate of Fence, All Types	m	69	$	$
		SSP 34	l) Remove, Salvage and Relocate Concrete Pillar	each	2	$	$
			m) Remove Steel Beam Guiderail	m	145	$	$
			n) Remove Steel Beam Guiderail End Treatment	each	4	$	$
			o) Removal of Median Concrete Barrier on Highway 406	m	34	$	$

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Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
13	B12 OPSS 310	SSP 35	Supply and Application of Tack Coat	m2	44,050	$	$
14	B14 OPSS 313	SSP 36, 37, 38	Supply and Pave Hot Mix Asphalt				
			a) Superpave 19.0	t	4,500	$	$
			b) Superpave 12.5 FC2 (echlon paving)	t	3,750	$	$
			c) HL3F	t	30	$	$
			d) HL8 MDBC	t	38	$	$
15	B3 OPSS 314	SSP 39	Granular 'A' Crushed Limestone	t	14,000	$	$
16	B3 OPSS 314	SSP 39	Granular 'M' (Provisional)	t	50	$	$
17	B8 OPSS 353	SSP 40	Concrete Curb and Gutter, All Types	m	2,300	$	$
18	B8 OPSS 353	SSP 40	Concrete Curb and Gutter Hand Work, (Premium to Concrete Curb item), All Types	m	50	$	$
19	B15 OPSS 311		Asphalt Driveways	m2	250	$	$
20	B16	SSP 41	Concrete Driveways	m2	30	$	$
21	B18		Granular Driveways	m2	30	$	$
22	B9 OPSS 351	SSP 42	Concrete Sidewalk and Bus Stop Pads	m2	1,500	$	$
23	B9, B29 OPSS 351	SSP 42	Concrete Sidewalk (Commercial Grade)	m2	200	$	$
24	B9 OPSS 351	SSP 43	Coloured Concrete in Islands	m2	325	$	$

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Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
25	B34 OPSS 351		Tactile Warning Surfaces	each	12	$	$
26	B6 OPSS 405	SSP 44	Pipe Subdrains				
			a) 100 mm Diameter Pipe Subdrains	m	1,920	$	$
			b) 150 mm Diameter Pipe Subdrains	m	210	$	$
27	B13 OPSS 406	SSP 45	Adjust of Appurtenances				
	B13 (a)		a) Existing Catchbasin Frame and Grate (up to 300mm)	each	5	$	$
	B13 (a)		b) Existing Catchbasin Frame and Grate (300 - 600mm)	each	2	$	$
	B13 (c)		c) Valve chamber, Manhole Frame and Cover (up to 300mm)	each	15	$	$
	B13 (c)		d) Valve chamber, Manhole Frame and Cover (300 - 600mm)	each	5	$	$
	B13 (d)		e) Repalce Manhole Frame and Grate	each	20	$	$
	B13 (e)		f) Valve and Curb Boxes	each	15	$	$
	B13 (f)		g) Supply and Replace Valve and Curb Boxes	each	5	$	$
	B13 (g)		h) Rebuid Manholes (< 500mm)	each	3	$	$
	B13 (g)		i) Rebuid Manholes (> 500mm)	each	2	$	$
	B13 (h)	SSP 46	j) Supply and Place Poured Concrete Valve Adjustments (all depths)	each	10	$	$
	B13 (h) OPSS 408	SSP 46	k) Supply and Place Poured Concrete Manhole Adjustments (all depths)	each	23	$	$
28	OPSS 710	SSP 47	Pavement Marking Obliteration by Abrasive Blasting	m	3,040	$	$

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
29	OPSS 710	SSP 48, 49	Pavement Markings				
			a) Solid White - 100 mm Wide	m	2,237	$	$
			b) Broken White 3-3-3 - 100 mm Wide	m	164	$	$
			c) Broken White 3-6-3 - 100 mm Wide	m	185	$	$
			d) Solid Yellow - 100 mm Wide	m	1,623	$	$
			e) Broken Yellow 3-6-3 - 100 mm Wide	m	170	$	$
			f) Solid White - 100 mm Wide, Durable	m	34	$	$
			g) Solid White - 200 mm Wide, Durable	m	2,048	$	$
			h) Broken White 3-3-3 - 200 mm Wide, Durable	m	490	$	$
			i) Broken White 3-6-3 - 100 mm Wide, Durable	m	39	$	$
			j) Broken White 3-9-3 - 100 mm Wide, Durable	m	150	$	$
			k) Solid Yellow - 100 mm Wide, Durable	m	601	$	$
			l) Solid White - 600 mm Wide, Durable	m	222	$	$
			m) Symbols	each	32	$	$
30	OPSS 710	SSP 50	Pavement Marking Temporary, Field Reacted Polymeric - Fluorescent Orange	m	5,450	$	$
31	OPSS 342		Shoulder Rumble Strips	m	94	$	$
32	OPSS 703	SSP 51, 52	Permenant Road Signs				
	OPSS 510		a) Remove and Dispose Existing Signs	each	5	$	$
			b) Remove, Store and Reinstall Existing Signs	each	25	$	$
			c) New Permanent Signs	each	11	$	$
			d) Ground Mounted Sign with MTO Sign Support System	each	1	$	$
			e) Delineator Posts, OPSD 984.105 (Type A)	each	19	$	$

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
33	OPSS 703	SSP 53	Advanced Notfication/ Warning/ Detour Route TC-64 Signs	each	5	$	$
34	OPSS 721	SSP 5	Steel Beam Guiderail with Channel	m	348	$	$
35	OPSS 732	SSP 55, 56	Steel Beam Energy Attenuating Terminal	each	4	$	$
36	OPSS 723	SSP 56	Energy Attenuator, Permenant	each	2	$	$
37	OPSS 723	SSP 56, 57	Temporary Energy Attenuators	each	4	$	$
38	OPSS 723	SSP 56, 57	Temporary Energy Attenuators, Relocation	each	4	$	$
39	OPSS 740	SSP 58, 59	Concrete Barrier, All Types	m	60	$	$
40	OPSS 740	SSP 58, 59	Tall Wall Barrier	m	34	$	$
41	OPSS 741		Temporary Concrete Barrier	m	240	$	$
42	OPSS 741		Temporary Concrete Barrier, Relocation	m	136	$	$
43	OPSS 741	SSP 60	Movable Temporary Concrete Barrier	m	616	$	$
44	OPSS 741	SSP 60	Movable Temporary Concrete Barrier, Relocation	m	268	$	$
45	OPSS 741	SSP 60	Movable Temporary Concrete Barrier, Shift	LS	1		$
46	B21 OPSS 801, 802	SSP 61	100mm Imported Topsoil and Sod	m2	5,000	$	$
47	B22 OPSS 802, 804		Topsoil, Seed and Mulch	m2	10,000	$	$
			Subtotal Section B				**$**

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
Section C - Storm Sewers							
48	C1, C2 OPSS 407, 410		250 mm Dia. PVC DR-35 Catchbasin Leads	m	243	$	$
49	C1, C2 OPSS 410		300 mm Dia. PVC DR-35 Storm Sewers and Catchbasin Leads	m	288	$	$
50	C1, C2 OPSS 410		375 mm Dia. PVC DR-35 Storm Sewers	m	153	$	$
51	C1, C2 OPSS 410		525 mm Dia. PVC DR-35 Storm Sewers	m	49	$	$
52	C1, C2 OPSS 410		600 mm Dia. PVC DR-35 Storm Sewers	m	85	$	$
53	C4 OPSS 410		Break Into or Modify Exist Openings into Manholes, Catchbasins,Ditch Inlets,Culverts and Sewers	each	10	$	$
54	C6 OPSS 407	SSP 62	Pre-Cast Concrete Manholes, Catchbasins and Ditch Inlets				
			a) 600 mm x 600 mm Catchbasin OPSD 705.010, Grate OPSD 400.081	each	23	$	$
			b) 600 mm x 600 mm Ditch Inlet OPSD 705.030	each	2	$	$
			c) 600 mm x 1450 mm Twin Inlet Catch Basin OPSD 705.020, Grate OPSD 400.081	each	1	$	$
			d) 1200 mm Dia. Storm Manhole OPSD 701.010, Grate OPSD 401.010	each	14	$	$
55	C6	SSP 63	Oil Grit Separator STC 750 or Equvalent	each	1	$	$
56	C5 OPSS 409		Flush and T.V. Inspect Storm Sewers				
			a) Upon Completion of Work	m	575	$	$
			b) At Two Year Maintenance	m	575	$	$
			Subtotal Section C				**$**

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
Section D - Watermain							
57	B27 OPSS 510		Removal of Hydrants and Valve, Including Concrete Plug Where Required	each	3	$	$
58	D1 OPSS 411	SSP 64	Watermain - 200mm PVC DR 18	m	83	$	$
59	D2 OPSS 441		Valves - 200mm Gate Valve & boxes	each	2	$	$
60	D2 OPSS 441		Valve - Tapping Sleeve and Valve	each	3	$	$
61	D1, D3 OPSS 441, 491	SSP 65	Hydrant Sets - Relocate Existing	each	2	$	$
62	D1, D3 OPSS 441	SSP 66	Hydrant and Secondary Valve	each	1	$	$
63	D4 OPSS 441	SSP 67	Water Services				
			a) 25mm or Less Waterservice Extension, all types	m	20	$	$
			b) Larger than 25mm Waterservice Extension, all types	m	2	$	$
64	D5 OPSS 441		Main Stop				
			a) 25mm or Less	each	20	$	$
			b) Larger than 25mm	each	2	$	$
65	D6 OPSS 441		Curb Stop				
			a) 25mm or Less	each	20	$	$
			b) Larger than 25mm	each	2	$	$
66	D7 OPSS 441		Curb Box	each	20	$	$

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
67	D8	SSP 68	Reconnect Water Services (all sizes)	each	2	$	$
68	D12 OPSS 493	SSP 69	Temporary Water Supplies	LS	1		$
69	D14 OPSS 441, 702	SSP 70	Tracer Wire	LS	1		$
70	D13 OPSS 441	SSP 71	Watermain Disinfection & Testing	LS	1		$
			Subtotal Section D				**$**

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
Section E - Illumination							
71	OPSS 602	SSP 72	Installation of Junction Boxes - (Supplied by Region)				
			a) Install 330 X 600mm junction box for Street lighting	each	24	$	$
			b) Install 330 X 600mm junction box for Fibre interconnect	each	7	$	$
72	OPSS 603	SSP 73	Supply and Install Rigid Ducts, Direct Buried				
			a) 1 x 50mm	m	720	$	$
			b) 2 x 50mm in common trench	m	530	$	$
73	OPSS 603	SSP 73	Supply and Install Rigid PVC Conduit Embedded in Bridge Structure c/w expansion joints, junction boxes				
			a) 1 x 50mm	m	45	$	$
			b) 2 x 50mm	m	90	$	$
74	OPSS 604	SSP 74	Supply and Install Low Voltage Cables, in Ducts				
			a) # 6 AWG RWU90	m	2,290	$	$
			b) # 2 AWG RWU90	m	120	$	$
75	OPSS 604	SSP 74	Supply and Install Low Voltage Cables, Aerial on Messenger Cable - 3 x #6 AWG RW90 + #6 IGRD c/w Messenger Cable	m	265	$	$
76	OPSS 609	SSP 75	Supply and Install Ground Wires - # 6 IGRD	m	810	$	$
77	OPSS 609	SSP 75	Supply and Install Ground Electrodes including all wires necessary for connection - 20mm dia. x 3.0m Copper rod	each	15	$	$
78	OPSS 615	SSP 76	Install 9.8m Aluminum pole on bridge structure (Supplied by Region)	each	2	$	$

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
79	OPSS 615	SSP 76	Install Sectional Steel Poles, Direct Buried in Earth (Supplied by Region)				
			a) 7.3m Sectional Steel Poles, (Supplied by Region)	esch	1	$	$
			b) 10.5m Sectional Steel Poles, (Supplied by Region)	esch	13	$	$
80	OPSS 617	SSP 77	Supply and Install Roadway Lighting Luminaires and Bracket Assemblies				
			a) 160W Philips Roadview LED Luminaire	each	42	$	$
			b) 3.0m bracket	each	25	$	$
81	OPSS 614	SSP 78	Supply & Install of power supply Control Cabinet Assemblies	each	1	$	$
82		SSP 74	Install Interconnect cable c/w with Tracer wire (Cable will be supplied by Region)	m	1110	$	$
83	OPSS 610	SSP 79	Remove and dispose of Existing luminaire, arm and associated wiring	LS	1		$
			Underpass Illumination				
84	OPSS 602		Supply & Install Electrical Handholes 600x600mm	each	2	$	$
85	OPSS 603		Supply & Install 50mm Rigid Ducts, Direct Buried	each	120	$	$
86	OPSS 603		Supply & Install 35mm Dia. Rigid Ducts, surface mounted under the bridge structure with junction boxes c/w all accessories	LS	1		$
87	OPSS 604		Supply and Install Low Voltage Cables, in Ducts				
			a) 3-1/C#6 LV + #6 IGRD	LS	1		$
			b) 3-1/C#2 LV	m	45	$	$
88	OPSS 611	SSP 80	Supply and Install Underpass Lighting Luminaires	each	12	$	$
89	OPSS 609		Ground Electrodes	each	2	$	$
90	OPSS 614	SSP 81	Supply Control Cabinet Assemblies	each	1	$	$
91	OPSS 615		Sectional Steel Poles, Direct Buried in Earth	each	1	$	$
			Subtotal Section E				**$**

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
Section F - Provisional Items							
92	B23		Supply and Apply Calcium Chloride	t	10	$	$
93	B24		Application of Water for Dust Control	m3	12,000	$	$
94		SSP 82	15 MPa Concrete	m3	10	$	$
95	B1	SSP 83	Test Pits				
			a) By Excavator (< 2.0m)	each	20	$	$
			b) By Excavator (2.0 - 4.0m)	each	5	$	$
			c) by Hydrovac (all depths)	each	20	$	$
96	OPSS 401	SSP 84	Unshrinkable Fill	m3	100	$	$
97	B3	SSP 85	19 mm Clear Stone	t	100	$	$
98	B11	SSP 86	Milling Buried Asphalt	m2	700	$	$
99	B2	SSP 87	Trench or Road Sub Excavation	m3	500	$	$
100		SSP 88	Recycled Granular for Trench Backfill	m3	1,500	$	$
101		SSP 89	Paid Duty Police	hr	10	$	$
102	OPSS 309		Cold Mix for Temporary Restotations	t	100	$	$
103	B13		Replace Existing Frame and Grates	each	50	$	$
104	B3 OPSS		Granular B	t	200	$	$
105		SSP 90	Repair Existing Irrigation System As Required	each	2	$	$
106		SSP 91	Tree Trimming As Required	hr	10	$	$
107		SSP 92	PVC Pipes				
			a) 100 mm	m	20	$	$
			b) 150 mm	m	10	$	$

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
108		SSP 93	Adjust Utility Manholes and Chambers	each	5	$	$
109		SSP 95	Adjusting Existing Hydrants and Valves (all depths and lengths)	each	5	$	$
110		SSP 96	Plant Material				
			a) Sugar Maple - 60mm - cal.	each	20	$	$
			c) Common Hackberry - 60mm - cal.	each	20	$	$
			d) Allegheny Serviceberry - 2.5m ht	each	10	$	$
			e) Ivory Silk Lilac - 60mm - cal.	each	10	$	$
			Subtotal Section F				**$**

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
Section G - Structural Hwy 406 Underpass (Rehabilitation)							
111	OPSS 902		Earth Excavation for Structure	m3	75.0	$	$
112	OPSS 904		Concrete in Deck	LS	1		$
113	OPSS 904		Concrete in Parapet Walls	LS	1		$
114	OPSS 904		Concrete in Approach Slabs	LS	1		$
115	OPSS 905		Reinforcing Steel Bar	LS	1		$
116	OPSS 905		Stainless Steel Reinforcing Bar	LS	1		$
117	OPSS 908		Bicycle Railing	m	59.4	$	$
118	OPSS 913		Embedded Work in Structure (Ministry)	LS	1		$
119	OPSS 914	SSP 96	Bridge Deck Waterproofing	LS	1		$
120	OPSS 920	SSP 97	Deck Joint Assemblies, Installation	LS	1		$
121	OPSS 922	SSP 98	Bearings	LS	1		$
122	OPSS 928	SSP 99	Concrete Removal - Partial Depth - Type A	m3	9.5	$	$
123	OPSS 928	SSP 99	Concrete Removal - Partial Depth - Type B	m3	1.2	$	$
124	OPSS 928	SSP 99, 100	Concrete Removal - Partial Depth - Type C	m2	9.5	$	$
125	OPSS 928		Concrete Removal - Full Depth	m3	98.6	$	$
126	OPSS 928		Concrete Removal - Deck Joint Assemblies	LS	1		$
127	OPSS 929		Abrasive Blast Cleaning of Reinforcing Steel	m2	20.0	$	$
128	OPSS 932		Crack Injection	m	16.8	$	$
129		SSP 101	Dowels Into Concrete	each	500.0	$	$
130		SSP 102	Glass Fibre Reinforced Polymer Reinforcing Bar	LS	1		$
131		SSP 103	Jacking of Superstructure	LS	1		$

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
132		SSP 104	Repairs of soffit chair locations	LS	1	[redacted]	$
133		SSP 105	Surface Applied Corrosion Inhibitor	LS	1		$
			Subtotal Section G				**$**

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
Section H - Structural Hwy 406 Underpass (New Structure)							
134	OPSS 902		Earth Excavation for Structure	m3	298.0	$	$
135	OPSS 903		Supply Equipment for Driving Piles	LS	1		$
136	OPSS 903	SSP 106	H-Piles - HP 310X110	m	788.9	$	$
137	OPSS 903		Driving Shoes	each	35.0	$	$
138	OPSS 904		Concrete in Footings	m3	72.0	$	$
139	OPSS 904		Concrete in Substructure	LS	1		$
140	OPSS 904		Concrete in Deck	LS	1		$
141	OPSS 904		Concrete in Parapet Walls	LS	1		$
142	OPSS 904		Concrete in Approach Slabs	LS	1		$
143	OPSS 904		Concrete in Slope Paving	LS	1		$
144	OPSS 905		Reinforcing Steel Bar	LS	1		$
145	OPSS 905		Stainless Steel Reinforcing Bar	LS	1		$
146	OPSS 908		Parapet Wall Railing	m	59.4	$	$
147	OPSS 909		Prestressed Concrete Box Girders Fabrication	LS	1		$
148	OPSS 909		Prestressed Concrete Box Girders Delivery	LS	1		$
149	OPSS 909		Prestressed Concrete Box Girders Installation	LS	1		$
150	OPSS 913		Embedded Work in Structure (Utility)	LS	1		$
151	OPSS 914		Bridge Deck Waterproofing	LS	1		$
152	OPSS 920	SSP 97	Deck Joint Assemblies, Installation	LS	1		$

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
153	OPSS 922	SSP 98	Bearings	LS	1		$
154		SSP 102	Glass Fibre Reinforced Polymer Reinforcing Bar	LS	1		$
			Subtotal Section H				**$**

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
Section I - Traffic Signals (Martindale Road and Elderwood Drive)							
155		SSP 107	Traffic Signal Construction Layout - Site layout to be approved by Supervisor Traffic Signals prior to construction	LS	1	[redacted]	$
			Concrete Footings and Pads (NRS 2001)				
156	NRS 2001	SSP 107	Concrete Pole Bases (anchor assembly supplied by Region) (NRS 2002)				
			a) Type 1 - Concrete pole base - 1.22m deep	ea	1	$	$
			b) additional hydrovac excavation (Provisional)	ea	1	$	$
			c) Type 6 - Concrete pole base - 2.60m deep	ea	7	$	$
			d) additional hydrovac excavation (Provisional)	ea	7	$	$
157	NRS 2203-M	SSP 107	Concrete Controller Base (NRS 2003-M) including 1.0m x 1.0m x 150mm concrete pad at cabinet door				
			a) Type M - Concrete base for Traffic Controller Cabinet	ea	1.0	$	$
158		SSP 107	Conduit which includes fish rope, sweeps and all reinstatement				
			a) Supply and Install 1-100mm and 1-50mm PVC Conduit	m	210	$	$
			b) Supply and Install 1-50mm PVC Conduit (signal plant)	m	65	$	$
			c) Supply and Install 1-100mm PVC Conduit	m	15	$	$
			d) Supply and Install 2-100mm PVC Conduit	m	10	$	$
159		SSP 107	Cable - Install (Supplied by Region) Including sufficient length of cable for all connections and drip loops				
			a) Install 4 conductor cable (cameras, 3 section heads)	m	60	$	$
			b) Install 25 conductor cable (traffic signals)	m	235	$	$
			c) Install Beldon cable - black/red (audible push buttons)	m	420	$	$
			d) Install coaxial cable (vehicle pre-emption detector)	m	25	$	$
			e) Install Radar Detector Cable	m	240	$	$

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
160		SSP 107	Cable - Supply and Install				
			a) Supply and Install #6 cable - black/white (illumination underground)	m	265	$	$
			b) Supply and Install #6 cable - green (ground)	m	235	$	$
			c) Supply and Install #8 cable - black/white (power supply)	m	55	$	$
			d) Supply and Install 12/2 cable (illumination riser)	m	45	$	$
161	NRS 2020	SSP 107	Junction Boxes *(supplied by Region) (NRS 2020)*				
			a) Install 330 X 600mm junction box (signal plant)	ea	9	$	$
			b) Install 330 X 600mm junction box (interconnect)	ea	2	$	$
162		SSP 107	Poles including all necessary mounting hardware to be supplied by Region				
			a) Install Sectional Steel Poles - Direct Buried, Type 6 - 7.0m (power pole) (NRS 2130)	ea	1.0	$	$
			b) Install Spun Aluminum poles - Base Mounted, Type 1 - 4.0m tall (pedestrian pole)	ea	1.0	$	$
			c) Install Section steel poles - Base Mounted				
			i) Type 6 - 6.3m tall (signal pole w/o luminaire/camera)	ea	4	$	$
			ii) Type 6 - 10.5m tall (signal pole with luminaire/camera)	ea	3	$	$
163		SSP 107	Signal Mast Arms *(supplied by Region)* *Install traffic signal mast arm of appropriate length to position signal head at standard location*				
			1.2m to 7.6m mast arm	ea	6	$	$
164			Luminaire Arms *(supplied by Region),* *Install luminaire mast arm of appropriate length at standard position and location*				
			0.6m to 3.0m arms	ea	3	$	$

CONTRACT NO. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Rd)
From Fourth Avenue
to Barton Street
In the City of St. Catharines

SCHEDULE OF TENDER UNIT PRICES

Item	Spec. No.		Item Description	Unit	Quantity	Unit Price	Amount
165		SSP 107	Grounding Rods				
			Supply and Install grounding rods including all wires necessary for	ea	9	$	$
166		SSP 107	Remove and salvage existing traffic signal and electrical equipment and to be delivered to Niagara Region Service Center	L.S.	1		$
			Subtotal Section I				**$**

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

TENDER SUMMARY

Section A - General	$
Section B - Roadwork	$
Section C - Storm Sewers	$
Section D - Watermain	$
Section E - Illumination	$
Section F - Provisional Items	$
Section G - Structural Hwy 406 Underpass (Rehabilitation)	$
Section H - Structural Hwy 406 Underpass (New Structure)	$
Section I - Traffic Signals (Martindale Road and Elderwood Drive)	$
TOTAL TENDER	$

STATEMENT "A"

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

TENDERER'S EXPERIENCE IN SIMILAR WORK

UNLESS THIS LIST IS PROPERLY COMPLETED, THE TENDER MAY BE DISQUALIFIED

YEAR COMPLETED	DESCRIPTION OF WORK	FOR WHOM WORK PERFORMED	VALUE

STATEMENT "B"

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

(a) Harmonized Sales Tax:

The Contractor shall **NOT** include any amount in his tender price for the Harmonized Sales Tax (H.S.T.). Any amount to be levied with respect to the H.S.T. will be included as a separate item on the payment certificate. The appropriate H.S.T. levy will be paid to the Contractor in addition to the amount approved by the Contract Administrator for work performed under the contract and will, therefore, not affect the amount of the contract. The Contractor will be required to make the appropriate remittance to Revenue Canada in accordance with the legislation.

i) Total Tender Price including contingency and excluding HST . $

ii) Estimated Cost of Harmonized Sales Tax..... $

iii) Total Contract Amount [(i) + (ii)] ..... $

iv) H.S.T. Registration Number: _____

_____ _____
Company Name **Contractor's Signature(s)**

_____
Address **Contractor's Seal**

Witnesses: _____

_____

STATEMENT "C"

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

ACCESSIBILITY REGULATIONS FOR CONTRACTED SERVICES CONFIRMATION FORM

If the nature of your business with the Regional Municipality of Niagara (the "Region") creates the opportunity that any of your staff, contractors or any others associated with you would interact with the public on behalf of the Owner, it is necessary that the Owner ensure those providing service on our behalf have received the Customer Service Training in order that we retain our compliance with the requirements of the *Accessibility for Ontarians with Disabilities Act 2005.*

Please sign below to ensure you are the person able to bind your company. Companies whose employee's role may require them to interact with the public on behalf of the Owner, shall receive the CUSTOMER SERVICE STANDARD TRAINING of the ACCESSIBILITY FOR ONTARIANS WITH DISABILITIES ACT 2005.

If you have any questions, please contact the **Accessibility Advisory Coordinator** at 905-980-6000, ext. 3252 or email **accessibility@niagararegion.ca**

Please enclose this form with your bid submission.

Company Name: _____

Signature of Authorized Individual: _____

Position: _____

AGREEMENT TO BOND

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

AGREEMENT TO BOND

We, the undersigned, hereby agree to become bound as surety for:

.....

.....

in a bond totalling One Hundred Percent (100%) of the contract amount, and conforming to the Instruments of Contract attached hereto, for the full and due performance and maintenance of the works shown as described herein if the Tender for

.....

.....

is accepted by the Owner. We also agree to bond as surety for the payment of the cost of all labour and materials for an amount equal to 100% of the contract sum used by the contractor in due performance of his work.

It is a condition of this Agreement that if the above mentioned Tender is accepted, application for a Performance Bond and Labour Materials Payment Bond must be completed with the undersigned within fourteen (14) days of acceptance of the tender related thereto, otherwise this Agreement shall be null and void.

Dated this _____ day of _____, 2019

_____
Name of Bonding Company

_____
Signature of Authorized Person Signing for Bonding Company

_____

(Bonding Company Seal)

_____
Position

FORM OF CONTRACT AGREEMENT

THIS AGREEMENT made in triplicate this _____ day of _____ 20 .

- BETWEEN -

THE REGIONAL MUNICIPALITY OF NIAGARA
1815 Sir Isaac Brock Way, P. O. Box 1042
Thorold, Ontario, L2V 4T7

Hereinafter called the "Region" (of the first part)

- AND –

CONTRACTOR NAME
Address

Hereinafter called the "Contractor" (of the second part)

WHEREAS on **(date),** the Region issued Tender # **(insert number)** (*if applicable* **and Addendum # (insert number) dated (date)** *[repeat for each Addendum])* for **(enter the description of work)** (the "Tender");

AND WHEREAS on **(enter date of Contractor's proposal)** the Contractor submitted a bid in response to the Tender (the "Bid");

AND WHEREAS the Region wishes to enter into an agreement with the Contractor for the services, as more particularly described in the Tender and the Bid, attached hereto as Schedule "A" and forming part of this Agreement (the "Services");

NOW THEREFORE THIS AGREEMENT WITNESSETH that in consideration of the premises and other good and valuable consideration, the sufficiency whereof is acknowledged hereby by the parties, the parties hereto agree with each other as follows:

1. The Contractor shall provide the Services pursuant to all the terms and specifications set out in Schedule "A". If there should be any conflict between the provisions of this Agreement and the provisions of Schedule "A", the provisions of this Agreement shall prevail.

2. The term of this Agreement shall commence _____.

3. The Region shall pay the Contractor for Services as outlined in Schedule "A".

4. If either party, acting reasonably, determines that the other party has failed to perform its obligations pursuant to this Agreement, then such party may terminate this Agreement upon giving at least thirty (30) days' written notice to the other party.

5. The Contractor shall indemnify and save harmless the Region, its elected officials, officers, employees and agents from and against any and all claims of any nature, actions, causes of action, losses, expenses, fines, costs (including legal costs), interest, or damages of every nature and kind whatsoever arising out of the negligence, errors, omissions, fraud or willful misconduct of the Contractor its officers, employees, agents and subcontractors, or any of them, attributable to or connected with the performance, non-performance or purported performance of the Contractor obligations pursuant to this Agreement, except to the extent that same is attributable or caused by the negligence of the Region, its officers, employees and agents, or any of them. Further, this indemnity shall survive the expiration or early termination of this Agreement and continue in full force and effect.

6. This Agreement together with its schedule constitutes the entire understanding between the parties. Any change, addition to, or waiver of the terms hereof must be specifically agreed upon, in writing, and signed by both parties. Failure on the part of either party to insist upon the strict observance of any of the terms and/or conditions herein shall not operate as a waiver of such party's right to require the future observance of any such terms or conditions.

7. This Agreement shall not be assigned, in whole or in part, by either party hereto without the prior written consent of the other party. This Agreement, all its covenants, promises and conditions shall enure to the benefit of and be binding upon the parties hereto and their respective permitted successors and assigns.

8. Either party may terminate this Agreement at any time, without notice, for just cause which shall include, without limitation, dishonesty, fraud, willful deceit or failure to properly fulfill the obligations hereunder where such failure is not remedied within ten (10) days after notice of same is given.

9. This Agreement shall be construed and interpreted in accordance with the laws of the Province of Ontario, Canada.

IN WITNESS WHEREOF the parties hereto have duly executed this Agreement.

(CONTRACTOR NAME)

Per: _____
Name:
Position:

Per: _____
Name:
Position:
I/We have authority to bind the Corporation.

THE REGIONAL MUNICIPALITY OF NIAGARA

Per: _____
Name:
Position:

Per: _____
Name:
Position:
I/We have authority to bind the Corporation.

SPECIAL PROVISIONS - GENERAL

(Refer to Niagara Peninsula Standard Contract Documents)

SPECIAL PROVISION - CONTRACT ITEMS

(Refer to Niagara Peninsula Standard Contract Documents)

SPECIAL PROVISIONS - SUPPLEMENTARY SPECIAL PROVISIONS

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road) from Fourth Avenue to Barton Street In The City of St. Catharines

SUMMARY OF SUPPLEMENTRY SPECIAL PROVISIONS

TABLE OF CONTENTS

SSP 1 GENERAL REQUIREMENTS

SSP 2 OPERATIONAL CONSTRAINT – GARBAGE/ RECYCLING PICKUP

SSP 3 OPERATIONAL CONSTRAINT (ENVIRONMENTAL) - MIGRATORY BIRD PROTECTION

SSP 4 OPERATIONAL CONSTRAINT (ENVIRONMENTAL) - CONTROL OF ASIAN LONG-HORNED BEETLE INFESTATION AND MANAGEMENT OF HOST TREES

SSP 5 OPERATIONAL CONSTRAINT – TRAFFIC RESTRICTIONS ON MILLED SURFACES

SSP 6 OPERATIONAL CONSTRAINT – ROADWAY DRAINAGE

SSP 7 AMENDMENT TO OPSS 313, NOVEMBER 2016

SSP 8 AMENDMENT TO OPSS 706, NOVEMBER 2016 - FREEWAY PAVING OPERATIONS

SSP 9 INFORMATION FOR VIEWING

SSP 10 OCCUPATIONAL HEALTH AND SAFETY ACT COMPLIANCE

SSP 11 AMENDMENT TO OPSS 206, NOVEMBER 2014

SSP 12 AMENDMENT TO OPSS 501, NOVEMBER 2014

SSP 13 USE OF AIR COOLED IRON BLAST FURNACE SLAG AS GRANULAR MATERIAL

SSP 14 AMENDMENT TO OPSS 1101, NOVEMBER 2014 - ADDITIONAL TEST RESULTS AND SAMPLES FOR PERFORMANCE GRADED ASPHALT CEMENT (PGAC)

SSP 15 AMENDMENT TO OPSS 1301, SEPTEMBER 1996

SSP 16 OTHER CONTRACTOR WITHIN OR ADJACENT TO THE LIMITS OF THE CONTRACT

SSP 17 PARTICIPATION IN THE ANNUAL LABORATORY CORRELATION PROGRAM

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In The City of St. Catharines

SSP 18 GENERAL REQUIREMENTS OF SAMPLES FOR QUALITY ASSURANCE, REFEREE AND OTHER TESTING BY THE OWNER OR THE OWNER'S AGENT

SSP 19 NATIONAL ENERGY BOARD (NEB) REGULATED PIPELINES

SSP 20 PRESERVATION OF EXISTING UTILITIES

SSP 21 GENERAL REQUIREMENTS FOR REFEREE TESTING

SSP 22 QUALITY CONFORMANCE REQUIREMENTS

SSP 23 PRE-CONSTRUCTION SURVEY

SSP 24 SITE OFFICE

SSP 25 CONSTRUCTION SIGNS, TRAFFIC CONTROL AND TRAFFIC MANAGEMENT PLAN

SSP 26 AS-CONSTRUCTED DRAWINGS

SSP 27 EARTH EXCAVATION (GRADING)

SSP 28 DISPOSAL OF CONTAMINATED SOILS

SSP 29 REMOVALS

SSP 30 REMOVAL OF CONCRETE DRIVEWAYS

SSP 31 REMOVAL OF CATCHBASINS, DITCH INLETS, MANHOLES REMOVAL OF SEWERS

SSP 32 REMOVE, SALVAGE AND RELOCATE CONCRETE PILLAR

SSP 33 TACK COAT

SSP 34 SUPERPAVE 19.0 FOR TEMPORARY RAMPS AND TEMPORARY ASPHALT CURB AND GUTTER

SSP 35 SUPERPAVE 12.5 FC2

SSP 36 GRANULAR 'A' CRUSHED LIMESTONE

SSP 37 CONCRETE CURB AND GUTTER, ALL TYPES

SSP 38 PATTERNED COLOURED CONCRETE DRIVEWAY

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In The City of St. Catharines

SSP 39 CONCRETE SIDEWALK

SSP 40 COLOURED CONCRETE ISLANDS

SSP 41 PIPE SUBDRAIN

SSP 42 PAVEMENT MARKING OBLITERATING – BY ABRASIVE BLASTING

SSP 43 PAVEMENT MARKING

SSP 44 PAVEMENT MARKING (MTO)

SSP 45 PAVEMENT MARKING, TEMPORARY, FIELD REACTED POLYMERIC - FLUORESCENT ORANGE

SSP 46 REMOVE AND REINSTALL SIGNS

SSP 47 NEW PERMANENT SIGNS

SSP 48 ADVANCED NOTIFICATION/WARNING/DETOUR ROUTE TC-64 SIGNS

SSP 49 SINGLE RAIL STEEL BEAM GUIDE RAIL

SSP 50 STEEL BEAM ENERGY ATTENUATING TERMINAL SYSTEM

SSP 51 ENERGY ATTENUATOR

SSP 52 ENERGY ATTENUATOR - TEMPORARY

SSP 53 CONCRETE BARRIER

SSP 54 CONCRETE BARRIER

SSP 55 MOVEABLE TEMPORARY CONCRETE BARRIER

SSP 56 100 MM IMPORTED TOPSOIL AND SOD

SSP 57 CATCHBASIN SEDIMENT TRAP

SSP 58 REPAIR EXISTING STORM SEWERS

SSP 59 CATCHBASINS AND MANHOLES

SSP 60 MANHOLES CATCH BASINS AND DITCH INLETS

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In The City of St. Catharines

SSP 61	**ADJUST MANHOLES AND CATCHBASINS INCLUDING CONCRETE COLLARS**
SSP 62	**OIL GRIT SEPARATOR**
SSP 63	**WATERMAIN**
SSP 64	**VALVES**
SSP 65	**CONNECTIONS TO EXISTING WATERMAINS**
SSP 66	**RELOCATE EXISTING HYDRANT AND SECONDARY VALVE**
SSP 67	**TRACER WIRE INCLUDING TESTING STATIONS**
SSP 68	**COMMISSIONING**
SSP 69	**INSTALLATION OF JUNCTION BOXES**
SSP 70	**SUPPLY AND INSTALL RIGID DUCTS, DIRECT BURIED**
SSP 71	**SUPPLY AND INSTALL LOW VOLTAGE CABLES, IN DUCTS**
SSP 72	**SUPPLY AND INSTALL GROUND WIRES**
SSP 73	**INSTALL ALUMINUM POLES ON BRIDGE STRUCTURE**
SSP 74	**SUPPLY AND INSTALL ROADWAY LIGHTING LUMINAIRES AND RACKET ASSEMBLIES**
SSP 75	**REMOVE AND DISPOSE OF EXISTING LUMINAIRE, ARM AND ASSOCIATED WIRING**
SSP 76	**UNDERPASS LUMINAIRES**
SSP 77	**SUPPLY CONTROL CABINET ASSEMBLIES**
SSP 78	**PLANT MATERIAL (PROVISIONAL ITEM)**
SSP 79	**15MPA CONCRETE (PROVISIONAL ITEM)**
SSP 80	**TEST PITS (PROVISIONAL ITEM)**
SSP 81	**SHORING AND BRACING LEFT IN PLACE (PROVISIONAL ITEM)**
SSP 82	**UNSHRINKABLE FILL (PROVISIONAL ITEM)**

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In The City of St. Catharines

SSP 83 19 MM CLEAR STONE (PROVISIONAL ITEM)

SSP 84 MILLING BURIED ASPHALT (PROVISIONAL ITEM)

SSP 85 TRENCH OR ROAD SUB-EXCAVATION (PROVISIONAL ITEM)

SSP 86 RECYCLED GRANULAR FOR TRENCH BACKFILL (PROVISIONAL ITEM)

SSP 87 PAID DUTY POLICE (PROVISIONAL ITEM)

SSP 88 INSULATE EXISTING WATERMAIN ON WATER SERVICES (PROVISIONAL ITEM)

SSP 89 DISPOSAL OF AC WATERMAIN (PROVISIONAL ITEM)

SSP 90 BRIDGE DECK WATERPROOFING

SSP 91 DECK JOINT ASSEMBLIES, INSTALLATION

SSP 92 BEARINGS

SSP 93 CONCRETE REMOVAL - PARTIAL DEPTH CONCRETE REMOVAL

SSP 94 CONCRETE REMOVAL -PARTIAL DEPTH TYPE C

SSP 95 DOWELS INTO CONCRETE

SSP 96 GLASS FIBRE REINFORCED POLYMER REINFORCING BAR

SSP 97 JACKING OF SUPERSTRUCTURE

SSP 98 REPAIRS OF SOFFIT CHAIR LOCATIONS

SSP 99 SURFACE APPLIED CORROSION INHIBITOR

SSP 100 H-PILES (1) – HP 310 X 110

SSP 101 TRAFFIC SIGNALS

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In The City of St. Catharines

SSP 1 GENERAL REQUIREMENTS

Construction Schedule

The contractor shall supply a detailed construction schedule at the pre-construction meeting to meet working days specified. The schedule shall show in a clear critical path diagram the proposed progress of all activities for the main items of the contract, including key milestones, interim completion dates and completion of work within the specified time allowed.

Occupational Health and Safety

The Contract Administrator will require copies of any Incident or Accident Reports related to the Project.

In accordance with the General Conditions of Contract, Section GC 7.01.08, the Contractor is hereby requested to submit a copy of its Health and Safety Policy and Program to the Contract Administrator prior to the Pre-Construction Review Meeting.

All procedures in the "Safe Work Procedures for Excavating in the Vicinity of Underground Electrical Plant" guide book must be adhered to. Any associated costs are deemed to be included in the tender items.

Operations

The Contractor shall be responsible to obtain all required inspections and permits before commencing construction operations, including any associated application fees, with the exception of the permits which will be provided by the Region:

Region Provide

- MECP Storm Sewers
- MECP Oil Grit Separators

Contractor to Obtain

- MTO Encroachment Permit
- City of St. Catherine's Noise by-law exemption

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In The City of St. Catharines

SSP 2 OPERATIONAL CONSTRAINT – GARBAGE/ RECYCLING PICKUP

Garbage Pickup

The Contractor shall maintain access for garbage and recycling pickup at normal pickup location or move garbage/ recycling from within the work zone to accessible location.

No additional payment shall be made for the above work.

SSP 3 OPERATIONAL CONSTRAINT (ENVIRONMENTAL) - Migratory Bird Protection

MTO 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

SSP 4 **OPERATIONAL CONSTRAINT (ENVIRONMENTAL) - CONTROL OF ASIAN LONG-HORNED BEETLE INFESTATION AND MANAGEMENT OF HOST TREES**

MTO 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).

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In The City of St. Catharines

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.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In The City of St. Catharines

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

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.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

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:

1. 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:

   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 and

2. 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

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

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 Disco Rd. in the City of Toronto; or

☐ 2699 Drew 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

SSP 5 OPERATIONAL CONSTRAINT – Traffic Restrictions on Milled Surfaces

The following special provision applies to work within MTO ROW:

MTO Special Provision

The Contractor shall be permitted to run traffic on milled pavement surfaces for a maximum of seven (7) calendar days.

Traffic shall be permitted on milled shoulders for a maximum of zero (0) calendar days on Highway 406.

Further to the above, the following additional restrictions shall apply:

- Traffic shall be returned onto asphalt paved surface prior to winter shutdown.

Should the Contractor run traffic on milled surface over and beyond the specified allowable maximum number of calendar days without the approval of the Ministry, a deviation will be assessed on the ground of disregarding the construction requirements.

The deviation will impact on the assessment of Contractor performance.

If the Contractor does not comply with the traffic restrictions on milled surface within three Business Days after the deviation has been assessed, the Ministry may take other action it deems necessary.

The Contractor shall ensure that milled pavement surfaces are kept clear of all refuse. The Contractor shall sweep the milled pavement surfaces, at no additional cost to the Owner. The Contract Administrator shall be the sole judge in determining when additional sweeping is required on milled pavement surfaces, at no additional cost to the Owner.

SSP 6 OPERATIONAL CONSTRAINT – Roadway Drainage

MTO 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.

SSP 7 SEASONAL SHUTDOWN

MTO Special Provision No. 199F37 May 24, 2018

1.0 Scope

This Special Provision covers the requirements for the seasonal shutdown of construction operations prior to the transfer of the Roadway to the Owner.

2.0 General

For the purposes of this Contract, seasonal shutdown shall be the period from:

Scheduled Winter Shutdown Periods	
Central Region	Dec. 1 - May 15
Notes: 1. Dates are approximate and should be scheduled to the nearest Monday/Sunday as detailed below. 2. Start Winter Shutdown on nearest Monday. End Winter Shutdown on nearest Sunday.	

At the commencement of the seasonal shutdown period, all permanent highway lanes, shoulders, structures and interchange ramps which were in place prior to the start of construction, their reconstructed counterparts, or the lane configuration specified in the Contract Documents for the seasonal shutdown period, shall be open to traffic and shall remain unrestricted at all times to public traffic during the seasonal shutdown period.

The Contractor's Critical Path Schedule shall at all times reflect the seasonal shutdown Contract requirements as defined in this Special Provision.

The Contractor shall schedule and carry out operations in accordance with Seasonal Shutdown Requirements, including the construction and/or removal of any temporary transitions between the existing pavement structure and the new pavement structure.

All hot mix paving work performed by the Contractor to meet seasonal shutdown requirements, that does not meet the full requirements of OPSS 313, shall be considered temporary paving and all costs associated with the placement and subsequent removal of the temporary pavement shall be at the Contractor's expense.

3.0 Seasonal Shutdown Requirements

The requirements in this Special Provision are additional to seasonal shutdown requirements specified elsewhere in the Contract Documents and shall not relieve the Contractor of any other requirements contained in the Contract, without the written approval of the Contract Administrator.

All operations shall be completed to the satisfaction of the Contract Administrator and as follows:

a) The minimum acceptable pavement structure for seasonal shutdown will be either the existing full depth pavement structure or the new proposed pavement structure up to and including the upper binder course.

b) No vertical pavement drop-offs will be permitted except on closed portions of the Roadway(s) separated from public traffic by temporary concrete barrier or other approved barrier system. Operations shall be carried out and scheduled according to these requirements, including the construction or removal or both of any temporary transitions between the existing pavement structure and the new pavement structure.

c) All pavement marking obliteration that is required to remove temporary pavement markings on a surface other than the final pavement surface shall be completed by grinding using equipment as specified in the DSM listing for Line Removal Systems, Pavement Markings, or by abrasive blasting, using equipment and material as specified in the DSM listing for Line Removal Systems, Pavement Markings. If the temporary pavement markings are on the final pavement surface, all required pavement marking obliteration shall be completed by abrasive blasting, using equipment and material as specified in the DSM listing for Line Removal Systems, Pavement Markings.

d) Pavement markings to be left in place during seasonal shutdown shall be painted markings only and shall have had a second application of paint according to the requirements specified elsewhere in the Contract Documents.

e) All guide rail systems that are to remain in place during seasonal shutdown shall be installed to the elevation requirements for the pavement surface that will be in place during seasonal shutdown. The shoulders shall be graded to reflect the required guide rail height. Sufficient room on the posts shall be left to allow for adjustment to final guide rail height.

4.0 Basis of Payment

Compensation for all work associated with the seasonal shutdown requirements specified above shall be deemed to be included in the Contract price for the appropriate tender items and no additional payment shall be made.

SSP 8 AMENDMENT TO OPSS 313, NOVEMBER 2016

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 103F03 October 2018

OPSS 313, November 2016, Construction Specification for Hot Mix Asphalt - End Result, is deleted in its entirety and replaced with the following:

313.01 SCOPE

This specification covers the requirements for the placement, compaction, and acceptance of hot mix asphalt (HMA).

This specification also covers the requirements for the placement, compaction, and acceptance of HMA produced using warm mix asphalt (WMA) technology when the item title includes "Warm Mix".

313.02 REFERENCES

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 308 Tack Coat

Ontario Provincial Standard Specifications, Material

OPSS 1101 Performance Graded Asphalt Cement

OPSS 1151 Superpave and Stone Mastic Asphalt Mixtures

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual
LS-100 Rounding-Off of Test Data and Other Numbers
LS-101 Calculation of Per Cent within Limits
LS-262 Bulk Relative Density of Compacted Bituminous Mixtures
LS-264 Theoretical Maximum Relative Density of Bituminous Paving Mixtures
LS-265 Determination of Percent Air Voids in Compacted Dense Bituminous Pavement Mixtures
LS-266 Determination of VMA in Compacted Bituminous Mixtures
LS-282 Quantitative Extraction of Asphalt Cement and Analysis of Extracted Aggregate from Bituminous Paving Mixtures
LS-291 Quantitative Extraction of Asphalt Cement and Mechanical Analysis of Extracted Aggregate from Bituminous Paving Mixtures - Ontario Procedure
LS-292 Quantitative Determination of Asphalt Cement Content by Ignition and Analysis of Remaining Aggregate from Bituminous Paving Mixtures
LS-294 Measuring Pavement Lift Thickness
LS-306 Bulk Relative Density of Compacted Bituminous Mixtures Using Paraffin Coated Specimens
LS-317 Determination of the Severity of a Segregated Asphalt Pavement Surface
LS-604 Relative Density and Absorption of Coarse Aggregate
LS-605 Relative Density and Absorption of Fine Aggregate

ASTM International

D 6752-11 Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method
E 178-16 Standard Practice for Dealing with Outlying Observations

American Association of State Highway and Transportation Officials (AASHTO)

M 320-17 Standard Specification for Performance Graded Asphalt Binder
R 35-17 Superpave Volumetric Design for Hot - Mix Asphalt
T 166-16 Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
T 283-14 Standard Method of Test for Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage
T 305-14 Determination of Draindown Characteristics in Uncompacted Asphalt Mixtures
T 312-15 Standard Method of Test for Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor

313.03 DEFINITIONS

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

Ambient Air Temperature means the air temperature measured in the shade and away from the paving operations.

Anti-Stripping Treatment (AST) means a treatment used to minimize stripping of asphalt cement from HMA aggregates as defined in OPSS 1151.

Asphalt Cement (AC) means asphalt binder as defined in OPSS 1101.

Attribute means one of the following properties: designated large sieve (DLS), 4.75 mm sieve, 75 µm sieve, AC content, air voids, lift thickness, VMA, draindown, or compaction.

Binder Course means a HMA course between a surface course and either a granular base course or stabilized base course, an existing pavement, or another HMA binder course.

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.

Design Lift Thickness (T_D) means the thickness in millimetres as specified in the Contract Documents of:

a) A specified lift of asphalt mix measured by square metres, or
b) For multiple binder course lifts of the same mix type, it means the combined specified thicknesses in millimetres of the successive binder course lifts of the same mix type, at the same location measured by square metres.

Designated Large Sieve (DLS) means a sieve size specifically designated for each mix type for gradation testing. The designated sieve for the following mix types is:

a) 25.0 mm for Superpave 37.5;
b) 19.0 mm for Superpave 25.0;
c) 12.5 mm for SMA 19.0 and Superpave 19.0;
d) 9.5 mm for SMA 12.5 and Superpave 12.5, 12.5FC 1 and 12.5FC 2; and
e) 4.75 mm for SMA 9.5 and Superpave 9.5.

Draindown means that portion of SMA mixture, fines and AC, that separates and flows downwards through the mixture.

Fat Spot means an area of pavement where asphalt mastic has migrated to the surface creating a substantially blacker area than the surrounding pavement.

Field Adjustment to the JMF means a change in the target gradation, AC content, or both of a mix, within limits as specified in the Contract Documents without a redesign of the HMA, resulting in an adjusted JMF.

Hot Mix Asphalt (HMA) means hot mixed, hot laid asphaltic concrete and includes mix produced using WMA technologies. HMA may include recycled or specialty mixes.

Hot Mix Asphalt Miscellaneous means HMA that is placed in areas other than the roadway as specified in the Contract Documents.

Job Mix Formula (JMF) means the percentage passing on each designated sieve of the total mass of aggregate and the amount of AC as a percentage by mass of the mixture that are based on mix design procedures as specified in the Contract Documents.

Joint means a vertical contact between a HMA pavement course and any HMA pavement or any rigid object that exists at the time the HMA is laid.

Levelling Course means a HMA course of variable thickness used for correcting crossfall and profile deficiencies in the existing pavement prior to placing an HMA binder or surface course. Levelling course may also be referred to as a padding course.

Lift Thickness means the thickness in millimetres of: a) A single lift of asphalt mix measured by square metres, or b) For multiple binder course lifts of the same mix type, it means the combined thickness of all placed and compacted successive binder course lifts of the same mix type, at the same location measured by square metres.

Loose Mix means a representative sample of uncompacted HMA for testing mix properties.

Lot means a specific quantity of Material or a specific amount of construction.

Mean means the arithmetic average of the test results within a lot.

Mid-Lane Segregation means a continuous or discontinuous longitudinal “streak” of segregation, typically no greater than 300 mm in width located anywhere across the width of the lane.

Mix Properties means the AC content, gradation, air voids, and VMA.

Other Segregation means discrete areas or patches of regular, irregular, or chevron shape segregation.

Outlier means a test result that for a specific significance level is determined by statistical analysis not to be part of the test result population.

Padding means a HMA layer used to eliminate transverse and longitudinal irregularities on an existing surface before placing the binder or surface course.

Paving in Echelon means two or more pavers are used to pave multiple adjacent lanes simultaneously.

Payment Adjustment Sieves means the DLS, 4.75 mm, and 75 µm gradation sieves.

Per Cent within Limits (PWL) means an estimate of the percentage of the lot that is within specification limits, determined by using the mean and standard deviation of the lot.

Performance Graded Asphalt Cement (PGAC) means an asphalt binder that is produced from petroleum residue, either with or without the addition of non-particulate modifiers, according to AASHTO M 320.

Quality Assurance (QA) means a system or series of activities carried out by the Owner to ensure that Materials received from the Contractor meet the requirements as specified in the Contract Documents.

Quality Control (QC) means a system or series of activities carried out by the Contractor to ensure that Materials supplied to the Owner meet the requirements as specified in the Contract Documents.

Random Sample means a sample from a location chosen by the Contract Administrator based on random numbers such that any portion of a lot or sublot has an equal probability of being selected.

Reclaimed Asphalt Pavement (RAP) means the processed HMA material that is recovered by partial or full depth removal.

Roof Shingle Tabs (RST) means ground roof shingle scrap generated when new shingles are trimmed during production.

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.

Standard Deviation means the square root of the value determined by summing the squares of the difference between each test result and the mean of the test results divided by the number of test results minus one.

Stone Mastic Asphalt (SMA) means HMA consisting of a gap graded, stone-on-stone coarse aggregate skeleton with an asphalt cement-rich mortar.

SMA Mixes means SMA 9.5, SMA 12.5, and SMA 19.0.

Straight Edge means a straight edge made of metal with a level recessed in its upper surface parallel to the lower edge.

Superpave means a system for specifying material components and asphalt mix design using the Superpave gyratory compactor. It is an acronym for Superior Performing Asphalt Pavements.

Surface Course means the HMA wearing course of any flexible or composite pavement.

Through Lane means a traffic lane not intended for entering or exiting the roadway and does not include shoulders. Where there is more than one roadway, through lane refers to the traffic lane for the higher-class roadway.

Vertical Surface means all edges of concrete curbs, catch basins, appurtenances, longitudinal joints, and transverse joints for application of joint painting material.

Voids means air voids and voids in mineral aggregate (VMA).

Warm Mix Asphalt (WMA) means warm mixed, warm laid asphaltic concrete produced using technologies that allow for the mixing, handling and compaction of the asphaltic concrete mixture at a temperature typically 20 to 50 °C lower than conventional HMA.

313.04 DESIGN AND SUBMISSION REQUIREMENTS

313.04.01 Submission Requirements

Prior to the start of paving, the purchase price of the AC, in the form of a purchase order or other document signed by the Contractor's senior financial officer, shall be submitted to the Contract Administrator.

If the Contractor intends to store hot mix production in a silo, the planned times of hot mix production shall be provided to the Contract Administrator with 1 Business Day advance notice.

Prior to the start of paving on bridge decks, the mass of the rollers, except for Class V rollers, to be used on bridge decks, shall be submitted to the Contract Administrator in writing. The minimum compaction temperature for HMA or WMA recommended by the AC supplier shall also be submitted to the Contract Administrator in writing.

A copy of the Technical Data Sheet and Safety Data Sheet of the release agent(s) shall be submitted to the Contract Administrator.

313.05 MATERIALS

313.05.01 Hot Mix Asphalt

HMA shall be according to OPSS 1151. Asphalt cement, tack coat, anti-stripping treatments, release agents, and other additives shall be compatible with the other components of the hot mix asphalt.

313.05.02 Tack Coat

Tack coat shall be according to OPSS 308.

313.05.03 Release Agents

No release agents shall be used that may adversely affect the quality or performance of the HMA. Release agents shall be used according to the proprietary requirements.

Petroleum based release agents, excess water, or excess release agents shall not be used.

313.05.04 Warm Mix Asphalt

WMA shall be according to OPSS 1151 and the following:

The mix shall be produced at a facility capable of producing the mix according to the WMA technology supplier's instructions for the use of their WMA technology. All information required for the proper preparation, handling, storage, and use of the WMA materials shall be obtained from the WMA technology supplier.

313.05.05 Grit for Stone Mastic Asphalt

Grit for SMA shall be as specified in the Contract Documents.

313.06 EQUIPMENT

313.06.01 Rollers

A Class R Roller is a self-propelled pneumatic-tired roller.

A Class S Roller is self-propelled steel-drum, tandem, or three-wheel roller.

A Class V Roller is a self-propelled vibratory roller specifically designed for HMA compaction having either dual vibratory rolls or a combination of vibratory roll and pneumatic tires with a contact area equal to or greater than 70% of the roll width.

313.06.01.01 Rollers for Granular Grade Preparation

Finish rolling for granular grade shall be accomplished using, as a minimum:

a) A Class S roller with a minimum mass of 7 tonnes and minimum mass of 3.5 kg per mm total roll width, or
b) A Class V roller with a drum width of at least 1.2 m.

313.06.01.02 Rollers on Bridge Decks

Compaction shall be accomplished using, as a minimum:

a) A Class S roller with a minimum mass of 9 tonnes and minimum mass of 4.5 kg per mm total roll width, and
b) A Class R roller with a minimum mass of 18 tonnes and minimum mass of 2,500 kg per tire.

If Class V rollers are used, they shall be used in static mode.

At the Contract Administrator's request, rollers shall be weighed in the presence of the Contract Administrator or a representative.

313.06.02 Diamond Grinding

A diamond grinder shall be power-driven, self-propelled, and designed for grinding HMA. It shall be equipped with a grinding head with at least 50 diamond blades per 300 mm of shaft. The grinding head shall be at least 0.9 m wide. The grinder shall be equipped with the capability to adjust the depth, slope, and crossfall to remove HMA to the required profile and shall also include a slurry pick-up system.

313.07 CONSTRUCTION

313.07.01 Quality Control

QC procedures shall be conducted to ensure HMA meets the requirements of the Contract Documents. Interpretation of QC inspections, test results, and measurements and the determination of any action to be taken shall be carried out to ensure that the work is according to the requirements of the Contract Documents.

A single sample for QC purposes may be obtained at the same time and location as QA acceptance samples. No additional loose mix samples shall be taken from the placed mix.

If the Contractor wishes to obtain additional samples for QC purposes, up to three cores may be taken in each surface lot. For binder courses, the Contractor shall be permitted to obtain one thickness core for their use from each sublot for each binder lift, prior to placement of the surface course. Cores shall not be spaced closer than 1 m from any other core. If further additional samples are required, a written request shall be made to the Contract Administrator, and samples shall only be taken upon written approval of the Contract Administrator. All sample locations shall be restored as specified in the Contract Documents.

313.07.02 Laboratory Correlations

On request, the Contract Administrator shall provide the opportunity to conduct a correlation of mix properties or compaction or both between the QA and QC laboratories prior to placement of HMA. The correlation may occur once for each mix type and shall be a maximum of 3 samples per mix type.

The Contract Administrator shall be provided with the samples and all information required to conduct the correlation testing. The Contract Administrator shall provide the QA test results on completion of the correlation testing.

313.07.03 Preparation of Foundation and Existing Pavement

Prior to placing any course of HMA on:

a) A granular grade, a Class S roller or an equivalent Class V roller shall be used to finish roll the grade ahead of the paver. The granular grade after rolling shall be a compacted, smooth, float-free surface, free from contamination of foreign materials. Any distortion that will impact the specified thickness of the pavement to be placed shall be repaired.

b) HMA or concrete surfaces, the HMA and concrete surfaces shall be clean and free of all loose, broken, and foreign materials.

c) Milled surfaces, the milled surface shall be clean of all loose, broken, and foreign materials and shall be swept with a power broom.

The Contractor shall be responsible for preparing the existing surface to be paved by milling or padding or a combination, as the Contractor deems necessary, to place and compact each lift to the thickness as specified in the Contract Documents, provided such corrections do not reduce the thickness of existing pavement materials or underlying materials by more than 5 mm below the general profile of the surrounding existing unground or unmilled pavement surface.

313.07.04 Correction of Pavement Beneath Surface Courses

Unless otherwise specified in the Contract Documents, the Contractor may correct any pavement course underlying the surface course by padding, milling, grinding or a combination, in order to meet the surface smoothness requirements. Padding shall be completed using a mix type acceptable to the Owner. The thickness of those pavements after milling or grinding shall not be reduced by more than 5 mm below the general profile of the surrounding unground or unmilled pavement surface. The milled surface shall not exceed 25 mm from ridge to ridge, and the ridge to valley depth of the milled surface shall not exceed 10 mm.

313.07.05 Tack Coat

Tack coat shall be applied to surfaces according to OPSS 308 prior to placing HMA.

313.07.06 Transportation of Hot Mix Asphalt

Truck boxes used to transport HMA shall be clean and, if required, lightly coated with a uniform application of a release agent. Truck boxes shall be drained after each application and before loading.

313.07.07 Placing Hot Mix Asphalt

313.07.07.01 Operational Constraints

Paving shall not be carried out if the roadbed is frozen. When placing the mixture on a granular grade, the granular grade shall not be saturated and shall be free of standing water. The surface of a pavement upon which HMA is to be placed shall be clean and dry at the time of HMA placement.

For paving on bridge decks, an HMA course shall not be placed over the waterproofing membrane and protection board until a minimum 4 hours has elapsed following completion of the waterproofing system or, until the waterproofing system has set sufficiently that the integrity of the waterproofing system is not jeopardized.

An HMA course shall not be placed upon a previously laid course until the temperature of the previous course is 50 °C or less. For a HMA lift thickness of 60 mm or less, this temperature shall be measured at the surface. For a HMA lift thickness greater than 60 mm, this temperature shall be measured internally.

HMA binder courses shall be not placed unless the ambient air temperature is at least 2 °C. HMA surface courses shall not be placed unless the ambient air temperature is at least 7 °C.

Public traffic shall not be permitted on freshly laid HMA until the temperature of the mat is 50 °C or less.

When WMA is used, the WMA technology supplier's recommendations for placing the WMA mix shall be followed. Placement and compaction temperatures of WMA shall be according to the WMA technology supplier's recommendations but shall also meet the operational constraints listed in this clause.

313.07.07.02 Paving

313.07.07.02.01 General

Levelling, binder, and surface courses shall be laid by means of mechanical self-propelled pavers. Prior to roller compaction, obvious defects in the HMA placed shall be corrected. Irregularities in the alignment and grade along the outside edges shall be corrected. Excess HMA shall not be cast onto the surface of the freshly laid mat. After final compaction of each course the surface shall be smooth and true to the established crown and grade, uniform in texture and shall be free of any defects including segregation, fat spots, oil spills, chatter, and roller marks.

If the Contractor's actions fail to prevent continued medium or severe segregation regardless of cause, the Contract Administrator may instruct the Contractor to cease paving until the problem has been corrected.

All through lane paving courses shall be completed prior to the placement of adjacent sideroads, speed change lanes, and other paved areas.

HMA shall be placed and compacted to the thickness as specified in the Contract Documents for each lift.

At the end of each completed portion of the lanes and prior to opening them to traffic, the ends of completed sections of HMA course shall be temporarily ramped down to the existing pavement according to the Temporary

If paving is being carried out under lane closures, paving shall be completed to the same station for the full pavement width, including paved shoulders, prior to the roadway being reopened to traffic except as noted in the Partial Paving of Full Pavement Width clause.

313.07.07.02.02 Paving in Echelon

For the purpose of laying levelling, binder and surface courses as required under this Contract, paving in echelon shall not be used for Whole Contract.

When paving in echelon, the pavers shall be operated at the same time within 60 m of the next paver so that a hot joint is obtained between the lanes of HMA being placed. Should one paver break down while placing levelling, binder, or surface course, the Contract Administrator may permit the day's work to be completed with the remaining paver only.

313.07.07.02.03 Paving on Bridge Decks

The temperature of the HMA immediately after spreading shall be equal to or greater than the minimum temperature recommended by the AC supplier. When the HMA is produced using WMA technology, the temperature of the WMA immediately after spreading shall be equal to or greater than the minimum temperature recommended by the WMA technology supplier. Breakdown rolling shall commence immediately after spreading.

313.07.07.02.04 Paving Widenings and Irregular Sections

The HMA shall be placed in widenings such that the top of the compacted HMA is placed to the top of the existing pavement. When stepped joints are specified in the Contract Documents, the layers placed in the widening shall be placed to the top of each step in separate operations. HMA shall be placed in the widening using equipment specially designed for this purpose.

In turnouts, driveways, and other irregular sections, other methods may be used to spread and finish the HMA.

313.07.07.02.05 Partial Paving of Full Pavement Width

Partial paving of the full pavement width is permitted except with the conditions listed below.

Partial paving of the full pavement width is not permitted when one or more of the following conditions exist:

a) When the ramping height would be greater than 50 mm,

b) At the longitudinal edges that will form the hot joint of lanes to be paved in echelon when specified under the Paving in Echelon clause, or

c) The pavement slope would cause water to accumulate at the edge of the ramping and extend onto an adjacent lane or shoulder that will be open to traffic.

When partial paving of the full pavement width is permitted, temporary longitudinal and transverse ramp downs shall be placed regardless of the difference in height elevations between adjacent pavement surfaces.

313.07.07.02.06 Temporary Ramp Downs

HMA 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 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 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. Temporary ramp downs shall remain intact and in place until they are removed prior to paving the adjacent section.

Temporary ramp downs shall be removed to produce a straight clean vertical surface for the full depth of the course prior to paving the adjacent lane or shoulder. After removal of the temporary longitudinal ramp down, traffic shall not be permitted to cross over the vertical surface at the longitudinal edge before the adjacent paving is completed.

313.07.07.03 Longitudinal and Transverse Joints

313.07.07.03.01 General

All joints shall be made to obtain a complete bond between the two pavement edges and a smooth riding surface. The existing or previously placed pavement edge shall be a straight clean vertical surface for the full depth of the course. Where ramping or damage has occurred, trimming shall be required. All dirt or other foreign material and all loose material shall be removed from all vertical surfaces.

313.07.07.03.02 Longitudinal Joints

The longitudinal joints shall be parallel to the lane and visually uniform longitudinally. The width of subsequent courses shall be staggered to an offset of 150 to 300 mm so that longitudinal joints do not coincide. 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.

313.07.07.03.03 Transverse Joints at Limits of Paving

Joints between HMA pavement laid under this Contract and existing HMA courses not laid under the Contract shall be constructed as follows:

a) Where a binder course is placed flush against an existing HMA pavement and a butt joint is to be made, the existing pavement shall be trimmed back to form a straight vertical surface.

b) Where a surface course is placed flush against an existing HMA pavement, a butt joint shall be prepared by removing the existing pavement to the full depth of the existing surface course, to form a straight vertical surface, and for a longitudinal distance not less than 5 m so that the surface course placed has a thickness equal to the full depth of the existing surface course over the 5 m section.

c) Where a binder course and surface course are not placed flush against an existing HMA pavement, the binder course shall be feathered out removing the existing surface course to a minimum depth of not less than 40 mm, to form a straight vertical surface, and for a longitudinal distance not less than 5 m so that the surface course placed has a minimum thickness of 40 mm over the 5 m section.

d) Where multiple courses are placed flush against an existing HMA pavement, the joint for each course shall be offset at least 150 mm from the joint on the course below.

313.07.07.04 Compaction

Compaction of the HMA shall be conducted using appropriate methods and equipment to provide a uniformly compacted mat according to the requirements of this Contract. Class R rollers shall not be used to compact SMA.

At all places not accessible to rollers, the HMA shall be compacted by mechanical self-powered gas-, electric-, or air-powered equipment.

313.07.07.05 Gritting of Stone Mastic Asphalt

Hot grit shall be embedded in the SMA surface as specified in the Contract Documents.

313.07.08 Field Adjustments to the Job Mix Formula

The Contractor shall be permitted to adjust the JMF to more closely reflect the mix being produced. The number of field adjustments to the JMF shall be limited to three for each mix design submitted, one prior to the start of production and a maximum of two during production. Field adjustments to the JMF shall be limited in scope such that the net impact of all field adjustments to the JMF does not exceed any of the maximum field adjustments to the JMF in Table 1 in comparison to the original JMF submitted under the current mix design.

JMF adjustments shall not be accepted once placement of the specific mix type has been completed. The adjusted JMF shall be submitted in writing on a form supplied by the Contract Administrator. Upon receipt of the JMF adjustment submission, the Contract Administrator shall give a written confirmation of receipt of the adjusted JMF. Within 1 Business Day of receipt of the JMF adjustment, the Contract Administrator shall give written notice confirming conformance to the Contract requirements or advising of any non-conformance. The revised JMF may be applied to the lot being placed at the time the confirmation of receipt of the revised JMF is issued and the previous lot, if requested by the Contractor as part of the written submission for a JMF change. If this request is not made, the revised JMF shall only apply to mix placed subsequent to the receipt of the revised JMF.

313.07.09 Sampling

313.07.09.01 Asphalt Cement

Samples of the AC shall be taken according to OPSS 1101.

When the selected WMA technology requires that additives be added to the AC, the samples for acceptance of the AC shall be taken after the additive has been added to the AC.

313.07.09.02 Hot Mix Asphalt Aggregates for Density Testing

The Contractor shall procure samples for RAP and the aggregates identified in the mix design for each mix type using methods as specified in the Contract Documents. The first set of samples shall be taken no later than 10 Days prior to the start of production of the first lot of HMA. Subsequent samples shall be taken immediately following the completion of 15,000 tonnes ± 1,000 tonnes of mix production, and thereafter at further intervals of 20,000 tonnes as required. The aggregate and RAP sampling program shall be established in consultation with the Contract Administrator prior to paving. If the Contractor determines that a sampling interval needs to be reduced to reflect changes in the aggregate properties, the Contract Administrator shall be notified, and samples shall be taken as warranted.

A set of two samples shall be taken. One of these samples shall be for QA testing and the other shall be for referee testing. Samples for QA and referee testing shall be obtained concurrently.

Each sample shall be clearly identified as to the date of sampling, the lot number, and the item hot mix tonnage being produced when the sample was taken.

313.07.09.03 Hot Mix Asphalt Mix Properties

Samples shall be appropriately labelled with the Contract number, highway number, Region, lot number, sublot number, mix type, lift number, station, and date and time of sampling.

The Contract Administrator shall advise the Contractor of each random sample location or the tonnage from which the sample is to be taken. A set of two samples shall be taken as per Table 2. One of these samples shall be for QA testing and the other shall be for referee testing. Samples for QA and referee testing shall be obtained concurrently.

When the mass of the sample does not meet the requirements of Table 2, the sample shall be discarded and a new one taken immediately.

The SMA sample for draindown testing shall coincide with one of the other sublot samples as designated by the Contract Administrator. The samples shall be transferred to a clean stainless steel bowl or pan of suitable size, immediately after splitting, for delivery to the QA laboratory.

If the Owner's QA laboratory chooses LS-292, the Contractor shall provide, for each mix design, two sets of samples consisting of:

a) 2 one-litre cans of AC,
b) 25 kilograms of each aggregate type, and
c) 1 kilogram of baghouse fines, if used in the mix design.

One sample is for Owner's QA testing and the other for referee testing for the purpose of ignition oven calibration, including aggregate correction factors. The samples shall be submitted to the Owner's QA laboratory at least 5 Business Days prior to the start of paving with the applicable HMA type. If materials have changed from the mix design, an additional two sets of samples, as detailed above shall be provided.

313.07.09.04 Compaction

Upon completion of each sublot, the Contract Administrator shall provide notification of each random sample location in writing. Pavement core samples shall be obtained in duplicate, from each sublot no later than the next Business Day after the completion of the sublot. Each core shall have a minimum nominal diameter of 150 mm and a maximum nominal diameter of 200 mm, and shall consist of the full layer being sampled and at least one underlying layer, if one is present. Cores shall not be taken within 250 mm of a longitudinal or transverse joint or the edge of pavement. Cores for compaction shall not be taken on bridge decks.

Each set of samples shall be taken from the same lane, same transverse offset, and at a spacing of 1.0 m $\pm$ 0.1 m between each individual core edge.

Care shall be taken to ensure that cores are not damaged during coring operations or in transit. If a core is damaged, a replacement core shall be extracted at a location adjacent to the original core.

Core samples shall also include design lift thickness on the label. The lot and sublot numbers shall be clearly marked with a permanent marker on all compaction cores.

HMA and compaction requirements for filling the sample holes shall be the same as the adjacent undisturbed pavement. Sample holes shall be cleaned, dried, and filled and then compacted using a mechanical self-powered gas-, electric-, or air-powered compactor immediately after sampling.

A 1 litre sample of the release agent(s) shall be delivered to the Contract Administrator upon request.

313.07.09.05 Warm Mix Asphalt

Samples of WMA shall be obtained at the paver from sublots according to Table 2 for moisture sensitivity testing. The sublots are to be selected randomly from the sublots identified for mix

properties by the Contract Administrator. These samples shall be designated for QA testing for moisture sensitivity as per AASHTO T 283. A complete sample data sheet shall accompany the samples. The data sheet shall also identify corresponding mix properties lot/sublot number and that the samples are for moisture sensitivity testing. Moisture sensitivity testing is required for information only.

313.07.09.06 Lift Thickness

For HMA items measured by square metres, single cores consisting of all lifts placed shall be used to evaluate the lift thickness of all lifts. Sample locations shall be determined based on the surface area of the upper most lift placed on the Contract.

All areas of hot mix paving within the Contract limits, including paved shoulders, shall be sampled for lift thickness with the following exceptions:

a) Detours and other temporary pavement.
b) Miscellaneous hot mix.
c) Bridge decks.

Upon completion of each sublot, the Contract Administrator shall provide notification in writing of the location to be used for sampling. One pavement core sample shall be obtained from each sublot not later than the next Day after the completion of the sublot. This one core shall be used for both QA and referee testing.

Each core shall have a nominal diameter of 50 mm and shall consist of all the hot mix lifts placed in the sublot and at least one underlying hot mix layer if one exists. Each core shall have its vertical side cored perpendicular to the upper surface of the core. Each sample shall be placed in a suitable container to protect the sample integrity during transport and until testing. The sublot number shall be clearly marked with a permanent marker on each core. In addition, the sample documentation as specified elsewhere in the Contract Documents shall also note the number of lifts for which the thickness measurements are required and mix type for each.

No replacement thickness cores shall be obtained for QA or referee testing. When a core thickness is reported as “indeterminate”, a new 150 mm core shall be taken centred over the sublot’s previously taken 50 mm core.

Holes resulting from the removal of thickness core samples shall be cleaned, dried and filled with a material acceptable to the Contract Administrator immediately after sampling.

313.07.10 Identification of Warm Mix Asphalt Paving Limits

When WMA is used, GPS coordinates for the WMA paving limits shall be submitted to the Contract Administrator no later than 7 Days after completion of WMA paving.

313.07.11 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

313.08 QUALITY ASSURANCE

313.08.01 Acceptance Criteria

Acceptance of HMA shall be based on the following criteria:

a) AC Physical Requirements
b) Mix Properties and Compaction
c) Surface Tolerance
d) Surface Appearance
e) Surface Smoothness
f) Lift Thickness
g) Geometrics and Longitudinal Joint Location

313.08.01.01 Asphalt Cement Physical Requirements

The Contract Administrator shall determine the acceptability of the AC according to OPSS 1101 and requirements specified elsewhere in the Contract Documents.

When the selected WMA technology requires that additives be added to the AC, acceptance of the AC shall be based on the samples that contain the WMA additive subject to the conditions as specified in the Contract Documents. The Contractor may request that an allowance be made for the impact of the WMA and AST on a PGAC grade for QA or referee purposes provided that when production begins the Contractor submits to the Contract Administrator complete AASHTO M 320 test results for the following:

a) AC with WMA and AST at the percentage identified in the mix design.
b) AC without the additives.

The combined allowance shall be limited to maximum 2 °C colder than the high temperature grade or maximum 2 °C warmer than the low temperature grade.

313.08.01.02 Mix Properties and Compaction

313.08.01.02.01 Lot Size

313.08.01.02.01.01 General

The Contract Administrator shall determine the size and location of the lots and sublots, after discussion with the Contractor and before HMA production for the tender item starts. Guidelines for the breakdown of the tender item quantity into lots are as listed in Table 3.

When only one or two sublots are completed at the end of paving for the tender item due to a change in the JMF or when a delay of more than 20 Business Days occurs in placing the complete lot, the test results obtained shall be considered as part of the previous lot and the previous lot shall then have 11 or 12 sublots. When only 3 to 9 sublots are completed due to the above circumstances, then the 3 to 9 sublots shall be considered as a lot.

When a delay of more than 20 Business Days occurs in placing the complete lot and this lot shall be completed during the same calendar year, the Contractor may, prior to the end of the 20 Business Days, request in writing to the Contract Administrator that the lot be continued upon the resumption of paving for that tender item. If the request is not made or is not accepted by the Contract Administrator, the lot shall be terminated and evaluated for acceptance.

313.08.01.02.01.02 Optional Surface Trial

When the surface hot mix tender item is 5,000 tonnes or more, an optional trial of one lot, not exceeding 500 tonnes, with one sublot shall be permitted. The trial shall be placed in a binder course, and the lift thickness shall not be greater than 60 mm. If the Contractor elects to place this optional trial, the Contract Administrator shall be advised in writing prior to placing the trial lot. The optional trial shall not be placed in a critical location such as bridge decks. The optional trial lot will be treated as a small quantity lot for basis of acceptance and payment.

313.08.01.02.01.03 Lot Size for Bridge Decks

Hot mix placed on a bridge deck should be treated as a separate lot. Where hot mix is placed in multiple stages, each stage shall be treated as a separate lot.

The lot shall be either a single sublot or divided into 3 approximately equal sublots as determined by the Contract Administrator, in consultation with the Contractor.

313.08.01.02.01.04 Lot Size for Tonnage Items

Lot size is generally 5,000 tonnes. Sublots are generally 500 tonnes, however, sublot sizes may be adjusted to ensure a minimum of 3 sublots per lot.

When the tendered item quantity is less than 1,000 tonnes, the sublots shall be determined by the Contract Administrator based upon such testing as is deemed necessary by the Contract Administrator to determine substantial conformance with the Contract.

313.08.01.02.01.05 Lot Size for Square Metre Items

For lift thicknesses in the order of 40 to 50 mm, lot size is generally 40,000 m² with sublots of 4,000 m², however, sublot sizes may be adjusted to ensure a minimum of 3 sublots per lot. For lift thicknesses in the order of 60 to 80 mm, the lot size would generally be adjusted to 25,000 m² with sublots of 2,500 m².

When the tendered item quantity is less than 4,000 m², the sublots shall be determined by the Contract Administrator based upon such testing as is deemed necessary by the Contract Administrator to determine substantial conformance with the Contract.

313.08.01.02.02 Acceptance Testing

The Owner shall conduct tests, carry out calculations and provide values according to Table 4. The Contractor shall be provided with results from the completed tests.

The QA laboratory shall conduct density tests for RAP and aggregates identified in the mix design for each mix type using methods as specified in the Contract Documents.

When new aggregate samples are received, QA testing on the new aggregate samples shall be conducted and the calculation of VMA for the subsequent lot(s) shall be based on the most recent samples submitted. When the Contractor notes a change in aggregate density and requests that new samples be obtained between routine random samples, the Contractor shall state in the sample request if the current lot will be closed, or if the lot will be completed and the new density tests results will not be used for calculation of VMA until the next lot.

313.08.01.02.03 Basis of Acceptance

Acceptance for all mixes for mix properties and compaction is based on the lot PWL for each attribute, excluding VMA. PWL shall be determined using lot test results, LS-101, and lower and upper limits as specified in Table 5. The PWL of the lot for each criterion shall be used to determine the payment adjustment factor from Table 6. If the PWL is less than 50% for AC content, air voids or compaction, or less than 25% for any payment adjustment sieve, the lot is

rejectable and shall be subject to repair or payment adjustment. VMA shall meet the minimum mix design requirements according to OPSS 1151 for each lot and payment shall be based on the lot mean as specified in the Payment Factor for Voids clause. If the VMA payment factor is less than 0.500, the lot shall be considered rejectable. SMA lots shall be considered rejectable if the draindown is more than 0.3%.

When the tendered item quantity is less than 1,000 tonnes, the HMA may be accepted by the Contract Administrator based upon such testing as is deemed necessary by the Contract Administrator to determine substantial conformance with the Contract. When 3 or more tests have been completed for a lot the Material shall be accepted at the full Contract price, subjected to a payment adjustment or rejected as specified in Contract Documents.

Any lot comprised of one or two sublots, shall not be subject to payment adjustment unless the mix is rejectable. Acceptance for these lots shall be on a sublot by sublot basis. The sublot shall be considered acceptable if the AC content, gradation, air voids, and compaction of each sublot comply with the limits specified in Table 5, and the VMA shall be no more than 0.50% below the design minimum. Mix that does not comply with the requirements shall be considered rejectable.

The Contract Administrator shall determine if a rejectable lot may remain in the work without repairs. When the Contract Administrator has determined that a rejectable lot may remain in the work without repair, the lot shall be subjected to an additional payment adjustment reflecting the extent of the non-conformance as determined by the Contract Administrator. If the Contractor elects to repair the lot in lieu of a payment adjustment, or if the Contract Administrator determines that a rejectable lot requires repair, the lot shall be repaired and re-evaluated as specified in the Repairs for Mix Properties and Compaction clause.

313.08.01.02.04 Referee Testing

A single request for referee testing for a given lot can only be invoked by the Contractor within 5 Business Days of the Contractor receiving the Contract Administrator's calculated QA payment factors for that lot. Referee testing for aggregate density can only be invoked by the Contractor within 5 Business Days of the Contractor receiving the test results for aggregate density.

For mix properties and compaction, the Contractor may request testing by a referee laboratory for the entire lot, or a maximum of two sublots from that lot. Referee testing shall fall into one of three categories:

a) Mix properties only,
b) Compaction only, or
c) Mix properties and compaction.

The Contractor may request referee testing for determining the draindown of a SMA sample.

The referee laboratory shall use the same test method as the QA laboratory except that when the QA laboratory chooses LS-292, the referee laboratory shall use that method provided the calibration requirements are met. If they are not met, the referee laboratory shall use LS-282.

When referee testing of mix properties is invoked, the referee laboratory shall conduct all necessary testing, with the exception of the combined aggregate density which shall be supplied by the Contact Administrator.

When referee testing for compaction is invoked, the referee laboratory shall determine the MRD of the loose mix sample for the sublot, and this value shall be used in the calculation of compaction for the referee core.

The results generated by the referee laboratory shall be used to re-evaluate the lot to determine the payment factors for the acceptance of the disputed properties for the disputed lots of HMA. The referee test results are binding on both the Owner and the Contractor.

313.08.01.02.05 Outliers in Referee Results

Where an entire lot of 3 or more sublots has been referee tested, the Contractor may question an individual value for any attribute of a sublot's test result, excluding VMA. The request shall be made within 3 Business Days of the Contractor receiving all of the test results for the lot, and only when the payment factor for the attribute with an outlier is less than 1.0. The validity of the questioned attribute shall be ascertained in accordance with ASTM E 178 using a T test at a 10% significance level.

If the T test procedure shows that the questioned value of the attribute is not an outlier, then the test result shall be used in the calculations. If the T test procedure shows that the questioned value of the attribute is an outlier, then the test result for the sublot shall be checked for mathematical errors. If there are no mathematical errors, the sublot with the outlier is treated as a lot with one sublot and the remaining sublots shall form a separate lot with no further consideration for outliers.

If only two sublots remain, the two sublots shall be treated as two separate lots each with one sublot.

313.08.01.03 Surface Tolerance

The surface tolerances of any pavement 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 surface of the pavement:

a) Greater than 6 mm for all binder courses, levelling courses and padding, or
b) Greater than 3 mm for all surface courses.

The Contractor shall provide all traffic control, as required, for the Owner to conduct surface tolerance measurements. All tolerance-related repairs shall be carried out according to the Repairs subsection.

Longitudinal joints shall be constructed such that the elevation difference across the 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.

313.08.01.04 Surface Appearance

HMA deemed by visual appearance to have flushing, bleeding, segregation, fat spot, surface damage, cracking, chatter, or surface contamination but not limited to these, shall be considered deficient material or work. The Contractor 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.

313.08.01.04.01 Segregation

HMA exhibiting medium or severe mid-lane segregation shall be assessed a payment reduction or shall be repaired at the discretion of the Contract Administrator.

From the time the Contract Administrator provides notification of mid-lane segregation, a maximum of 500 tonnes of HMA may be placed, to demonstrate the effectiveness of any repairs or adjustments or both made to a defective paver. The repairs or adjustments or both shall be demonstrated to the Contract Administrator. If the repairs or adjustments or both to the paver do not eliminate midlane segregation to the satisfaction of the Contract Administrator within the allowable 500 tonnes of HMA, then the use of that paver shall be discontinued.

Other segregation shall be addressed in accordance with the following:

a) Slightly segregated mix shall be accepted into the work with no payment reduction.

b) Medium segregation in levelling courses or padding with a thickness greater than 40 mm, and binder courses shall normally be left in place with no payment reduction. However, any

areas of medium segregation that deteriorates prior to being overlaid by another pavement course shall be repaired at no cost to the Owner.

c) Medium segregation in surface courses shall be assessed a payment reduction or repaired at the discretion of the Contract Administrator.

d) Severely segregated mix shall be repaired by removal and replacement.

Levelling courses and padding with a total thickness less than 40 mm, bullnoses, and tapers that were not machine-laid and any areas of handwork shall not be assessed on the basis of segregation but on the basis of other workmanship-related problems. However, if they deteriorate prior to being overlaid by another pavement course, the Contract Administrator shall assess the causes of the deterioration before determining responsibility for the cost of repairs.

313.08.01.04.02 Challenging Severity of Segregation

The Contractor may challenge, in writing, the severity of any segregated area assessed as either medium or severe, within 5 Business Days of receiving the Owner's first visual assessment. The written challenge shall list the dimensions and the Contractor's assessment of the severity of each disputed area.

For Contracts with up to 30,000 tonnes of HMA, the Contractor shall be allowed a maximum of two separate written challenges for each tender item. However, for Contracts with more than 30,000 tonnes of HMA, the Contractor shall be allowed a maximum of four separate written challenges for each tender item. 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 Contractor's written challenge and the results of that second visual assessment shall be binding on both the Owner and Contractor.

The Contractor may further challenge the Owner's second visual assessment of the segregation severity, if the segregation has occurred in any one of the mixes listed in Table 7. Such a challenge shall be resolved by a representative of the Owner determining the Macrotexture Ratio, according to LS-317. Table 7 shall be used with the Macrotexture Ratio to determine the degree of severity and the disposition of the disputed area of segregation. The results of that testing shall be binding on both the Owner and the Contractor.

313.08.01.05 Acceptance Criteria for Surface Smoothness

The acceptability of surface smoothness shall be as specified in the Contract Documents.

313.08.01.06 Lift Thickness for Square Metre Items

313.08.01.06.01 Lot Size

The Contract Administrator shall determine the size and location of the lots and sublots before hot mix production for the item starts. Generally, there shall be one lot of the total pavement quantity. When the number of lifts is different or the tender item for any of the lifts is different, there shall generally be a separate lot for each of these areas. Each lot shall be divided into sublots, corresponding to the upper most lift of hot mix thickness sublots, which generally is the surface course. Sublots shall normally be 2,000 m² in size. A minimum of 3 sublots are required for each lot.

313.08.01.06.02 Acceptance Testing

The Owner shall conduct tests, carry out calculations, and provide values according to Table 4. The Contract Administrator shall provide the Contractor with a copy of each lift thickness measurement for each lift placed at each sample location upon completion of the sublot measurement.

313.08.01.06.03 Basis of Acceptance

The acceptance of lift thickness is based on lift thickness measurements. The Contract Administrator shall calculate the thickness payment adjustment for the lot once all measurements for the lot have been completed.

Sublot measurements shall be acceptable if they are equal to or greater than the minimum sublot lift thickness as specified in Table 8 for the item's T_D.

The sublot shall be deemed rejectable and shall be repaired if:

a) The lift thickness measurement is less than the minimum sublot lift thickness as specified in Table 8, or

b) For successive binder lifts of the same mix type, the combined lift thickness for these successive lifts is less than the minimum sublot lift thickness as specified in Table 8, or

c) Both a) and b) apply.

In addition, when a core taken for compaction testing does not meet the minimum lift thickness as specified in Table 8, the thickness sublot in which the compaction core was located shall be rejectable and shall be repaired.

When a lot contains any sublot that is deemed rejectable, the lot is rejectable until the sublot has been repaired and re-evaluated as acceptable. When the Contract Administrator allows a rejectable sublot to remain in place without repair, the Contractor shall receive a payment reduction for the sublot according to the Payment Adjustment for Lift Thickness clause. A sublot lift thickness measurement for a rejectable sublot that receives a payment reduction shall not be used to assess the lot mean.

The Contract Administrator shall calculate the lot mean to one decimal point and the lot thickness payment adjustment based on all the sublot lift thickness measurements in the lot, according to LS-101 and Table 9. If the lot mean is less than 85% of the T_D the lot is rejectable.

The Contract Administrator shall determine if a rejectable surface course lot may remain in the work without repairs. When the Contract Administrator has determined that a rejectable surface course lot may remain in the work without repair, the lot shall be subjected to a payment adjustment as determined by the Contract Administrator.

313.08.01.06.04 Referee Testing

The Contractor may only challenge an individual lift thickness measurement by requesting referee testing within 5 Business Days of the Contractor receiving the sublot lift thickness measurement and shall submit the request in writing to the Contract Administrator. The Contractor shall then have the opportunity to view the re-measurement of the QA designated pavement core for that sublot at an alternative Owner designated QA laboratory together with the Owner's representative. The re-measurement shall include the individual lift thickness that was challenged and shall also include any other lifts or combination of lifts in the core. The re-measured lift thickness measurements shall be considered binding and shall replace the original lift thickness measurements for assessment of all lifts measured for the core.

313.08.01.07 Geometrics and Longitudinal Joint Location

313.08.01.07.01 General

After final compaction, the HMA shall be smooth and true to the design profile and cross-section and constructed to the design width.

313.08.01.07.02 Pavement Width

The Contract Administrator shall conduct random spot checks of the width of each binder and surface course HMA lift for acceptance. The Contractor 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 Contractor that the stakes or identifiers are no longer required.

The width of each lift shall be accepted provided:

a) The outside edges of the lanes and the paved shoulders are parallel to the centreline and visually uniform.

b) The 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) The width of the paved shoulders is not less than the paved shoulder width as specified in the Contract Documents.

If the width is not acceptable at any location, the Contract Administrator shall notify the Contractor in writing that the pavement is rejectable, and the Contractor shall submit a written proposal for corrective action to the Contract Administrator within 3 Business Days of receiving the notification.

313.08.01.07.03 Longitudinal Joint Location

Longitudinal joints not meeting the Contract requirements shall be removed and replaced, or assessed a payment reduction.

313.08.02 Repairs

313.08.02.01 General

The Contractor shall perform all repairs 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. A paver shall be used in carrying out the repair.

Repairs shall be full lane or full shoulder width except where localized repairs are allowed as specified in the Contract Documents.

The materials and the construction of repairs shall meet the requirements as specified in the Contract Documents.

The limits and type of repairs shall be subject to the approval of the Contract Administrator and shall be approved prior to the repair being carried out.

Repairs of an urgent nature, including moderate to very severe aggregate loss, moderate to very severe flushing, and wheel track rutting 16 mm in depth or greater shall be repaired within 7 Days, unless extended by mutual agreement.

With the exception of urgent repairs, repairs shall be completed within 60 Days or prior to seasonal shutdown each year, whichever is the lesser, unless extended by mutual agreement.

313.08.02.02 Repairs for Mix Properties and Compaction

The Contractor may elect to carry out repairs in lieu of accepting a payment adjustment, if the lot is not rejectable and the total payment factor for the lot is less than 0.940. When the Contract Administrator requires a rejectable lot to be repaired or the Contractor elects to carry out repairs in lieu of accepting a payment adjustment, the Contractor shall determine what areas of HMA in a lot are to be repaired subject to the minimum lengths and widths as specified in the Contract Documents. Each repair area shall include at least one of the loose mix or core sample locations or both representing that sublot.

The minimum length of a single-repair to one lane shall be 250 m. The minimum length of a single-repair that extends over more than one lane shall be 250 lane-metres and no portion of the single-repair in a lane shall be less than 125 m in length.

The minimum limits of each repair shall be at least 125 lane-metres from the location of the loose mix or compaction core or both that represents the sublot; otherwise, a repair limit shall coincide with one end of the sublot when the sample location is less than 125 lane-metres from it. If the proposed limit of a single-repair falls within the proposed limit of another single-repair, the overlap shall count towards the 250 lane-metre minimum for both repairs. Repair areas within a single lane shall be separated by at least 100 m. If the delineation of repair areas results in patches less than 100 m apart, these repair areas shall be re-established to form a continuous repair.

The Contractor shall submit a list and sketch identifying the proposed locations of the repairs to the Contract Administrator for review at least 5 Business Days prior to the intended start of the repair work. Each sublot and single-repair shall be uniquely labelled. Overlapping repair areas and discontinuous portions of a single-repair shall be labelled so that they are readily identified with their single-repair.

Prior to the repair, the Contractor shall take slab samples or cores for testing of mix properties or compaction or both in the unrepaired area within 1 m of the limits of each end of the repair area. The Contractor shall not be permitted to take additional samples or cores beyond these locations until after QA or referee testing demonstrates that the remaining Material in the sublot proposed for repair is deemed to be rejectable. If the proposed repair limit coincides with the beginning of a sublot that is being left unrepaired, samples are not required at this location. Sufficient material shall be obtained for testing by the Owner's QA laboratory and for possible referee testing.

Testing shall demonstrate that the remaining Material in the sublot proposed for repair is not rejectable. To determine if the mix is rejectable, the mix properties and compaction shall comply with the basis of acceptance of lots with one or two sublots. If the Material is deemed to be rejectable, the proposed limit of the repair shall be extended by a minimum of 25 m, and the sampling and testing repeated. The repair area selected by the Contractor shall incorporate the location used for obtaining samples that shall be used to confirm that the remaining mix is not rejectable. If the contractor's repair proposal results in the removal of at least half the sublot tonnage, the Contract Administrator may waive testing demonstrating the suitability of the remainder of that sublot.

The unrepaired sublots combined with the unrepaired areas of any repaired sublots shall comprise one lot and shall be assessed on the basis of the loose mix or core samples or both representing the unrepaired sublots. If there are only one or two sublots in a lot that are not repaired, the Contract Administrator shall include those sublots as part of the previous or next lot.

The mix used for the repair shall comprise a separate lot or the Contract Administrator in conjunction with the Contractor may decide to include it as part of the current lot being produced. The repaired area shall be tested for all criteria.

The two reconfigured lots shall be accepted at the full Contract price, subjected to a payment adjustment according to the Payment Adjustment for Mix Properties and Compaction clause, or rejected.

313.08.02.03 Repairs for Surface Tolerance

All areas 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 site by the Contractor and managed as specified in the Contract Documents.

313.08.02.04 Repairs for Segregation

Repairs for segregation shall meet the requirements of the General Repairs clause. In binder courses, localized repairs for mid-lane segregation less than 300 mm in width are permitted.

313.08.02.05 Repairs for Thickness

The Contractor shall not be permitted to make any repairs solely to correct for excess lift thickness.

The minimum length of a repair is the entire length of the sublot being repaired.

Acceptance for lift thickness of the repaired sublot shall be based on the individual sublot lift thickness measurement and the lot thickness payment adjustment shall be calculated based on the re-evaluated sublot measurement.

313.09 MEASUREMENT FOR PAYMENT

313.09.01 Actual Measurement

313.09.01.01 Superpave 12.5FC 2
Superpave 19.0

313.09.01.01.01 By Area

Measurement of HMA by area shall be the horizontal area in square metres in place.

The quantities of HMA used for temporary ramping shall not be measured for payment. The removal of HMA used for temporary ramping shall not be measured for payment.

313.09.01.01.02 Tonne to Square Metre Conversion

When the unit of measure for a HMA tender item is square metres, and the Contract Documents refer to a quantity of mix for that tender item in tonnes and the Contract Documents do not already modify the quantity to relate to square metres, the Contract Administrator shall determine the theoretical HMA quantity in square metres (Q_A) that shall replace the non-payment tonnage quantity (Q_t) references as follows:

$Q_A = Q_t / [0.975 \times BRD_{MD} \times (T_D/1000)]$ (Formula 1)

Where:

BRD_{MD} = the bulk relative density in t/m³, provided in the HMA design submitted for mix, the Q_A is calculated for

T_D = the design thickness, in millimetres, of the mix

Q_t = non-payment tonnage quantity referred to elsewhere in the Contract Documents for the mix under the measurement by square metre item

313.09.01.01.03 By Mass

Measurement of HMA by mass shall be in tonnes according to the requirements of the Contract Documents.

The quantities of HMA used for temporary ramping shall not be measured for payment. The removal of HMA used for temporary ramping shall not be measured for payment.

313.09.01.02 Hot Mix Asphalt Miscellaneous

Measurement of HMA Miscellaneous shall be by area in square metres, regardless of the number of lifts placed.

313.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement is based on the units shown in the clauses under Actual Measurement. The Plan Quantity shall not be adjusted due to any of the exceptions specified in the Lift Thickness clause under the Sampling clause.

313.10 BASIS OF PAYMENT

313.10.01 Hot Mix

313.10.01.01 Superpave 12.5FC 2
Superpave 19.0

Payment at the Contract price for the above tender items shall include full compensation for all labour, Equipment, and Materials required to do the work (including the HMA quantities used for temporary ramping), the removal of HMA used for temporary ramping, and the applicable payment adjustments.

When repairing HMA, the Contractor shall be responsible for and shall carry out all associated work and replace or restore all associated damage and removals at no cost to the Owner.

When the Contract Administrator instructs the Contractor to cease paving due to continued medium or severe segregation regardless of cause, the Owner shall not be held responsible for any additional costs that the Contractor may incur.

The preparation and correction of existing surfaces and pavement beneath surface courses carried out in order to meet the requirements of the Contract Documents, including milling, padding, and diamond grinding, shall be at no cost to the Owner.

313.10.01.02 Payment Adjustment for Mix Properties and Compaction

For all mixes, when the Contractor is not required to or does not elect to repair a lot, the payment adjustment for that lot due to mix properties and compaction requirements shall be:

PA_{MC} = lot quantity x price x [PF_{MC} - 1.000] (Formula 2)

Where:

PA_{MC}	=	payment adjustment for mix properties and compaction
lot quantity	=	the quantity of the mix in the lot. For SMA 19.0, SMA 12.5, SMA 9.5, Superpave 12.5FC 1, and Superpave 12.5FC 2 items measured by tonnage, the lot quantity is the quantity of the mix in the lot multiplied by the applicable mass multiplier factor (MF) in the Payment Adjustment for Aggregate Density clause.
price	=	the Contract price of the hot mix tender item
PF_{MC}	=	payment factor for mix properties and compaction

For all mixes, when the PF_{MC} is:

a) Less than 1.000, there shall be a reduction in payment, and
b) Equal to 1.000 there shall be no adjustment.

313.10.01.02.01 Calculations

313.10.01.02.01.01 General

The PF_{MC} shall be based on the individual payment factors obtained from Table 6, based on PWL, determined for gradation, AC content, voids, and compaction using LS-101, Table 5, and the formulae in the Payment Factor for Gradation clause, the Payment Factor for Combined Gradation and Asphalt Cement Content clause, the Payment Factor for Voids clause, the Payment Factor for Combined Mix Properties clause, and the Payment Factor for Combined Mix Properties and Compaction clause. Rounding-off procedures for all calculations shall follow LS-100.

When there is no sampling or testing specified in the Contract Documents for an attribute or when the requirement for sampling or testing for an attribute is waived by the Owner, the payment factor for that attribute shall be equal to the payment factor it is added to in Formulae 5, 10, 11 or 12.

313.10.01.02.01.02 Payment Factor for Gradation

The payment factor for gradation shall be calculated using the following formulae:

For Superpave 37.5, Superpave 25.0, Superpave 19.0, Superpave 12.5, Superpave 12.5FC 1, Superpave 12.5FC 2, SMA 19.0, and SMA12.5:

$$PF_G = (PF_{DLS} + PF_{4.75} + PF_{75}) / 3 \quad \text{(Formula 3)}$$

For Superpave 9.5, Superpave 4.75, and SMA 9.5:

$$PF_G = (PF_{4.75} + PF_{75}) / 2 \quad \text{(Formula 4)}$$

Where:
PF_G = payment factor for gradation
PF_{DLS} = payment factor for designated large sieve
$PF_{4.75}$ = payment factor for the 4.75 mm sieve
PF_{75} = payment factor for the 75 µm sieve

313.10.01.02.01.03 Payment Factor for Combined Gradation and Asphalt Cement Content

The payment factor for combined gradation and AC content shall be calculated using the following formula:

$$PF_{GAC} = (PF_G + PF_{AC}) / 2 \quad \text{(Formula 5)}$$

Where:
PF_{AC} = payment factor for AC content
PF_{GAC} = payment factor for combined gradation and AC content

313.10.01.02.01.04 Payment Factor for Voids

For Superpave mixes, if the lot mean VMA is not more than 0.5 per cent below the minimum VMA as specified in the Contract Documents for mix design purposes, the payment factor for VMA is 1.000. For lot mean VMA results more than 0.5 per cent lower than the minimum

specified for mix design purposes, a payment factor for the subject lot shall be calculated in accordance with the following:

If $(VMA_{min} - VMA_{mean}) \geq 2.5$, then $PF_{VMA} = 0.0$ (Formula 6)
If $(VMA_{min} - VMA_{mean}) < 2.5$ then, $PF_{VMA} = 0.8000 - 0.4 \times (VMA_{min} - 0.5 - VMA_{mean})$ (Formula 7)

Where:
PF_{VMA} = payment factor for VMA
VMA_{mean} = lot mean VMA
VMA_{min} = minimum VMA specified for mix design

For Superpave mixes, the payment factor for VMA shall be compared to the payment factor for air voids and the lesser of the two is the payment factor for voids (PF_{VOIDS}).

For SMA mixes, if the lot mean VMA is not more than 1.0 per cent below the minimum VMA as specified in the Contract Documents for mix design purposes, the payment factor for VMA is 1.000. For lot mean VMA results more than 1.0 per cent lower than the minimum specified for mix design purposes, a payment factor for the subject lot shall be calculated in accordance with the following:

If $(VMA_{min} - VMA_{mean}) \geq 3.0$, then $PF_{VMA} = 0.0$ (Formula 8)
If $(VMA_{min} - VMA_{mean}) < 3.0$ then, $PF_{VMA} = 0.8000 - 0.4 \times (VMA_{min} - 1.0 - VMA_{mean})$ (Formula 9)

Where:
PF_{VMA} = payment factor for VMA
VMA_{mean} = lot mean VMA
VMA_{min} = minimum VMA specified for mix design

For SMA mixes, the payment factor for VMA shall be compared to the payment factor for air voids and the lesser of the two is the payment factor for voids (PF_{VOIDS}).

313.10.01.02.01.05 Payment Factor for Combined Mix Properties

The payment factor for combined mix properties shall be calculated using the following formula:

$PF_M = (PF_{GAC} + PF_{VOIDS}) / 2$ (Formula 10)

Where:
PF_M = payment factor for combined mix properties

313.10.01.02.01.06 Payment Factor for Combined Mix Properties and Compaction

The payment factor for combined mix properties and compaction shall be calculated using Formula 11.

$PF_{MC} = (PF_C + PF_M) / 2$ (Formula 11)

Where:
PF_C = payment factor for compaction

The PF_{MC} shall be rounded and reported to four decimal places.

When the Contract Administrator decides that the unrepaired area of an original lot that has been partially repaired shall not be resampled, the PF_{MC} for the unrepaired area shall be 1.000.

313.10.01.02.01.07 Small Quantity Lots

For any lot comprised of one or two sublots, each sublot shall be assigned a PF_{MC} of 1.000 if the sublot is not rejectable. If the sublot is determined to be rejectable, it shall be administered as described in the Repairs for Mix Properties and Compaction clause. When the Contract Administrator has determined that a rejectable sublot may remain in the work without repair, the lot shall be subjected to a payment adjustment reflecting the extent of the non-conformance as determined by the Contract Administrator.

313.10.01.03 Payment Adjustment for Surface Smoothness

Payment adjustment for surface smoothness shall be as specified in the Contract Documents.

313.10.01.04 Payment Adjustment for Segregated HMA

For all surface courses, where payment reduction for segregation is allowed in lieu of repairs, the payment reduction shall be calculated as follows:

a) $2,000 once for each applicable surface course tender item,
b) An additional payment reduction of $2.50/m for mid-lane segregation, and
c) An additional payment reduction of $5.00/m² for other segregation. The area of repair shall be computed by multiplying the full lane width by the length of the repair and rounded to the next whole square metre.

313.10.01.05 Payment Adjustment for Aggregate Density

For Superpave 12.5FC 1, Superpave 12.5FC 2, SMA 19.0, SMA 12.5, and SMA 9.5 items measured in tonnes, the tender quantity is based on reference densities according to Table 10. A payment adjustment for aggregate density for each lot for these tender items shall be calculated by the following formulae:

$MF = D_R/(BRD_{mix})$ (Formula 12)
$PA_{AD} = M_{mix}$ x Contract Price x [MF - 1.000] (Formula 13)

Where:

D_R	=	the reference density in t/m³, as specified in Table 10
BRD_{mix}	=	the lot average bulk relative density in t/m³, calculated from values obtained in the testing of bulk samples obtained during production. The values shall be the same as those used in calculating the final air voids payment factor for the lot.
PA_{AD}	=	payment adjustment for aggregate density
M_{mix}	=	the weighed mass of the mix in the lot incorporated into the work
MF	=	the mass multiplier factor calculated to 3 decimal places
Contract Price	=	the Contract price of the tender item for the mix

For all mixes, when the mass multiplier factor is:

a) Less than 1.000 there shall be a reduction in payment,
b) Equal to 1.000 there shall be no adjustment, and
c) Greater than 1.000 there shall be an increase in payment for the lot.

There shall be no payment adjustment for aggregate density for HMA items measured by square metres.

313.10.01.06 Payment Adjustment for Asphalt Cement Content and Changes in the Price Index

313.10.01.06.01 Hot Mix Asphalt Quantity Calculation

The quantity of HMA for use in the calculations (T_{mix}) shall be the tonnage of HMA accepted into the work.

When the unit of measure is square metres, T_{mix} shall be determined using the theoretical tonnage. The theoretical tonnage shall be calculated by the Contract Administrator as follows and rounded to one decimal according to LS-100:

$T_{mix} = [0.975 \times BRD_{mix} \times (T_D/1000) \times A_{mix}]$ (Formula 14)

Where:

BRD_{mix} = the lot average bulk relative density in t/m³, calculated from values obtained in the testing of bulk samples obtained during production of the first complete lot of at least 3 sublots of HMA placed in the work. The values shall be the same as those used in calculating the final payment factor for air voids for the lot.

T_D = the design thickness, in millimetres, of the HMA

A_{mix} = area of hot mix placed in square metres

313.10.01.06.02 Payment Adjustment for Asphalt Cement Content

The payment adjustment for AC content shall be calculated using the following formula:

$PA_{AC} = T_{mix} \times [Price_{AC} \times (AC_{ERS} - AC_{BID})/100]$ (Formula 15)

Where:

PA_{AC} = payment adjustment for asphalt cement content

T_{mix} = the quantity of the HMA accepted into the lot according to the Hot Mix Asphalt Quantity Calculation clause

$Price_{AC}$ = the purchase price per tonne of the AC used in the mix according to the invoice submitted as per the Submission Requirements subsection

AC_{ERS} = the average percentage by mass of AC in the lot

AC_{BID} = the percentage by mass of AC specified for bidding purposes elsewhere in the Contract Documents

For progress payment purposes, payment adjustments are made on the monthly progress payment certificate for the months in which hot mix paving occurs.

313.10.01.06.03 Payment Adjustment for Changes in the Asphalt Cement Price Index

A payment adjustment is applied based on changes to the Ministry's PGAC price index unless the Contractor opts out by notifying the Ministry in writing within 5 Business Days of receiving permission to start work. Once the Contractor has opted out of payment adjustments based on the price index, the Contractor shall not be permitted to opt back in. The price index is published monthly in the Contract Bulletin. The price index is used to calculate the amount of the payment adjustment per tonne of new AC accepted into the Work.

The price index is based on the price, excluding taxes, FOB the depots in the Toronto area, of AC grade PG 58-28 or equivalent. One index is used to establish and calculate the payment adjustment for all grades.

A payment adjustment per tonne of new AC is established for each month in which paving occurs when the price index for the month differs by more than 5% from the price index for the month prior to Tender Opening. When the price index differential is less than 5%, there is no payment adjustment established for that month. Payment adjustments due to changes in the price index are independent of any other payment adjustments made to the hot mix tender items.

The payment adjustment for the month is calculated from the formulae in Table 11.

The payment adjustment per tonne applies to the quantity of new AC in the HMA accepted into the Work during the month for which it is established. The quantity of new AC includes all grades of AC supplied by the Contractor with and without polymer modifiers.

For each month in which a payment adjustment has been established, the quantity is calculated using the HMA quantity accepted into the Work and its corresponding AC content as required by the JMF except for mixes which contain reclaimed asphalt pavement.

For mixes which contain reclaimed asphalt pavement the percentage of new AC is determined from the difference between the AC content required by the JMF and the AC content of the reclaimed asphalt pavement incorporated into the HMA, as calculated by the Contract Administrator.

For mixes containing an AST-AC, the percentage of AST-AC is deducted from the percentage of new AC. No other deductions are made for any other additives.

For progress payment purposes, payment adjustments are made on the monthly progress payment certificate for the months in which HMA paving occurs.

313.10.01.07 Payment Adjustment for Lift Thickness

The payment adjustment for lift thickness shall apply to all placed and compacted HMA measured by square metre items using the horizontal area of the surface course in the lot or overlying the lot. When the thickness payment adjustment is determined using a T_L calculated using a combination of tender items of the same mix type, the thickness payment adjustment shall apply to each binder course tender item included in T_L. The thickness payment adjustment shall be a reduction in payment. The formulae provided in Table 9 shall be used to calculate the thickness payment adjustment.

When a rejectable sublot remains in the work without repair, the sublot shall be subject to a payment adjustment. The payment adjustment shall be a reduction in payment. The sublot thickness payment adjustment shall be:

PA_T = 0.5 x (sublot quantity x Contract price) (Formula 16)

Where:
PA_T = payment adjustment for lift thickness
sublot quantity = the area of the sublot
Contract price = the Contract price of the tender item for the mix

313.10.02 Anti-Stripping Treatments

When aggregates have been processed from commercial sources for use in hot mix surface course paving, payment at the Contract price for the applicable HMA tender item shall be full compensation for all labour, Equipment, and Materials required to test, supply, and incorporate, the AST.

When aggregates have been processed from MTO/Crown, Wayside, and/or Letter of Approval quarries for use in hot mix surface course paving and the use of an AST was required, payment at the Contract price for the applicable HMA tender item shall be full compensation for all Labour, Equipment, and Materials required to test, supply, and incorporate the AST. When hydrated lime is used as the AST, payment includes full compensation for the amount up to 1.0% by mass of total dry aggregate. When an alternate AST-AGG is used as the AST, payment includes full compensation for the amount up to the listed minimum dosage from the DSM listing for Anti-Stripping Treatments by mass of aggregate. When an AST-AC is used as the AST, payment includes full compensation for the amount up to the listed minimum dosage from the DSM listing for Anti-Stripping Treatments by mass of AC. Payment for additional AST above the listed minimum dosages shall be administered as a Change in the Work.

313.10.03 Hot Mix Asphalt Miscellaneous

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Materials to do the work except that the HMA Material shall be paid for under the appropriate HMA tender item.

313.10.04 Tack Coat

Where there is no separate tender item for tack coat, payment at the Contract price for the applicable HMA tender item to be placed on the tack coat shall be full compensation for all labour, Equipment, and Materials for the tack coating.

313.10.05 Repair

No payment shall be made for the:

a) Quantity of HMA that is removed and replaced, overlaid, or otherwise repaired; or
b) For additional shouldering, traffic control, and other work such as zone painting or bridge deck waterproofing,

when:

a) In lieu of a reduction in payment, the Contractor repairs the lot, sublot, or visually defective HMA; or
b) The Contract Administrator has determined that a rejectable lot or sublot requires repair.

The Contractor shall be charged for all additional testing resulting from a repair to a lot at the rates established by the Owner for the year in which the testing was carried out.

313.10.06 Referee Testing and Segregation Challenge

313.10.06.01 Mix Properties and Compaction

If the referee test results show that the referee payment factor for compaction or mix properties is higher than the payment factor for compaction or mix properties based on the original QA test results by more than 0.025 and the referee results show that the lot is not rejectable, the Owner shall bear the cost of the referee testing for that attribute.

If the referee test results show that the lot is rejectable or the referee test results show that the referee payment factor for compaction or mix properties is not higher than the payment factor for compaction or mix properties based on the original QA test results by more than 0.025, the Contractor shall be charged the cost of the referee testing.

For density testing of aggregates, if referee testing is invoked, the cost of referee testing is assigned as follows:

a) If the combined aggregate density as determined by the referee laboratory is within 0.010 of the result determined by the QA laboratory, the cost of referee testing shall be borne by the Contractor.

b) If the referee result is between 0.011 and 0.020 of the QA result, the cost of referee testing shall be shared equally between the Contractor and Owner.

c) If the difference in results is equal to or in excess of 0.020, the cost of referee testing shall be borne by the Owner.

When there is an outlier in the referee test results, the Contractor shall be charged 50% of the total cost for referee testing of all sublots in the original lot.

The cost of the referee testing shall be based on the referee testing rates as specified elsewhere in the Contract Documents.

313.10.06.02 Lift Thickness

If the referee test result is at least 3 mm greater than the original QA test result, the Owner shall bear the cost of the thickness measurement referee testing. If the referee test result is not 3.0 mm or greater than the original QA test result for the sublot retested, the Contractor shall be charged the cost of the referee testing.

313.10.06.03 Segregation Challenge

If, under a challenge, as described in the Challenging Severity of Segregation clause, the Contractor 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 Contractor is not successful, the Contractor shall be responsible for all costs associated with the second visual assessment, including the cost of traffic control and delays.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

TABLE 1
Maximum Field Adjustments for JMF

JMF Properties	**Maximum Field Adjustment** **%** (Notes 1 and 2)
AC content (all mixes except SMA mixes)	± 0.2
AC content (SMA mixes only)	± 0.4
Per cent RAP	- 5.0
Per cent passing 26.5 mm, 25.0 mm, 19.0 mm, and 16.0 mm sieves	± 5.0
Per cent passing 13.2 mm, 12.5 mm, and 9.5 mm sieves	± 4.0
Per cent passing 4.75 mm, 2.36 mm, and 1.18 mm sieves	± 3.0
Per cent passing 300, and 150 µm sieves	No limits
Per cent passing 75 µm sieve (all mixes except SMA mixes)	± 1.0
Per cent passing 75 µm sieve (SMA mixes only)	± 2.0

Notes:
1. The maximum field adjustment is applied against the original JMF submitted with the mix design.
2. The adjusted JMF shall meet the requirements of the Contract, including AC content and gradation on all sieves.

TABLE 2
Sample Size and Frequency

Material	Sample Size	Frequency of Sampling
SMA mixes, Superpave 9.5, 12.5, 12.5FC 1, 12.5FC 2, and 19.0 (Note 1)	20 to 30 kg or 30 to 40 kg (Note 2)	Every sublot
Superpave 25.0 and 37.5 (Note 1)	25 to 35 kg or 35 to 45 kg (Note 2)	Every sublot
HMA Compaction Cores	150 to 200 mm diameter	Every mix properties sublot
HMA Thickness Cores	50 mm diameter	Every thickness sublot
HMA Aggregates for Density Testing	Coarse aggregate 10 kg Fine aggregate, RAP 5 kg	Every 20,000 tonnes or when new samples requested
SMA mixes for draindown testing	3 to 5 kg	Once per lot
WMA for moisture sensitivity testing (Note 1)	50 kg	3 sublots per mix type

Notes:
1. Each material sample receptacle shall have a maximum mass of 30 kg. For ease of handling, especially when the larger sample size is required, splitting of material at the paving site is permitted such that a sample is contained in a maximum of two receptacles whose total mass does not exceed the maximum specified above. Once delivered to testing laboratories, combining of the material from the two receptacles is only mandatory if a single receptacle contains insufficient material to carry out the full suite of tests required.
2. The larger sample size shall be applicable when samples are designated for testing to the maximum number of gyrations. The frequency of the larger samples shall be one per lot, as designated by the Contract Administrator.

TABLE 3
Breakdown of the Tender Item Quantity into Lots for Mix Properties and Compaction

Number of Tonnes	Quantity of Square Metres		Number of Lots
	40 to 50 mm Lift Thickness	60 to 80 mm Lift Thickness	
< 5,000	40,000	25,000	1
5,000 to 10,000	40,000 to 80,000	25,000 to 50,000	2
10,000 to 12,000	80,000 to 100,000	50,000 to 60,000	2 or 3 (Note 1)
> 12,000	> 100,000	> 60,000	3 +

Notes:
1. As determined by the Contract Administrator in consultation with the Contractor.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

TABLE 4
Testing Requirements

Properties and Attributes	Testing Method	Calculations, Values, and Results Required
Mix Properties		
AC Content and Aggregate Gradation for mix samples	LS-291, LS-282, or LS-292	% AC, % passing DLS sieve, 4.75 mm sieve, 75 µm sieve
Volumetric Properties		
Laboratory Compaction to: i. Design number of gyrations (N_{des}) ii. Maximum number of gyrations (N_{max}) Maximum Theoretical Specific Gravity (G_{mm})	AASHTO T 166 using the same laboratory compaction protocol as was used in mix design. (Note 1) AASHTO T 312, LS-264 Superpave Mixes only: in addition to compacting all samples to the design number of gyrations, one sample from each lot of HMA shall be compacted to the maximum number of gyrations. Bulk Relative Density for mix samples, BRD_m	BRD_m BRD at N_{des} BRD at N_{ini} BRD at N_{max} G_{mm} $\%G_{mm}$ @ N_{ini} $\%G_{mm}$ @ N_{des} $\%G_{mm}$ @ N_{max}
Voids in Mineral Aggregate (VMA)	LS-604, LS-605, LS-266 (Note 2)	VMA
Voids Filled with Asphalt (VFA)	AASHTO R 35	VFA
Air voids for mix (V_a)	LS-265	V_a
Dust to Binder Ratio (D_P) for Superpave mixes	AASHTO R 35	D_P
Compaction		
Compaction and Thickness of Cores	BRD_c = Bulk Relative Density for core samples, LS-262 (Note 1) $MRD_m = G_{mm}$ (Maximum Relative Density for loose mix samples, LS-264) % Compaction = ($100 \times BRD_c/MRD_m$)	Thickness of Core % Compaction
Lift Thickness		
Thickness of Cores	LS-294	Lift Thickness

SMA Mix Properties		
Draindown for mix	AASHTO T 305	% Draindown
WMA Mix Properties		
WMA Moisture Sensitivity	AASHTO T 283 including Table 1	TSR Visual Stripping Rating

Notes:
1. For all gyratory-compacted specimens and cores of SMA mixes and Superpave mixes, if the per cent water absorbed by the specimen is found to exceed 2% by volume, as described in AASHTO T 166, then the bulk relative density shall be determined using either LS-306 or ASTM D 6752
2. Calculate to two decimal places for each sublot using the BRD_m for the sublot, and the combined aggregate densities of the blended coarse and blended fine aggregate, as specified in the Contract Documents, to provide a lot mean VMA to one decimal place.
3. The rounding-off procedure, for all values, shall be according to LS-100.

TABLE 5
Specification Limits for HMA Acceptance Attributes

Attributes	HMA Type	Lower Limit (LL) %	Upper Limit (UL) %
AC Content	All HMA types	JMF - 0.40 (Note 1)	JMF + 0.50
Designated Large Sieve	All HMA types	JMF - 5.0	JMF + 5.0
4.75 mm Sieve	All HMA types	JMF - 5.0	JMF + 5.0
75 µm Sieve	All HMA types	JMF - 2.0	JMF + 2.0
Air Voids	All HMA types	2.5	5.5
Pavement Compaction	Superpave 37.5, 25.0, 19.0,12.5, 9.5 and 12.5FC 1	92.0	97.0
	Superpave 12.5FC 2	92.0	98.0
	SMA	93.0	98.0

Notes:
1. When a JMF change results in a decrease in the design AC content, the lower limit (LL) shall be set at the revised JMF minus 0.3% for all lots to which the JMF change applies.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

TABLE 6
Payment Factors Based on Per Cent Within Limits

PWL	Designated Large Sieve	4.75 mm Sieve	75 µm Sieve	AC Content	Air Voids	Compaction
100	1.000	1.000	1.000	1.000	1.000	1.000
99	1.000	1.000	1.000	1.000	1.000	1.000
98	1.000	1.000	1.000	1.000	1.000	1.000
97	1.000	1.000	1.000	1.000	1.000	1.000
96	1.000	1.000	1.000	1.000	1.000	1.000
95	1.000	1.000	1.000	1.000	1.000	1.000
94	1.000	1.000	1.000	1.000	1.000	1.000
93	1.000	1.000	1.000	1.000	1.000	1.000
92	1.000	1.000	1.000	1.000	1.000	1.000
91	1.000	1.000	1.000	1.000	1.000	1.000
90	1.000	1.000	1.000	1.000	1.000	1.000
89	1.000	1.000	1.000	1.000	1.000	0.991
88	1.000	1.000	1.000	1.000	1.000	0.983
87	1.000	1.000	1.000	1.000	1.000	0.974
86	1.000	1.000	1.000	1.000	1.000	0.965
85	1.000	1.000	1.000	1.000	1.000	0.956
84	0.997	0.997	0.997	0.992	1.000	0.948
83	0.994	0.994	0.994	0.984	1.000	0.939
82	0.992	0.992	0.992	0.976	1.000	0.930
81	0.989	0.989	0.989	0.968	1.000	0.921
80	0.986	0.986	0.986	0.960	1.000	0.913
79	0.983	0.983	0.983	0.952	0.999	0.904
78	0.980	0.980	0.980	0.944	0.998	0.895
77	0.977	0.977	0.977	0.936	0.995	0.886
76	0.974	0.974	0.974	0.928	0.991	0.878
75	0.972	0.972	0.972	0.920	0.986	0.869
74	0.969	0.969	0.969	0.912	0.980	0.860
73	0.966	0.966	0.966	0.904	0.973	0.851
72	0.963	0.963	0.963	0.896	0.964	0.843
71	0.960	0.960	0.960	0.888	0.955	0.834
70	0.957	0.957	0.957	0.880	0.944	0.825
69	0.954	0.954	0.954	0.872	0.933	0.816

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

PWL	Designated Large Sieve	4.75 mm Sieve	75 µm Sieve	AC Content	Air Voids	Compaction
68	0.951	0.951	0.951	0.864	0.920	0.808
67	0.949	0.949	0.949	0.856	0.906	0.799
66	0.946	0.946	0.946	0.848	0.891	0.790
65	0.943	0.943	0.943	0.840	0.875	0.781
64	0.940	0.940	0.940	0.832	0.858	0.773
63	0.937	0.937	0.937	0.824	0.839	0.764
62	0.934	0.934	0.934	0.816	0.820	0.755
61	0.931	0.931	0.931	0.808	0.799	0.746
60	0.929	0.929	0.929	0.800	0.778	0.738
59	0.926	0.926	0.926	0.790	0.755	0.729
58	0.923	0.923	0.923	0.780	0.731	0.720
57	0.920	0.920	0.920	0.770	0.706	0.711
56	0.917	0.917	0.917	0.760	0.680	0.703
55	0.914	0.914	0.914	0.750	0.653	0.694
54	0.911	0.911	0.911	0.740	0.624	0.685
53	0.909	0.909	0.909	0.730	0.595	0.676
52	0.906	0.906	0.906	0.720	0.564	0.668
51	0.903	0.903	0.903	0.710	0.533	0.659
50	0.900	0.900	0.900	0.700	0.500	0.650
49	0.882	0.882	0.882	0.686	0.490	0.637
48	0.864	0.864	0.864	0.672	0.480	0.624
47	0.846	0.846	0.846	0.658	0.470	0.611
46	0.828	0.828	0.828	0.644	0.460	0.598
45	0.810	0.810	0.810	0.630	0.450	0.585
44	0.792	0.792	0.792	0.616	0.440	0.572
43	0.774	0.774	0.774	0.602	0.430	0.559
42	0.756	0.756	0.756	0.588	0.420	0.546
41	0.738	0.738	0.738	0.574	0.410	0.533
40	0.720	0.720	0.720	0.560	0.400	0.520
39	0.702	0.702	0.702	0.546	0.390	0.507
38	0.684	0.684	0.684	0.532	0.380	0.494
37	0.666	0.666	0.666	0.518	0.370	0.481
36	0.648	0.648	0.648	0.504	0.360	0.468
35	0.630	0.630	0.630	0.490	0.350	0.455

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

PWL	Designated Large Sieve	4.75 mm Sieve	75 µm Sieve	AC Content	Air Voids	Compaction
34	0.612	0.612	0.612	0.476	0.340	0.442
33	0.594	0.594	0.594	0.462	0.330	0.429
32	0.576	0.576	0.576	0.448	0.320	0.416
31	0.558	0.558	0.558	0.434	0.310	0.403
30	0.540	0.540	0.540	0.420	0.300	0.390
29	0.522	0.522	0.522	0.406	0.290	0.377
28	0.504	0.504	0.504	0.392	0.280	0.364
27	0.486	0.486	0.486	0.378	0.270	0.351
26	0.468	0.468	0.468	0.364	0.260	0.338
25	0.450	0.450	0.450	0.350	0.250	0.325
24	0.432	0.432	0.432	0.336	0.240	0.312
23	0.414	0.414	0.414	0.322	0.230	0.299
22	0.396	0.396	0.396	0.308	0.220	0.286
21	0.378	0.378	0.378	0.294	0.210	0.273
20	0.360	0.360	0.360	0.280	0.200	0.260
19	0.342	0.342	0.342	0.266	0.190	0.247
18	0.324	0.324	0.324	0.252	0.180	0.234
17	0.306	0.306	0.306	0.238	0.170	0.221
16	0.288	0.288	0.288	0.224	0.160	0.208
15	0.270	0.270	0.270	0.210	0.150	0.195
14	0.252	0.252	0.252	0.196	0.140	0.182
13	0.234	0.234	0.234	0.182	0.130	0.169
12	0.216	0.216	0.216	0.168	0.120	0.156
11	0.198	0.198	0.198	0.154	0.110	0.143
10	0.180	0.180	0.180	0.140	0.100	0.130
9	0.162	0.162	0.162	0.126	0.090	0.117
8	0.144	0.144	0.144	0.112	0.080	0.104
7	0.126	0.126	0.126	0.098	0.070	0.091
6	0.108	0.108	0.108	0.084	0.060	0.078
5	0.090	0.090	0.090	0.070	0.050	0.065
4	0.072	0.072	0.072	0.056	0.040	0.052
3	0.054	0.054	0.054	0.042	0.030	0.039
2	0.036	0.036	0.036	0.028	0.020	0.026
1	0.018	0.018	0.018	0.014	0.010	0.013

PWL	Designated Large Sieve	4.75 mm Sieve	75 µm Sieve	AC Content	Air Voids	Compaction
0	0.000	0.000	0.000	0.000	0.000	0.000

TABLE 7
Allowable Macrotexture Ratios for Various Mixes

Mix Type	Macrotexture Ratio (M_R)		
	Degree of Segregation		
	Slight	Medium	Severe
Superpave 12.5, 12.5FC 1, 12.5FC 2	< 1.6	1.6 to 2.2	> 2.2
Superpave 19.0	< 1.8	1.8 to 2.6	> 2.6
Superpave 25.0	< 2.0	2.0 to 3.5	> 3.5

TABLE 8
Minimum Sublot Lift Thickness

Mix Course	Design Lift Thickness (T_D) mm	Minimum Sublot Lift Thickness mm
All Courses	25 to 39	T_D - 7
	40 to 59	T_D - 10
Surface Course	60 and greater	T_D - 15
Binder Courses	60 and greater	0.70 x T_D

TABLE 9
Lot Thickness Payment Adjustment

Course	T_L	Thickness Payment Adjustment, PA_T
Surface Course (Note 1)	$T_L \geq [0.85 \times T_D]$	PA_T = lot quantity x price x {[1.000 - (T_L / T_D)] x 2.0}
Binder Course	$T_L \geq [0.95 \times T_D]$	PA_T = lot quantity x price x {[1.000 - (T_L /T_D)]}
	$[0.95 \times T_D] > T_L \geq [0.85 \times T_D]$	PA_T = lot quantity x price x {[1.000 - (T_L /T_D)] x 2.0}
	$T_L < [0.85 \times T_D]$	PA_T = lot quantity x price x {[1.000 - (T_L /T_D)] x 3.0}
Where: T_L = lot mean, if lot mean is less than or equal to T_D (see definition), or $T_L = T_D$, if lot mean is greater than T_D lot quantity = the horizontal area of the upper most lift of hot mix in the lot (normally surface course) price = the Contract price of the hot mix tender item		
Notes: 1. A lot is rejectable when $T_L < [0.85 \times T_D]$. When the Contract Administrator has determined that a rejectable surface course lot may remain in the work without repair, the lot shall be subjected to a payment adjustment as determined by the Contract Administrator.		

TABLE 10
Reference Densities, D_R

Region	Reference Densities, D_R tonnes/m³
West Region	2.530
Central Region Northeastern Region Northwestern Region	2.520
Eastern Region	2.390

TABLE 11
AC Price Adjustment

I_P	AC Price Adjustment, PA
$I_P > 1.05\ I_{TO}$	$PA = (I_P - 1.05\ I_{TO}) \times T_{AC}$
$I_P < 0.95\ I_{TO}$	$PA = (0.95\ I_{TO} - I_P) \times T_{AC}$

Note:
If $I_P > 1.05\ I_{TO}$ the Contractor receives compensation; however, if $I_P < 0.95\ I_{TO}$ the Owner receives a rebate.
Where:
PA = payment adjustment for new AC, in dollars
I_{TO} = PGAC price index for the month prior to Tender Opening
I_P = PGAC price index for the month in which paving occurs
T_{AC} = quantity of new AC in tonnes
T_{AC}, shall be calculated as follows:
$T_{AC} = [AC_{new} /100] \times T_{mix_mnth}$
Where:
AC_{new} = the percentage of new AC in the mix as required by the JMF.
T_{mix_mnth} = the tonnage of HMA, as calculated in the Hot Mix Quantity Calculation clause, accepted into the work during the month for which the payment adjustment was calculated.

SSP 9 **AMENDMENT TO OPSS 706, NOVEMBER 2016 - Freeway Paving Operations**

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 107S05 April 2017

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.

SSP 10 OCCUPATIONAL HEALTH AND SAFETY ACT COMPLIANCE

MTO 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	N/A

Substance	Location
Asbestos on Construction Projects and in Buildings and Repair Operations (O. Reg. 278/05)	N/A
Lead	N/A
Silica	N/A
Benzene	N/A
Vinyl Chloride, Coke Oven Emissions, Ethylene Oxide, Acrylonitrile and Isocyanates	N/A
Mercury	N/A

SSP 11 AMENDMENT TO OPSS 206, NOVEMBER 2014

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 102S05 May 2017

206.02 REFERENCES

Section 206.02 of OPSS 206 is amended by the addition of the following to **Ontario Ministry of Transportation Publications**:

MTO Laboratory Testing Manual:
LS-706 Moisture-Density Relationship of Soils Using 2.5 kg Rammer and 305 mm Drop

206.06 EQUIPMENT

Section 206.06 of OPSS 206 is amended by the addition of the following subsections:

206.06.03 Nuclear Moisture and Density Gauge

Nuclear moisture and density gauges shall meet the requirements of the Nuclear Moisture and Density Gauge subsection of OPSS 501.

206.06.04 Hydraulic Excavator - Crawler Mounted for Rock Embankment Construction

Hydraulic excavator, crawler mounted for rock embankment construction required in the General clause of the Rock Embankments clause shall have a minimum operating weight of 32,000 kg.

206.06.07 CONSTRUCTION

206.07.05.01.03 Modified Layer Compaction Method

Clause 206.07.05.01.03 of OPSS 206 is amended by deleting the fifth and sixth paragraphs in their entirety and replacing them with the following:

Prior to the construction of the trial section, the maximum dry density (MDD) of the material to be compacted shall be determined according to LS-706 from a minimum of 3 independent samples of the material.

Acceptance of the trial section shall be based on compaction testing within the trial section lift. For testing within the lift, the trial section shall be a single lot with 4 sublots of equal area. At a random location within each sublot, a level surface shall be prepared at a depth that permits the probe of a nuclear moisture and density gauge to extend to the bottom of the lift. Field wet density and moisture content shall be determined at each random location using the gauge and the dry density value calculated for each sublot.

If the quality index for the lot, calculated according to the Quality Index clause of OPSS 501, is equal to or greater than 1.47, the trial section shall be accepted. If the quality index for the lot is less than 1.47, the method of construction of the trial section shall not be accepted. The target density for the purpose of the quality index calculation shall be the average of the 3 MDD values determined according to LS-706.

If the trial section has been accepted, field wet density and moisture content testing shall be carried out at 10 random locations on the trial section surface using a nuclear moisture and density gauge. The average dry density from the 10 locations shall be calculated and used as the target density for acceptance, according to OPSS 501, for further placement of the material by the modified layer compaction method.

The same procedure used for the construction of the accepted trial section, including compaction equipment, vibration characteristics, and number of passes, shall be used for the further placement and compaction of the same material by the modified layer compaction method.

A new trial section shall be required for the material when one or more of the following apply:

a) A new target density is required according to the Target Density clause of OPSS 501.

b) The Contractor wants to change the accepted modified layer compaction method procedure.

c) An accepted modified layer compaction method procedure is no longer producing the required degree of compaction.

When requested by the Contract Administrator, compacted material shall be removed to verify the thickness and/or complete compaction testing on a levelled surface within any compacted lift.

All excavation, backfilling, and re-compaction necessary for thickness verification and compaction testing within the trial section lift and as requested by the Contract Administrator at other locations shall be completed to the satisfaction of the Contract Administrator at no additional cost to the Owner.

206.07.05.02 Rock Embankments

206.07.05.02.01 General

Clause 206.07.05.02.01 of OPSS 206 is amended by deleting the fifth and sixth paragraphs in their entirety and replacing them with the following:

For rock embankments, other than shale, the layers shall not exceed 1.5 m thickness prior to compaction. The material in each layer shall be fully compacted before the succeeding layer is placed. Each rock fill layer shall be compacted with a tractor bulldozer, crawler type, as specified in the Tractor Bulldozer - Crawler Type for Rock Embankment Construction subsection. In confined areas or in any other areas where the Contract Administrator agrees that a tractor bulldozer , crawler type, cannot be reasonably used, then each rock fill layer may be compacted using a hydraulic excavator , crawler mounted, as specified in the Hydraulic Excavator - Crawler Mounted for Rock Embankment Construction subsection. The minimum number of complete passes shall be six and the maximum number of passes shall be eight for either type of equipment. A complete pass shall be defined as 100% coverage of the layer surface. The maximum speed of the equipment during each pass shall be 3.2 km/h.

For all rock embankments, materials shall be placed in their final position by blading when using a tractor bulldozer, crawler type for or by raking and chinking when using a hydraulic excavator, crawler mounted or a combination of both types of equipment, providing that the total number of complete passes over the same area specified in the paragraph given above is achieved. End dumping or depositing of rock over the end of any layer by hauling equipment is not permitted,

except as otherwise noted below. Each layer shall be levelled in place and compacted to minimize voids and bridging of large rock fragments within the embankment.

SSP 12 AMENDMENT TO OPSS 501, NOVEMBER 2014

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 105S22 June 2016

501.07 CONSTRUCTION

501.07.01 General

Subsection 501.07.01 of OPSS 501 is deleted in its entirety and replaced with the following:

The method of placing and lift thickness of earth or granular material shall be according to the specifications that govern the Work. When not specified, the lift thickness of earth shall not exceed 300 mm and the lift thickness for granular materials shall not exceed 150 mm.

When field testing indicate that the required degree of compaction cannot be obtained with the equipment in use or the procedure being followed, the operations shall be modified so that the equipment and procedures will produce the required results.

501.07.04 Quality Control

501.07.04.02 Compaction Requirements

501.07.04.02.04 Target Density

Clause 501.07.04.02.04 of OPSS 501 is deleted in its entirety and replaced with the following:

New target densities shall be established for each separate component of the Work (e.g., backfilling of a trench, construction of a granular base, or placement of cover) at the following times:

a) For earth and granular materials:

   i. At the time of initial use of each source.
   ii. When there is a perceptible change in the appearance or gradation of the materials or both.

iii. At least once per calendar year on all carry-over Contracts.

b) For earth being placed:

i. As backfill, after QC lots representing 2000 tonnes or 1000 m³ of material have been completed, whether accepted or rejected, on the basis of one set of target density values, or
ii. For all other purposes, after each 10 QC lots of material have been completed, whether accepted or rejected, on the basis of one set of target density values.

c) For granular materials being placed:

i. As backfill, or at the discretion of the Contract Administrator, any other areas, after QC lots representing 5000 tonnes or 2500 m³ of material have been completed, whether accepted or rejected, on the basis of one set of target density values, or
ii. For all other purposes, after each 25 QC lots of material have been completed, whether accepted or rejected, on the basis of one set of target density values.

The new target density shall be established by the construction of a control strip according to the Control Strip clause, except the new target density shall be based on the maximum dry density (MDD) as determined by LS-706 not more than 14 Days prior to placing the material, when:

a) Placing material in confined areas that do not allow equipment meeting the requirements specified in the Compaction clause to be used.

b) With the consent of the Contract Administrator, a control strip cannot be reasonably constructed or is impractical.

The MDD used for the new target density shall be the average of the MDD calculated from a minimum of 3 independent samples selected from the materials to be used.

501.07.04.02.04.01 Control Strip

Prior to construction of a control strip:

a) A minimum notice of 24 hours shall be given to the Contract Administrator, and

b) The optimum moisture content (OMC) of the material shall be determined according to LS-706.

Each control strip shall consist of a single uniform lift not more than 0.30 m in depth and covering at least 400 m² in area. The surface of each control strip shall be graded flat.

Prior to compaction, the field moisture content of the control strip material shall be determined using a nuclear gauge at a minimum of 3 randomly selected locations. The average moisture content at those three locations shall be within the range of no less than 2.0% lower than and no more than 1.0% greater than the OMC of the control strip material. If the average moisture content is not within this range, the moisture content of the material shall be uniformly adjusted (e.g. by adding water and re-mixing or scarifying and drying). The material shall then be graded flat and re-tested using a nuclear gauge. This process shall be repeated until the average moisture content of the material, at a minimum of 3 randomly selected locations, is within the range of no less than 2.0% lower than and no more than 1.0% greater than the OMC of the control strip material.

When the OMC is within the acceptable range, the compaction equipment shall make 6 passes over the entire surface of the control strip. A pass shall be deemed to be compaction of the full width of the control strip in one direction only. The field wet density and field moisture content shall be determined at a minimum of 3 randomly selected locations. The dry density shall be calculated for each of these locations and the average dry density used as the initial value for the dry density.

All passes of the compaction equipment for the control strip shall be carried out in vibratory mode at a speed of no more than 5 km/hour.

The compaction equipment shall then make 2 additional passes over the entire surface of the control strip.

A minimum of 3 separate random field density and moisture content determinations shall then be made and a new average dry density shall be calculated.

If the new average dry density exceeds the previous value by more than 0.030 t/m³, then additional passes of the equipment shall be carried out as described above. If the new average dry density does not exceed the previous value by more than 0.030 t/m³, then the compaction of the control strip shall be considered satisfactory and complete.

Upon satisfactory completion of the control strip, an additional 7 field wet density and moisture content tests shall be taken at random locations and the dry density values determined. The final dry density of the control strip, which shall be deemed to be the target density, shall be the average of the dry density values determined at these 7 additional random locations plus the 3 most recent values that were determined upon completion of the control strip.

SSP 13 USE OF AIR COOLED IRON BLAST FURNACE SLAG AS GRANULAR MATERIAL

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 110F10 September 2001

SCOPE

This special provision covers the requirements for the use of air cooled iron blast furnace slag as granular material in road construction.

DEFINITIONS

Slag: means air cooled iron blast furnace slag.

CONSTRUCTION

General Operational Constraints

For those applications permitted in this special provision, it is the Contractor's responsibility to notify the District Manager of the local District Office of the Ministry of the Environment (MOE), of the locations where slag will be utilized.

The Contractor shall prepare a contingency plan that specifically addresses management by the Contractor, during construction, of any odour and leachate which may be generated by the slag material. The plan shall include but not be limited to the following:

a. a strategy for containment, cleanup and disposal of leachate to ensure a quick and comprehensive response to any escape of leachate from the construction site;

b. a strategy for communicating with MOE and other regulatory authorities in the event of any escape of leachate;

c. a strategy to identify the project specific causes of leachate problems as well as a commitment to developing short and long term corrections; and

d. a strategy for dealing with public complaints about odour problems which may occur.

Restrictions On the Use of Slag

a. Slag is prohibited for any application below top of subgrade.

b. Slag may be applied above subgrade with the following exceptions:

N/A

c. During construction, water shall not be directed, through means such as channelized flow or dewatering effluent, to areas where slag has been placed.

d. When placing slag, the Contractor shall ensure that the material is graded and placed in a manner which ensures free drainage and prevents ponding on, within or against the material.

SSP 14 AMENDMENT TO OPSS 1151, NOVEMBER 2016

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 111F06 October 2018

1151.03 DEFINITIONS

Section 1151.03 of OPSS 1151 is amended by deleting the definition of **RAP Content**.

Section 1151.03 of OPSS 1151 is further amended by the addition of the following definitions:

Binder Replacement means the asphalt cement from the RAP contributing to the total asphalt cement content in the mix, expressed as a percentage.

Roof Shingle Tabs (RST) means as defined in OPSS 313.

1151.04 DESIGN AND SUBMISSION REQUIREMENTS

1151.04.01 Design Requirements

1151.04.01.01 General

Clause 1151.04.01.01 of OPSS 1151 is deleted in its entirety and replaced with the following:

A laboratory that has current CCIL Type A certification, AMRL, or AMRL equivalent certification shall be used to conduct all mix designs and mix checks.

Superpave mixes shall be designed using the procedures specified in LS-309, with the exception of WMA mixes. WMA mixes shall be designed using the procedures specified in LS-318 at the anticipated WMA production temperature. In the mix design procedure, all references to RAP Content shall be deleted and replaced with % binder replacement.

Superpave materials, mix designs, and the JMF shall be according to the requirements specified in Tables 1, 2, 3 and 4 for the HMA mix type specified in the Contract Documents.

The use of RST is not permitted in the HMA.

SMA mixes shall be designed using the procedures specified in LS-311. SMA materials, mix designs, and the JMF shall be according to the requirements specified in Tables 1, 4, and 5 for the SMA mix type specified in the Contract Documents. Cellulose or mineral fibres shall be used as a stabilizing additive in dosage rates of 0.3% or 0.4%, respectively, by mass of the total mixture. Regardless of the type of fibre used, the manufacturer's recommendations for any product used shall be followed.

The composition of the HMA may be modified as permitted in Table 6.

The amount of RAP allowable by mass in a mix will be calculated by the Asphalt Binder Replacement method according to the following formula:

% Binder Replacement = [(% asphalt cement content of RAP x % RAP by mass of mix) / (% total asphalt cement content of mix)] x 100%

RAP as processed and ready for use in a HMA shall be tested using LS-282 or LS-292 to determine the average percentage asphalt cement and the average gradation for the extracted RAP aggregates.

Density testing of aggregates and RAP shall be conducted for the purpose of developing the mix design for each mix type in the Contract. Such testing shall be performed during production of each aggregate, RAP, or during stockpiling of the materials at the HMA plant.

In addition, if the composition of the mix is modified by including RAP, the high and low grade of PGAC required shall be lowered by 6 °C when:

% Binder Replacement > 20 %

The JMF selected for use shall produce HMA that meets all the requirements specified in the Contract Documents.

For HMA in this Contract, the mix properties, the compaction effort, and the aggregate properties specified in the Contract Documents, shall conform to the requirements for the traffic category specified in Table A. The use of a mix designed with a traffic category different than specified in Table A is not permitted.

The asphalt cement (AC) added to the hot mix types shall be performance graded asphalt cement, PGAC as specified in Table A. For bidding purposes only, the percentage by mass of asphalt cement, AC_{BID} contained in the various HMA mix types shall be as specified in Table A.

TABLE A
HMA Mix Design Criteria

HMA Type	Location in Contract	Traffic Category	PGAC Grade	AC_{BID} % (Note 1)
SP12.5 FC2	Highway 406	D	70-28	5.2
SP 19.0	Highway 406 Detour	B	64-28	4.8
Note 1: For SMA Mix Types a minimum AC Content is specified in Table 5 based on combined aggregate bulk relative density.				

1151.04.02 Submission Requirements

1151.04.02.01 Mix Design

Clause 1151.04.02.01 of OPSS 1151 is amended by the addition of the following:

The % Binder Replacement shall be calculated and submitted with the mix design.

The asphalt film thickness (T_F) shall be calculated according to the procedure given in Appendix A enclosed with this specification and submitted with the mix design.

1151.05 MATERIALS

1151.05.02 Aggregates

1151.05.02.01 Reclaimed Asphalt Pavement and Roof Shingle Tabs

Clause 1151.05.02.01 of OPSS 1151 is deleted in its entirety and replaced with the following:

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

1151.05.02.01 Reclaimed Asphalt Pavement

The aggregate contained in the RAP, where permitted in a HMA, shall be according to the aggregate requirements of OPSS 1003 for the mix type specified in the Contract Documents.

RAP that is contaminated with deleterious material shall not be used and shall be removed from the work. RAP shall be stockpiled conforming to the stockpiling requirements for coarse aggregates according to OPSS 1001, except that when the material is stockpiled on a compacted granular pad, the top 75 mm of the pad shall be the coarse aggregate that is required for a new (virgin) mixture of the tendered hot mix item.

The use of RAP that is obtained from existing stockpiles that do not have a foundation conforming to the above paragraph shall be permitted provided that the bottom 0.3 m of the stockpile is not incorporated into the work.

Process control sampling and testing of the RAP shall be as specified in the Contract Documents.

Table 6 of OPSS 1151 is deleted in its entirety and replaced with the following:

TABLE 6
Maximum % Binder Replacement

Traffic Category (Note 1)	**Binder Course 150 mm or More Below Pavement Surface**	**Binder Course Within 150 mm of Pavement Surface**	**Surface Course**
A, B	40%	40%	0%
C, D	40%	20%	0%
E	40%	20%	0%
Note 1: Traffic category as specified in the Contract Documents.			

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Table 8 of OPSS 1151 is deleted in its entirety and replaced with the following:

TABLE 8
Sample Quantities for Mix Design Monitoring

Material	**Quantity** (Note 1)
Asphalt Cement	4 litres evenly split between 2 containers
Aggregate	75 to 100 kg of each type
RAP	75 to 100 kg required when RAP contained in the mix
Fines material passing 75 µm sieve	5 to 10 kg when the mix is to be produced with a plant that returns fines to the mix
Mineral Filler	5 to 10 kg sample for SMA mixes
Any other material samples including anti-stripping agents and fibres to be used in HMA	Quantity large enough to allow for a complete mix design
Note 1: Each material sample receptacle shall have a maximum mass of 30 kg.	

Table 9 of OPSS 1151 is deleted in its entirety.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

APPENDIX A
METHOD OF TEST FOR DETERMINING ASPHALT FILM THICKNESS (T_f)

The procedure for determining asphalt film thickness (T_F) was referenced from NCHRP Report 673, pages 57 to 60.

- The asphalt film thickness, T_F, is calculated using the following equation:

  $T_F = (1{,}000 \times VBE) / (S_s \times P_s \times G_{mb})$

  Where,
  T_F = Asphalt Film Thickness, µm;
  VBE = Effective asphalt cement content, % by total mix volume
  S_s = Aggregate specific surface, m^2/kg
  P_s = Total aggregate content, % by mix mass, $(100-P_b)$
  G_{mb} = Bulk specific gravity of the asphalt mix

- The aggregate specific surface, S_s, is calculated using the following equation:

  $S_s = [1 / (1{,}000 \times G_{sb})] \times [2.0 \times (P_{37.5} - P_{25}) + 2.8 \times (P_{25} - P_{19.5}) + 3.9 \times (P_{19.5} - P_{12.5}) + 5.5 \times (P_{12.5} - P_{9.5}) + 8.9 \times (P_{9.5} - P_{4.75}) + 17.9 \times (P_{4.75} - P_{2.36}) + 36.0 \times (P_{2.36} - P_{1.18}) + 71.3 \times (P_{1.18} - P_{0.60}) + 141 \times (P_{0.60} - P_{0.30}) + 283 \times (P_{0.30} - P_{0.15}) + 566 \times (P_{0.15} - P_{0.075}) + 1{,}600 \times (P_{0.075})]$

  Where,
  The P values represent the % of aggregate passing the designated sieve sizes in mm.

  For example,
  P_{25} = % of aggregate passing 25-mm sieve
  $P_{0.15}$ = % of aggregate passing 0.15-mm sieve
  Each successive pair of sieves are multiplied by a factor (2.0, 2.8, 3.9, etc.)

  G_{sb} = Average bulk specific gravity for the blended aggregate

  G_{sb} can be calculated using the following equation:

  $G_{sb} = [P_{S1/A} + P_{S2/A} + P_{S3/A} + ...] / [(P_{S1/A}/G_{sb1}) + (P_{S2/A}/G_{sb2}) + (P_{S3/A}/G_{sb3}) + \ldots]$

Where,
$P_{S1/A}$ = volume % of Aggregate 1 in aggregate blend
$P_{S2/A}$ = volume % of Aggregate 2 in aggregate blend
$P_{S3/A}$ = volume % of Aggregate 3 in aggregate blend
G_{sb1} = bulk specific gravity for Aggregate 1
G_{sb2} = bulk specific gravity for Aggregate 2
G_{sb3} = bulk specific gravity for Aggregate 3

- The total aggregate content, P_s, is calculated using the following equation:

  $P_s = 100 - P_b$

  Where,
  P_b = Total asphalt cement content, % by mix mass

  P_b can be calculated using the following equation:

  $P_b = 100 \times [M_b / (M_s + M_b)]$

  Where,
  M_b = Mass of asphalt cement in specimen
  M_s = Mass of aggregate in specimen

- Sequential steps to calculate the effective asphalt cement content, VBE, are detailed below:

  1. Determine the total asphalt cement content by mass, P_b, using the equation outlined above.

  2. Determine the total asphalt cement content by volume, VB, using the following equation:

     $VB = (P_b \times G_{mb}) / G_b$

     Where,
     VB = Total asphalt cement content, % by total mix volume
     P_b = Total asphalt cement content, % by mix mass
     G_{mb} = Bulk specific gravity of the asphalt mix
     G_b = Specific gravity of asphalt cement

  3. Determine the absorbed asphalt cement content, VBA, using the following equation:

     $VBA = G_{mb} \times [(P_b / G_b) + (P_s / G_{sb}) - (100 / G_{mm})]$

Where,
VBA = Absorbed asphalt cement content, % by total mix volume
G_{mb} = Bulk specific gravity of the asphalt mix
P_b = Total asphalt cement content, % by mix mass
G_b = Specific gravity of asphalt cement
P_s = Total aggregate content, % by mix mass, (100-P_b)
G_{sb} = Average bulk specific gravity for the blended aggregate
G_{mm} = Maximum specific gravity of the asphalt mix

4. Determine the effective asphalt cement content, VBE, using the following equation:

   VBE = VB - VBA

   Where,
   VBE = Effective asphalt cement content, % by total mix volume
   VB = Total asphalt cement content, % by total mix volume
   VBA = Absorbed asphalt cement content, % by total mix volume

SSP 15 AMENDMENT TO OPSS 1101, NOVEMBER 2014 - Additional Test Results and Samples for Performance Graded Asphalt Cement (PGAC)

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 111F09 August 2018

1101.02 REFERENCES

Section 1101.02 of OPSS 1101 is amended by the addition of the following under **Ontario Ministry of Transportation Publications**:

LS-100 Method for Rounding-Off of Test Data and Other Numbers

Section 1101.02 of OPSS 1101 is amended by the deletion of the following under **American Association of State Highway and Transportation Officials (AASHTO)**:

TP 70 Multiple Stress Creep and Recovery (MSCR) of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)

Section 1101.02 of OPSS 1101 is further amended by the addition of the following under **American Association of State Highway and Transportation Officials (AASHTO)**:

T 350-14 Standard Method of Test for Multiple Stress Creep Recovery (MSCR) Test of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)

1101.04 DESIGN AND SUBMISSION REQUIREMENTS

1101.04.01 Submission Requirements

Subsection 1101.04.01 of OPSS 1101 is amended by the addition of the following clause:

1101.04.01.02 PGAC Documentation

For each grade of PGAC specified in the Contract Documents, the Contractor shall supply the following items to the Contract Administrator prior to the commencement of HMA production:

a) PGAC documentation from the asphalt cement supplier in the form of bill of lading and certificate of analysis, confirming the grade of PGAC. The bill of lading and certificate of analysis shall also be supplied for each subsequent delivery of PGAC that will be used for the HMA production.

b) Documentation identifying the PGAC storage tank that the PGAC will be supplied from for the HMA production. The Contractor shall notify the Contract Administrator and provide updated documentation prior to changing the storage tank that is being used to supply PGAC for the HMA production.

1101.08 QUALITY ASSURANCE

1101.08.02 Anti-Stripping Additive

Subsection 1101.08.02 of OPSS 1101 is deleted in its entirety and replaced with the following:

1101.08.02 Asphalt Cement Anti-Stripping Treatment

The Contractor may request that an allowance be made for the impact of the asphalt cement anti-stripping treatment on a PGAC grade for QA or referee purposes provided that when production begins the Contractor submits to the Contract Administrator complete AASHTO M 320 test results for the following:

a) Asphalt cement with anti-stripping treatment at the percentage identified in the mix design.

b) Asphalt cement without the anti-stripping treatment.

1101.08.03 Sampling

Subsection 1101.08.03 of OPSS 1101 is amended by deleting the last paragraph in its entirety and replacing it with the following:

Sampling frequency, minimum quantities and additional labelling shall be as shown in Table 2.

1101.08.06 Referee Testing

Subsection 1101.08.06 of OPSS 1101 is amended by deleting the first paragraph in its entirety and replacing it with the following:

Referee testing by an independent laboratory may be invoked by the Contractor for any lot of PGAC within 5 Days of receiving all the QA test results for the lot.

Table 1 is deleted in its entirety and replaced with the following:

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Table 1
Additional Testing Requirements and Acceptance Criteria for All PGAC Grades (Notes 1 and 2)

PGAC Grade	Property and Attributes (Unit)	Test Method	Results Reported Rounded to Nearest	Acceptance Criteria	Major Borderline	Rejectable
All PGAC Grades except PG58-28	Ash Content, % by mass of residue (%)	LS-227	0.01	≤ 0.60	> 0.60 and ≤ 0.80	> 0.80
PG58-28				≤ 0.40	> 0.40 and ≤ 0.60	> 0.60
All PGAC Grades Except PG58-28 and PG52-34	Non-recoverable creep compliance at 3.2 kPa ($J_{nr-3.2}$) (kPa^{-1})	AASHTO T 350 testing conducted at 58 °C	0.01	< 4.50	N/A	≥ 4.50
	Average percent recovery at 3.2 kPa ($R_{3.2}$) (%)		0.1	> the lesser of 55.0 or [(29.371) $(J_{nr-3.2})^{-0.2633}$]	N/A	≤ the lesser of 45.0 or [(29.371) $(J_{nr-3.2})^{-0.2633}$-10]
	Percent difference in non-recoverable creep compliance between 0.1 kPa and 3.2 kPa, J_{nrdiff} (%)		0.1	Testing carried out for information purposes only		
PG70-28, PG64-28	CTOD, δ_t (mm)	LS-299	0.1	≥ 10.0	< 6.0 and ≥ 4.0	< 4.0
	Low temperature limiting grade (LTLG) (°C)	LS-308	0.1	≤ -28.0	> -25.0 and ≤ -22.0	> -22.0
	Grade Loss (°C)	LS-308	0.1	≤ 6.0	> 6.0 and ≤ 8.0	> 8.0
PG58-28	CTOD, δ_t (mm)	LS-299	0.1	≥ 6.0	N/A	< 4.0
	Low temperature limiting grade (LTLG) (°C)	LS-308	0.1	≤ -25	> -25 and ≤ -22.0	> -22.0
	Grade Loss (°C)	LS-308	0.1	≤ 4	N/A	> 6.0
PG70-34, PG64-34, PG58-34, PG52-34	CTOD, δ_t (mm)	LS-299	0.1	≥ 14.0	< 10.0 and ≥ 8.0	< 8.0
	Low temperature limiting grade (LTLG) (°C)	LS-308	0.1	≤ -34.0	> -31.0 and ≤ -28.0	> -28.0
	Grade Loss (°C)	LS-308	0.1	≤ 6.0	> 6.0 and ≤ 8.0	> 8.0

PG58-40, PG52-40	CTOD, δ_t (mm)	LS-299 (Note 3)	0.1	≥ 18.0	< 14.0 and ≥ 12.0	< 12.0
	Low temperature limiting grade (LTLG) (°C)	LS-308	0.1	≤ -37.0	> -37.0 and ≤ -34.0	> -34.0
	Grade Loss (°C)	LS-308	0.1	≤ 6.0	> 6.0 and ≤ 8.0	> 8.0

Notes:
1. PGAC grades are as specified in the Contract Documents.
2. The rounding-off procedure, for all values, shall be according to LS-100.
3. Sections 6.1 and 6.3 of LS-299 (Rev 31 dated 2017 09 01) are deleted and replaced with the following:
   6.1 After trimming, condition the samples on their base plates at 15 ± 0.5°C for 3 h ± 5 min in their molds in a temperature-controlled bath under a minimum of 25 mm of water.
   6.3 Run the test according to AASHTO T 300 at a displacement rate of 50 ± 2.5 mm/min in a bath maintained at 15 ± 0.5°C, until ductile failure is reached, or a stroke length of 1000 mm is reached.

Table 2 is deleted in its entirety and replaced with the following:

Table 2
Sampling Requirements

Samples	Frequency	Minimum Sample Quantity	Labelling
QA	Each Lot	2 litres (Note 1)	Label shall include: - Grade - Supplier
Referee	Each Lot	2 litres (Note 1)	
Samples for possible Owner testing (Note 2)	First Lot for each grade and source of asphalt cement used on the Contract and for any subsequent Lot requested by the Contract Administrator.	2 litres (Note 1)	Label shall include: - Grade - Supplier - MERO Sample

Notes:
1. Two litres shall be provided in 2 suitable one litre containers or a container able to hold a minimum of 2 litres.
2. Samples for possible Owner testing shall be delivered to:
   Materials Engineering and Research Office (MERO)
   Bituminous Laboratory, Room 15
   145 Sir William Hearst Avenue
   Downsview, Ontario M3M 0B6

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 16 AMENDMENT TO OPSS 1301, SEPTEMBER 1996

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 113S03 December 2004

OPSS 1301, September 1996, Material Specification for Cementing Materials is amended as follows:

1301.01 SCOPE

Section 1301.01 of OPSS 1301 is deleted and replaced by the following:

This specification covers the requirements for cementing materials together with the method of sampling, testing, delivery, handling and storage, prior to use.

The following types of cementing materials are covered by this specification:

Portland Cements

GU - General use hydraulic cement (formerly Type 10 Portland cement)
MS - Moderate sulphate-resistant cement (formerly Type 20 Portland cement)
MH - Moderate heat of hydration hydraulic cement (formerly Type 20 Portland cement)
HE - High early strength hydraulic cement (formerly Type 30 Portland cement)
LH - Low heat of hydration hydraulic cement (formerly Type 40 Portland cement)
HS - High sulphate resistant hydraulic cement (formerly Type 50 Portland cement)

Blended Hydraulic Cements

GUb - Blended general use hydraulic cement (formerly Type 10E blended hydraulic cement)
MSb - Blended moderate sulphate-resistant cement (formerly Type 20E blended hydraulic cement)
MHb - Blended moderate heat of hydration hydraulic cement (formerly Type 20E blended hydraulic cement)
HEb - Blended high early strength hydraulic cement (formerly Type 30E blended hydraulic cement)
LHb - Blended low heat of hydration hydraulic cement (formerly Type 40E blended hydraulic cement)
HSb - Blended high sulphate resistant hydraulic cement (formerly Type 50E blended hydraulic cement)

Supplementary Cementing Materials

Slag - Ground granulated blast furnace slag, Type S

Fly ash – the finely divided residue that results from the combustion of pulverized coal or a combination of pulverized coal blended with up to 30% by mass of petroleum coke and that is carried from the combustion chamber of a furnace by exhaust gases, Types F, CI or CH.

Silica Fume – the finely divided residue, resulting from the production of silicon or ferrosilicon alloys, that is carried from the burning area of a furnace by exhaust gases. The silica fume shall contain a minimum of 80% SiO_2.

1301.02 REFERENCES

Section 1301.02 of OPSS 1301 is deleted and replaced by the following:

This specification refers to the following standards, specifications or publications:

Canadian Standards Association Standards:

CAN/CSA A3000-03 Cementitious Materials Compendium

1301.04 SUBMISSION AND DESIGN REQUIREMENTS

1301.04.01.01 Product Data

Clause 1301.04.01.01 of OPSS 1301 is amended by deletion of point a. and replacing it with the following:

a. A test certificate from a laboratory, qualified according to the Materials Section, showing compliance of the cementing material with all the physical and chemical test requirements of CAN/CSA A3000, including the additional requirements of this specification and the optional test for false set if the product is Portland cement.

1301.05 MATERIALS

1301.05.01 Physical and Chemical Requirements

Clause 1301.05.01of OPSS 1301 is amended by deletion of first and third paragraph and replacing it with the following:

Cementing materials shall conform to the physical and chemical requirements of CAN/CSA A3000. Fly ash, slag and silica fume shall also conform to the optional requirements of CAN/CSA A3000 with the exception of the requirements for "Control of Expansion Due to Alkali-Silica Reactivity".

Where Portland cement is required to be certified as being free from early stiffening tendencies, the penetration shall be 50% or greater when determined by the method specified in the Annex A of CAN/CSA A3000.

SSP 17 INFORMATION TO BIDDERS REGARDING AGGREGATE SOURCES

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 199F14 August 2018

General

The Contractor must demonstrate the ability of aggregate sources to produce aggregate that satisfies the requirements of the Contract Documents.

During tendering, a request for approval for use of an MTO/Crown source not listed on an Aggregate Sources List (ASL) shall be made through the bid enquiry process. Any MTO/Crown sources not listed on an ASL may be used, subject to the approval of the Head, Regional Geotechnical Section. If approval is granted, the ministry's ASL Conditions of Information shall apply.

For enquiries related to Crown sources or sources under permit to MTO, Contractors may contact the appropriate Regional Geotechnical Section to request available Mineral Aggregate Inventory Data Bank (MAIDB) information.

For enquiries related to a specific commercial and/or private source, the Contractor may contact the Aggregate Unit of the appropriate Regional Geotechnical Section to access available Mineral Aggregate Inventory Data Bank (MAIDB) information provided they have written consent from the source owner.

Regional Geotechnical Section offices are located in:

Location/Office	Region	Telephone #	Fax #
Kingston	East	(613) 545-4794	(613) 540-5106

North Bay	Northeast	(705) 497-5478	(705) 497-5499
Thunder Bay	Northwest	(807) 473-2090	(807) 473-2022

For aggregate related enquiries for sources located in Central Region or West Region, please contact:

Location/Office	Region	Telephone #	Fax #
Materials Engineering and Research Office, Soils and Aggregates Section	Central	(416) 235-3736	(416) 235-4101
	West		

Access to the information in MAIDB is provided for the convenience of the Contractor only. Since MAIDB information is dated and subject to interpretation, the information is not guaranteed.

For Contracts that include concrete items, Structural Concrete Aggregate Source Lists and Concrete Base/Pavement Aggregate Source Lists, as applicable, are available on the RAQS/MERX website: www.raqs.merx.com/public/bulletin/bulletin.jsf

Earth Borrow, Rock Supply, Granular Base, and Conventional Hot Mix Aggregates

This contract does not include an Aggregate Sources List (ASL) for earth borrow, rock supply, granular base, and conventional hot mix aggregates. For information regarding commercial sources, Contractors may refer to the following sources of information:

a) Commercial Aggregate and Membership Directory, available through Ontario Stone, Sand & Gravel Association (OSSGA);

b) Aggregate License/Permit List, available through the Ministry of Natural Resources and Forestry (MNRF); www.ontario.ca/environment-and-energy/find-pits-and-quarries, and

c) Aggregate Resources Inventory Papers (ARIPs), available through the Ministry of Northern Development and Mines (MNDM). www.geologyontario.mndm.gov.on.ca/index.html

SSP 18 OTHER CONTRACTOR WITHIN OR ADJACENT TO THE LIMITS OF THE CONTRACT

MTO Special Provision No. 199F43 March 2018

Other work may be in progress within or adjacent to the limits of this contract.

The Contractor shall coordinate the work with other Contractors 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 Contractor shall ensure that a minimum separation as defined by the Ministry of Labour (MOL) is maintained between the operation included in this contract and the work within and/or adjacent to this project, done by others. The contractor may be required to consult with the Ministry of Labour (MOL) to determine exact separation requirements.

The Contractor shall provide a written submission to the Contract Administrator explaining how the work with other Contractors will be coordinated.

The following work may be ongoing:

- Utility Relocations
- MTO Contract 2017-2037
- MTO Contract GWP 2453-18-00 - Fourth Ave Structural Rehabilitation

No claims for extra payment will be allowed for this requirement.

SSP 19 PARTICIPATION IN THE ANNUAL LABORATORY CORRELATION PROGRAM

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 199S54 February 2018

Annual Laboratory Correlation Program

Laboratories that are operated or hired by the Contractor to perform testing for acceptance purposes according to the Contract Documents, shall participate in the relative Ministry Laboratory Correlation Program for the appropriate material(s).

For other testing, the laboratories shall have the option to participate in the Ministry Laboratory Correlation Program.

There will be no compensation for participation in the Ministry Laboratory Correlation Program.

SSP 20 GENERAL REQUIREMENTS OF SAMPLES FOR QUALITY ASSURANCE, REFEREE AND OTHER TESTING BY THE OWNER OR THE OWNER'S AGENT

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 199F57 December 2017

Scope

This Special Provision covers the minimum requirements for the handling, identification, and delivery of samples to a laboratory for quality assurance, referee and other testing by the Owner or the Owner's agent.

Sampling and Identification

All samples shall be obtained and packaged by the Contractor, in the presence of the Contract Administrator or a designated representative. All samples shall be provided with a unique number by the Contract Administrator for identification purposes.

Sampling, handling, and storage of samples shall be as specified in the Contract Documents. Notwithstanding, the Owner may take samples for its own purposes at any time from any location. The Contractor shall furnish all reasonable assistance to the Owner and shall require its Subcontractors and suppliers to do the same.

The Contractor shall supply sample containers and all relevant Material Safety Data Sheets or Safety Data Sheets. All containers used for samples of materials controlled under the Workplace Hazardous Materials Information System shall be appropriate for the materials and shall be labelled and accompanied with the relevant Material Safety Data Sheets or Safety Data Sheets.

The Contractor shall package all samples to minimize risk of damage or contamination during transport. Once packaging is complete, the Contractor shall inspect all samples and confirm each sample and packaging is acceptable to the Contract Administrator for delivery.

After inspecting and determining that each sample is acceptable for delivery, the Contractor shall enter the sample data information. Upon the Contractor submitting the sample data information, the Contractor accepts responsibility that the information entered is accurate.

The Contractor shall place bags or containers of samples into clear polyethylene security bags supplied by the Owner when instructed by the Contract Administrator. At this point, the Contract Administrator shall take possession of, and assume responsibility for the samples. The Contract Administrator or his representative may apply security seals.

The Contractor shall be responsible for all costs associated with obtaining new samples if the original samples did not conform to the sampling requirements (e.g. weight and size) and were deemed unsuitable for testing by the laboratory or the Owner.

Sample Delivery by the Contractor

The Contractor shall be responsible for the delivery of concrete cylinders for strength and grout cubes for strength determination, and bridge bearing pads, to the laboratory designated by the Owner. All other samples shall be delivered by the Contract Administrator.

Samples delivered by the Contractor shall be within the time limits and locations specified in the Contract Documents. The Contractor shall normally deliver samples during normal business hours. Normal business hours are deemed to be from 8:00 a.m. to 5:00 p.m., each Business Day. Where a sample has to be delivered outside these hours, the Contractor shall give the laboratory one full Business Day notice. If the time limits or locations or both for delivering samples are not specified in the Contract Documents, then the sample shall be delivered by the Contractor no later than 1 Business Day(s) from the date of sampling to the regional quality assurance laboratory located within a 150 km radius of the Contract limits.

For all samples delivered by the Contractor, the Contractor shall maintain a record of the date and time of delivery, and the printed name and signature of the authorized individual receiving the sample. The Contractor shall sign the laboratory's records to confirm the date and time of delivery.

The Contractor shall be responsible for all costs associated with obtaining new samples if the original samples delivered by the Contractor are lost or deemed unsuitable for testing by the laboratory or the Owner.

The regional quality assurance laboratory shall be designated by the Owner.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 21 NATIONAL ENERGY BOARD (NEB) REGULATED PIPELINES

MTO Special Provision No. 199F59 December 2017

1.0 SCOPE

The Contractor shall comply with regulations pursuant to Section 112 of the National Energy Board Act when using power-operated equipment or explosives within the prescribed area.

The NEB Act and Regulations referenced below must be read in conjunction with and are intended to supplement the general requirements of the Ontario Occupational Health and Safety Act and Regulations for Construction Projects, specifically Section 228, Precautions Concerning Services.

2.0 REFERENCES

This Special Provision refers to the following publications:

National Energy Board Act 112(1) and 112(2)
NEB Pipeline Damage Prevention Regulations - Authorizations
NEB Pipeline Damage Prevention Regulations - Obligations of Pipeline Companies
NEB Pipeline Damage Prevention - Ground Disturbance, Construction and Vehicle Crossings

3.0 DEFINITIONS

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

Prescribed Area means a strip of land measured 30 metres perpendicularly on each side from the centreline of a pipe controlled by the NEB.

Ground Disturbance means any activity that may disturb the ground within the prescribed area.

4.0 COMPLIANCE MEASURES

The Contractor shall contact all pipeline owners listed below and request from them a copy of their technical guidelines for work adjacent to their pipelines.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Pipeline Owner	Contact Information
N/A	N/A

SSP 22 PRESERVATION OF EXISTING UTILITIES

The contractor is advised that existing utilities are in very close proximity to the proposed construction. Extra care is required by the contractor to not disturb or undermine these utilities. Contractor shall be aware that utilities may not be as exactly shown on the drawings and may be in the located in areas required for excavation of road. Contractor shall be responsible for protection of the existing utilities. Any associated cost for this work is deemed to be included in the tender items. Existing utility locations and depths of utilities, whether indicated on the drawings or not, shall be confirmed by the contractor prior to construction.

Preservation of existing utilities shall be as per OPSS 491. For utilities greater than 300 mm diameter, the Contractor shall submit to the Contract Administrator shop drawings, stamped by a professional engineer licensed to practice in Ontario, detailing the temporary and permanent support. The Contractor shall also advise the utility owner when he will be working in the vicinity of their plant, and conduct all operations in accordance with utility company requirements.

The contractor shall be aware that there are existing Enbridge gas plants within the project limits. Working in the vicinity of Enbridge gas facilities shall be in accordance with Enbridge standards as per the document in the below website link:

https://www.enbridgegas.com/assets/docs/third%20party%20requirements%20in%20the%20vicinity%20of%20natural%20gas%20facilities.pdf

Any appurtenance damaged directly or indirectly by the contractor's operation shall be replaced by the contractor. The costs associated with any repairs to appurtenances damaged by the Contractor's operation will be at the expense of the Contractor.

No payment shall be made to meet the requirements of this specification.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 23 GENERAL REQUIREMENTS FOR REFEREE TESTING

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 199S64 July 2016

1.0 Scope

This Special Provision describes the common requirements for referee testing related to laboratory and field testing of engineering materials and associated costs. Individual specifications and Special Provisions provide details on the referee process for specific materials where applicable.

2.0 Definition

Referee Testing means testing of a material property or attribute by an independent, 3rd party laboratory for the purpose of resolving acceptance.

3.0 Referee Testing Requirements

Referee testing may be invoked by the Contractor provided that all associated contractual conditions have been met. The Contractor shall identify in writing the material and specific property or properties, attribute(s) lot and sublot(s), as applicable, for which the referee testing is being requested.

Referee testing shall be carried out by a laboratory designated by the Owner from a roster maintained for this purpose, unless otherwise specified elsewhere in the Contract Documents.

Referee test results shall be binding on both the Contractor and the Owner.

4.0 Observation

The Contractor and Owner may designate a maximum of two representatives each to observe the referee testing. The Owner and Contractor shall be notified a minimum of three Business Days in advance of the date and time of referee testing. Provided that such notice was given, referee testing shall commence on time, and be carried out regardless of the absence of one or more observers.

All communications with the referee testing laboratory shall be through the Contract Administrator.

Observers shall follow all referee laboratory protocols for access to the premises and testing equipment and shall not unnecessarily impede the progress of the referee testing. Observers shall be permitted to validate sample identification and view sample condition. Subject to safety requirements, testing procedures and equipment limitations, observers shall be permitted to witness test activities, take notes, view equipment readings and review completed work sheets while in attendance. The taking of photographs and videos shall not be permitted.

Concerns with sample condition or sample identification shall be made known to all observers prior to commencement of the referee testing. Comments on deviations from the applicable test method shall be made at the time of referee testing. Unresolved concerns shall be specific in nature and submitted in writing to the referee laboratory's designated representative and the other observers present, at the time of testing.

5.0 Referee Testing Costs

Referee testing costs shall be the sum of all applicable testing costs, as shown in Table 1, for all tests included in each referee testing request plus, a standard shipping and handling charge, unless otherwise specified elsewhere in the Contract Documents. Responsibility for payment of referee testing costs shall be as specified elsewhere in the Contract Documents.

No compensation shall be made for any costs incurred in observing the referee testing or for travelling to and from the referee laboratory.

TABLE 1

Category	Attribute (Test Description)	Cost per Test (Note 1)
Aggregates	Material Finer than 75µm Sieve in Mineral Aggregates by Washing (LS-601)	$135
	Sieve Analysis of Aggregates (includes washing of the fine aggregate portion according to LS-601) (LS-602)	$320
	Resistance to Degradation of Coarse Aggregate by Abrasion and Impact in the Los Angeles Abrasion Machine (LS-603)	$600
	Relative Density and Absorption of Coarse Aggregate (LS-604)	$315
	Relative Density and Absorption of Fine Aggregate (LS-605)	$355
	Soundness of Aggregates by Use of Magnesium Sulphate (coarse aggregate fraction only) (LS-606)	$630
	Percent Crushed Particles in Processed Coarse Aggregate (LS-607)	$225
	Percent Flat and Elongated Particles in Coarse Aggregate Containing no RAP or RST Aggregates (LS-608)	$340 (Note 2)

	Petrographic Analysis of Coarse Aggregate (Part A), complete analysis (LS-609)	$850
	Petrographic Examination of Coarse Aggregate (Part A), analysis for determination of percentage of specific material types only (e.g. % total carbonate rock type, and/or % contamination) (LS-609)	$375
	Petrographic Analysis of Coarse Aggregate (Part B), includes the extraction using LS-282 (LS-609)	$850
	Organic Impurities in Concrete Sands for Concrete (LS-610)	$150
	Insoluble Residue of Carbonate Aggregates (LS-613)	$460 (Note 2)
	Freezing and Thawing of Coarse Aggregate (LS-614 or CSA A23.2-24A)	$710
	Potential Alkali-Carbonate Reactivity of Carbonate Rocks by Chemical Composition (LS-615 or CSA A23.2-26A)	$1,010
	Petrographic Analysis of Fine Aggregate (Part A) (LS-616)	$1,020 (Note 2)
	Petrographic Analysis of Fine Aggregate (Part B) (LS-616)	$470
	Mica Content (LS-616)	$790
	Percent Particles with Two or More Crushed Faces and Uncrushed Particles in Processed Coarse Aggregate (LS-617)	$245
	Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus (LS-618 or CSA A23.2-29A)	$615
	Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus (LS-619 or CSA A23.2-23A)	$615
	Accelerated Detection of Potentially Deleterious Alkali-Silica Reactive Aggregate by Expansion of Mortar Bars (LS-620 or CSA A23.2-25A)	$3,030
	Amount of Asphalt Coated Particles in Coarse Aggregate (LS-621)	$195
	One Point Proctor Test (OPT) (LS-623)	$235
	Open-Graded Drainage Layer (OGDL) Core Porosity Test (LS-627)	$290
	Uncompacted Void Content of Fine Aggregate (Test for determination of relative density will be paid separately) (LS-629)	$355
	Presence of Plastic Fines in Aggregates (LS-631)	$205
	Extraction for Aggregates that Incorporate RAP and/or RST (LS-282)	$350 (Note 2)
	Specific Gravity and Absorption, Fine Aggregate (AASHTO T84)	$630
	Specific Gravity and Absorption, Coarse Aggregate (AASHTO T85)	$300
	Sand Equivalent, (Method 1) (AASHTO T176)	$325
	Flat and Elongated Particles, Coarse Aggregate (ASTM D 4791)	$360
	Fractured Particles, Coarse Aggregate, One Face (ASTM D 5821)	$250
	Fractured Particles, Coarse Aggregate, Two Faces (ASTM D 5821)	$290

Bituminous (Note 3)	Asphalt Cement Content and Analysis of Extracted Aggregate from Bituminous Paving Mixtures (Solvent Method) (LS-282)	$315 per sample
	Asphalt Cement Content, Aggregate Gradation, and Percent Gmm at Ndes (LS-282/LS-292, LS-313, LS-264)	$625 per sample
	Determination of Percent Compaction of Compacted Bituminous Mixtures (MRD Method) on core sample (LS-287)	$140 per sample
	Determination of Percent Compaction of Compacted Bituminous Mixtures (MRD Method) on loose mix sample (LS-287)	$140 per sample
	Asphalt Cement Content By Ignition and Analysis of Remaining Aggregate from Bituminous Paving Mixtures (LS-292)	$315 per sample
	Determination of Correction Factor for Use of Ignition Furnace (LS-292)	$1,250 per calibration
	Measuring Pavement Lift Thickness (LS-294)	$35 per core (single lift) $55 per core (multi-lift)
	Determination of Draindown Characteristics in Uncompacted Asphalt Mixtures (LS-310)	$200 per sample
	Bulk Relative Density of Both Blended Coarse and Blended Fine Aggregate Containing no RAP or RST Aggregates (LS-604, LS-605)	$800 per combined density
	Bulk Relative Density of Both Blended Coarse and Blended Fine Aggregate that Incorporate Extracted RAP and/or RST Aggregates (LS-604, LS-605, LS-282)	$1,100 per combined density
	Tack Coat: Percent Residue and Penetration of Residue (LS-200, LS-216)	$285 per sample
	Continuous Grading the Performance Grade (PG) of an asphalt binder and Ash Content (AASHTO R29, LS-227)	$1,175 per sample
	Continuous Grading the Performance Grade (PG) of an asphalt binder, Ash Content, DENT and MSCR (AASHTO R29, LS-227, LS-299, AASHTO T350)	$2,450 per sample
	Continuous Grading the Performance Grade (PG) of an asphalt binder, Ash Content, DENT, MSCR and Extended BBR (AASHTO R29, LS-227, LS-299, AASHTO T350, LS-308)	$4,000 per sample
	Granular Sealer Type Ia Quality (LS-200, LS-202, LS-204, LS-205, ASTM D402)	$1,000 per sample
	Granular Sealer Type Ib or II Quality (LS-200, LS-204, LS-205, LS-216, LS-217, LS-218, LS-219, LS-223 or ASTM D1310, and ASTM D6930)	$1,275 per sample

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Surface Smoothness by Inertial Profiler (LS-296) (Notes 4 and 5)	West Region, Central Region, and Eastern Regio n	1 to 5 Sublots on all Highways	$3,060
		6 to 20 Sublots on all Highways and 21 to 40 Sublots on non 400 series Highways	$5,100
		21 to 40 Sublots on 400 series Highways and 41 to 80 Sublots on non 400 series Highways	$7,140
		41 or more Sublots on 400 series Highways and 81 or more Sublots on non 400 series Highways	$9,180
	Northeastern Region	1 to 5 Sublots on all Highways	$4,080
		6 to 20 Sublots on Highways and 21 to 40 Sublots on non 400 series Highways	$6,120
		21 to 40 Sublots on 400 series Highways and 41 to 80 Sublots on non 400 series Highways	$8,160
		41 or more Sublots on 400 series Highways and 81 or more Sublots on non 400 series Highways	$10,200
	Northwestern Region	1 to 5 Sublots on all Highways	$7,140
		6 to 20 Sublots on all Highways and 21 to 40 Sublots on non 400 series Highways	$9,180
		21 to 40 Sublots on 400 series Highways and 41 to 80 Sublots on non 400 series Highways	$11,220
		41 or more Sublots on 400 series Highways and 81 or more Sublots on non 400 series Highways	$13,260
Water-proofing	Waterproofing Membrane Thickness (Field Guide for the Acceptance of Hot Mix and Bridge Deck Waterproofing)		$1,000
	Waterproofing Membrane Quality (OPSS 914 and OPSS 1213)		$1,100
Concrete	Compressive Strength of Moulded Concrete Cylinders (LS-407)		$90 (per set of two 150mm diameter cylinders or three 100mm diameter cylinders)
	Compressive Strength of High Strength Concrete Cylinders (LS-426)		$90 (per set of three 100mm diameter cylinders)
	Compressive Strength Testing of Concrete Cores (LS-410)		$100 (per one core)
	Microscopical Determination of Air Void System Parameters in Hardened Concrete for Referee Test (LS-431)		$650 per test (Note 6)
	Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration (LS-433)		$600 (per set of two specimens from one core or cylinder)

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

	Linear Shrinkage of Concrete (LS-435) per test		$1,000 (per set of three 75mm x 75mm x 285mm specimens)
Admixtures	Chemical Admixture (Including Superplasticizers)	Method of Test for Non-Volatile Content of Chemical Admixtures, Latex Admixtures and Curing Compounds, and Method of Test for Relative Density of Chemical Admixtures, Air Entraining Admixtures, Latex Admixtures and Curing Compounds (LS-413 and LS-414)	$500 (per non-volatile content and relative density determination of one sample of admixture)
	Air Entraining Admixture	Method of Test for Relative Density of Chemical Admixtures, Air Entraining Admixtures, Latex Admixtures and Curing Compounds, and Method of Test for pH of Aqueous Solutions by Glass Electrode (LS-414 and LS-415)	$500 (per relative density and pH determination of one sample of admixture)
Mechanical Connectors	Method of Test for Mechanical Connectors Used to Splice Steel Reinforcement (LS-434)		$500 (per set of three sample connectors)
Soils	Determination of Moisture Content of Soils (LS-701)		$60
	Determination of Particle Size Analysis of Soils (includes LS-705, Relative Density, in triplicate) (LS-702)		$880
	Liquid Limit, Plastic Limit and Plasticity Index of Soils (LS-703/704)		$310
	Determination of Relative Density of Soils (in triplicate) (LS-705)		$640
	Moisture-Density Relationship of Soils Using 2.5 Kg Rammer and 305 mm Drop (LS-706)		$495
	Moisture-Density Relationship of Soils Using 4.5 Kg Rammer and 457 mm Drop (LS-707)		$565
	Determination of Permeability of Granular Soils (LS-709)		$945

Notes:
1. The standard shipping and handling charge shall be $300 per delivery trip from the Owner's Quality Assurance laboratory to the referee laboratory.
2. Extraction (LS 282) will be paid for one time per sample when required.
3. The minimum fee for any individual referee testing assignment for Bituminous items will be $300.
4. The standard shipping and handling charge shall not be applied to surface smoothness by inertial profiler testing costs.
5. 400 series highways include the Queen Elizabeth Way (QEW) highway.
6. Shipping of AVS samples to the Ministry and polishing, if necessary, is included in the fee.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 24 QUALITY CONFORMANCE REQUIREMENTS

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 199S66 March 2018

1.0 SCOPE

This Special Provision describes the process for the assessment of conformance to the quality requirements and the administrative actions for non-conformance. This Special Provision does not cover conformance to occupational health and safety legislation and regulations, traffic control requirements, excess loading of vehicles, CVOR requirements, or traffic management plans.

2.0 DEFINITIONS

For the purpose of this Special Provision, the following definitions apply:

Acceptance Test Results means the test results that are used for the final assessment of conformance with the specification for the Material. Depending on the specification for the Material, the final assessment of conformance is based on one of the following: quality control, quality assurance or referee test results.

Deficient Material means Material that has an attribute, property or characteristic that does not meet the requirements of the Contract Documents. This includes, but is not limited to, any Material for which acceptance test results indicate less than full payment under a Contract Document containing provisions for payment adjustments.

Deficient Workmanship means work that does not meet the requirements of the Contract Documents due to the Contractor's construction activities including, but not limited to, incorrect elevations, dimensions, alignment, appearance and/or crossfall of individual components, products and finished construction.

Non-Conformance means an occurrence of work not meeting the requirements of the Contract Documents, or an occurrence of deficient Material or deficient workmanship.

Quality Control (QC) means a system or series of activities carried out by the Contractor to ensure that the final product and Material supplied to the Owner meet the requirements of the Contract Documents.

3.0 QUALITY REQUIREMENTS

3.1 General

The Contractor shall meet the quality requirements as detailed in Table 1.

The Contractor is responsible for all QC activities and shall provide the staff and resources necessary to implement QC processes that result in conformance to the quality requirements.

The Contractor is responsible for identifying and immediately communicating to the Contract Administrator all occurrences of work not meeting the quality requirements according to this Special Provision.

3.2 Assessment of Conformance

During the course of construction, and within 30 Days after the date of certification of Contract Completion, the Contract Administrator shall assess the conformance to the quality requirements related to the following activities:

a) The production, supply and placement of all Material used in the Work;

b) The removal, rehabilitation, modification or construction of temporary or permanent elements of the Work; and

c) Sampling, testing and QC records associated with a) and b) above.

The Contract Administrator's assessment of conformance may consist of random or milestone inspections, continuous inspection, sampling and testing for audit or acceptance purposes, audits of the QC documentation specified in the Contract Documents or any combination of the preceding actions, at the discretion of the Owner. In addition, the Owner may perform audits to assess conformance.

3.3 Non-Conformance Process

3.3.1 General

The Contractor shall identify and address all non-conformances prior to issuing a Certificate of Conformance, Manufacturer’s Certificate of Conformance, Request to Proceed, or any other certification when such submissions are required by the Contract Documents.

If components of the work do not conform with the Contract Documents, the Contractor shall propose a corrective action which may include an amendment to the Contract Documents.

Amendments to the Contract Documents shall deliver the functionality of the original Contract Documents. Any aspect of a corrective action that involves or may involve doing work or an act that is within the practice of professional engineering shall be prepared by an Engineer.

Proposed amendments to the Contract Documents shall be approved by the Owner prior to issuing a Certificate of Conformance, Manufacturer's Certificate of Conformance, or Request to Proceed.

Any amendments to the Contract Documents accepted by the Owner, and within the scope of the Certificate of Conformance, Manufacturer Certificate of Conformance, and/or Request to Proceed shall be appended to the related certification.

3.3.2 Non-Conformances

The Contractor shall address identified non-conformances as follows:

a) Implement preventative measures prior to continuing with the associated activity and not proceed with any subsequent activity that would prevent or impede corrective action.

b) Within 3 Business Days, unless otherwise mutually agreed in writing, submit a Non-Conformance Report to the Contract Administrator. The report shall include the following information:

   i. Date and time of the occurrence
   ii. Description of the non-conformance
   iii. Cause of the non-conformance
   iv. Extent of the non-conformance
   v. Proposal for corrective action, payment reduction, or mitigation action, including any amendments to the Contract Documents, for the Contract Administrator's written approval.

c) Carry out corrective action, payment reduction, or mitigating action according to the approved proposal.

3.3.3 Non-Conformances not Identified by Contractor

When the Contractor does not submit a Non-Conformance Report, the Contract Administrator may initiate the Non-Conformance Report. The initial report shall include the following information:

a) Date and time of the occurrence.

b) Description of the Non-Conformance.

When a Non-Conformance Report is initiated by the Contract Administrator, the Contractor shall complete the Non-Conformance Report within 3 Business Days and address the non-conformance according to this Special Provision.

3.4 Deviations

3.4.1 Notification of the Status of the Non-Conformance

Within 3 Business Days of receiving a completed Non-Conformance Report, the Contract Administrator will notify the Contractor in writing that the non-conformance is one of the following:

a) A deviation, including the reason for the deviation;

b) Not a deviation; or

c) Under review with the Owner.

When the status of the non-conformance is identified as “under review with the Owner”, the status will be updated in writing to a) or b) when the review is complete.

3.4.2 Assessment of Deviations

A deviation shall be assessed for:

a) Any non-conformance to the performance requirements of Category 1 through 4 of Table 1 that are not addressed according to the Non-Conformance Process subsection;

b) Any non-conformance to the performance requirements of Category 5 or 6 of Table 1;

c) The third and each subsequent occurrence of the same or similar non-conformance regardless of compliance with the Non-Conformance process subsection;

d) Incorporating deficient Material into the Work without prior approval of the corrective action by the Contract Administrator, after the deficiency has been identified; or

e) Omitting and/or disregarding Material placement and/or construction requirement(s), without the approval of the Owner, reducing the quality level and/or making the quality level unacceptable, indeterminate or unexpectedly acceptable.

Within 3 Business Days after a deviation has been assessed, the Contractor shall comply with the requirements of the Contract Documents that were the subject of the deviation. The deviation will not be waived regardless of the Contractor's subsequent conformance.

3.4.3 Classification of a Deviation

The Contract Administrator will notify the Contractor in writing of the classification of a deviation ("minor" or "major"), after a non-conformance is determined to be a deviation.

The classification of the deviation may be subject to the Owner's review at any time. The Contract Administrator will inform the Contractor of the classification of the deviation, or a change in the classification resulting from a review by the Owner, in a timely manner.

The classification of all deviations will be determined no later than 30 Days after the date of certification of Contract Completion.

A deviation will be assessed as a **major deviation** if it negatively impacts, or increases the Owner's risk of negatively impacting, one or more of the following:

a) The short or long term performance of the product;

b) The Owner's ability to assess the quality of the Material or workmanship as a result of, but not limited to, inadequate documentation, and/or completeness of the records or reports; or

c) The Owner's ability to administer the acceptance of Material according to the Contract Documents as a result of, but not limited to, missing or deficient quality assurance or referee samples.

or a deviation will be assessed as a **major deviation** for:

d) The third occurrence and each subsequent occurrence of the same or similar minor deviation;

e) Submitting a Certificate of Conformance, Manufacturer's Certificate of Conformance, Request to Proceed, or any other certification when the work does not conform with the requirements of the Contract Documents.

f) Proceeding with work prior to submission of a Certificate of Conformance, Manufacturer's Certificate of Conformance, Request to Proceed, other certification, or prior to receiving a Notice to Proceed when required by the Contract Documents.

All other deviations will be assessed as minor deviations.

3.4.4 Contractor's Right to Challenge a Deviation

Within 3 Business Days of being notified of the classification of a deviation, the Contractor may challenge the assessment of the deviation. To challenge a deviation, the Contractor shall submit in writing to the Contract Administrator the reason they are challenging the assessment of the deviation and all relevant documentation supporting their position. The Contract Administrator will review the Contractor's submission and issue a final decision on the assessment of the deviation.

4.0 ADMINISTRATIVE ACTION

If the Contractor does not comply with the requirements of the Contract Documents that were the subject of a Non-Conformance Report, the Owner may take other action it deems necessary.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

TABLE 1
QUALITY REQUIREMENTS

Category	Requirement
1.0 Contractor Personnel / Firms	a) Personnel and firms shall meet the qualifications as specified in the Contract Documents; and b) Qualifications (for example: certificates, licences) shall be maintained for the duration of their participation in the Work.
2.0 Sampling, Testing and Submission of Results	The following shall be performed according to the Contract Documents: a) Material sampling, preparation, handling, delivery and storage; and b) Quality control sampling, testing and submission of results where quality control requirements are specified in the Contract Documents.
3.0 Material and Mix Designs	Each of the following shall comply with, and be supplied, according to the Contract Documents: a) Material from approved/designated sources; b) The complete mix design submission, including all supporting documentation; c) Material from sources identified in the accepted mix design submission; and d) Submission of certification for all materials that require certification. Each of the following shall be performed according to the Contract Documents: a) The mix design; b) Material testing and/or inspection prior to incorporation into the work, and checking that Material meet the accepted mix designs, c) Material handling and/or storage; and d) Addition and/or mixing of materials identified in the accepted mix design. Deficient Material shall not be incorporated into the work.
4.0 Material Placement and Construction	Each of the following shall be according to the Contract Documents: a) Submission of Material-related documentation; b) Submission of drawings plans and procedures; c) Condition of substrate, formwork or other locations against which Material is to be placed; d) Environmental conditions for Material placement, including but not limited to temperature and weather constraints and placement restrictions, e) Tools and equipment; f) Construction requirements for Material placement and/or removal and/or repairs; and g) Provision of protection of Material and components of the work and/or maintenance of environmental conditions after Material placement (for example; curing of concrete, cold weather protection).
5.0 Addressing Non-Conformances	The Contractor shall address all non-conformances according to the Non-Conformance Process subsection.

6.0 Certifications, Request to Proceed, Notice to Proceed and Submission of Drawings / Documents	The Contractor shall ensure that: a) All specified inspections have been carried out prior to certification and issuing of Request to Proceed when specified in the Contract Documents; b) A written Notice to Proceed is received prior to proceeding to the next operation of the work when specified in the Contract Documents; c) All certifications and Request to Proceed are correct, completed accurately, submitted on time according to the Contract Documents and submitted prior to proceeding with the next phase of the work where specified; and d) All drawings and other documents sealed and signed by an Engineer or signed by an Ontario Land Surveyor are submitted on time according to the Contract Documents.

SSP 25 PRECONSTRUCTION SURVEY

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The Contractor will provide the Contract Administrator with a complete copy of the pre-condition survey including all CDs/DVDs and field reports, together with, any subsequent inspection report related to claims investigation forthwith. The precondition survey must be completed and submitted to the Contract Administrator prior to the commencement of construction.

The Contractor shall submit to the Contract Administrator for review and approval a draft copy of the notice to residents for the pre-condition survey. Once approved, the precondition survey contractor shall submit on letterhead the final version of this notice. All notices for the precondition survey shall be delivered by the contractor.

The pre-condition survey must, upon the approval of the property owner and any tenants, include the taking of high resolution video or still photos of all properties inspected. A record must be kept of all properties where the owner or tenants will not allow the videos or photos.

The limits of the properties to be included in the survey shall extend a minimum of 30 metres along each side street and beyond the construction limits

SSP 26 SITE OFFICE

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The provisions of Special Provision A3 shall apply, except as amended or extended herein.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

The site office shall be for the sole use of the Contract Administrator/Resident Engineer. This trailer must be separate from the Contractor's construction trailer.

The Contractor is responsible to erect the Engineer site trailer in location approved by the Region. In addition, the Contractor must obtain written approval from the property owner and forward a copy to the Contract Administrator prior to construction.

Site office shall be a wind-proof weather-tight trailer pre-fabricated steel structure with a ceiling height of 2.4 m, and a minimum floor area of 20 sq. m. and include ceiling lights and windows with screens.

Site office provided shall include wall mounted electrically operated heater and air conditioner with integral thermostats capable of maintaining a room temperature of
21°C.

Office shall be equipped with one 4-drawer lockable file cabinet, one coat rack, one business size desk with drawers, one new ergonomic cushioned swivel tilt armchair with castors, one suitably sized waste container with cover including a supply of trash bags for the duration of the project, one water cooler and one compact microwave.

The Contractor shall arrange and pay (including monthly rentals) for the following:

.1 New plain paper multi-function colour / scanner / photocopier / card reader / printer device. Contractor shall supply plain white paper and ink cartridges for the duration of the contract and when requested by Engineer.

.2 Internet connection (high speed wireless (air card if necessary)) complete with required hardware and software for Engineer's exclusive use.

.3 Private washroom facilities for Engineer's exclusive use adjacent to the site office complete with flush or chemical type toilet.

.4 Contractor is responsible for the removal and disposal of all full trash bags for the duration of the contract.

In addition to the Engineer's site office, the Contractor shall provide space in the trailer suitably sized to allow for site meetings with attendance of up to 15 people, including table and chairs

Clean up and restoration of the site after the trailer is removed is to be included in the lump sum bid price. The Contractor is responsible to obtain a confirmation letter from the property owner stating that he/she is satisfied with the restoration work completed by the Contractor to the site to comply with any of the items listed below will result in a reduction in payment as determined by the Engineer.

The Contractor shall indemnify the Region and its agents against loss by fire, theft or injury to the office and their contents.

Costs associated with the supply of permanent and temporary power to the site office shall be deemed to be included in the lump sum price. The Contractor must make himself/herself aware of the local noise by-laws when considering the use of a temporary portable generator.

Site office must be in-place with all items listed above no later than two (2) weeks following the start of construction and remain on site until completion of the project.

SSP 27 INSTALL, MAINTAIN AND REMOVE SILTATION CONTROL DEVICES

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

Catchbasin Sediment Trap

Catchbasin sediment traps shall be placed in all catchbasins, as directed by the Contract Administrator.

Traps shall consist of non-woven geotextile Terrafix 270R or approved equal.

Geotextile shall be placed in the catchbasin grates preventing runoff from directly entering catchbasins, as directed by the Contract Administrator.

SSP 28 CONSTRUCTION SIGNS, TRAFFIC CONTROL AND TRAFFIC MANAGEMENT PLAN

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The Contractor shall be responsible for the preparation of a traffic management and control plan, to be provided to the Contractor Administrator for review and comment within seven (7) days of contract award. This plan shall have details for the following requirements but shall not be limited to:

- traffic flows with regards to work schedule
- traffic management during peak traffic flows
- maximum delay time
- traffic signal changeover schedule

- number of flag person(s) and communication devices

The plan shall be updated and submitted to the Contract Administrator upon request within 72 hours and shall incorporate any comments made at these meetings.

Vehicular traffic must be maintained at all times for the duration of this contract. Where movement of traffic must be restricted to one lane during construction operations, the Contractor shall supply, erect and maintain all necessary warning signs, delineator hazard markers and competent flagmen to ensure that traffic can be maintained with safety and a minimum of disruption. Lane closure and temporary trench restoration shall be in accordance with Regional Niagara Specifications.

Driveway access must be maintained whenever possible. When it is necessary to close a driveway, the length of the closure must be kept to a minimum. The Contractor must notify the property owner 48 hours in advance with written notice of any driveway closure. The maximum duration for interruptions due to excavation and granular placement is 4 hours. A temporary access must be provided during the interruption for all commercial entrances.

Daily Diary of Signs

OPSS 706, Construction Specification for Traffic Control Signing, November 2010, is amended by the addition of the following:

The Contractor shall maintain a daily, hard bound diary of the signs in use for temporary and long term traffic control. The diary shall be submitted with the final payment documents. For the duration of the contract and within 24 hours of a request by the Contract Administrator, the Contractor shall provide the Contract Administrator full access to the daily diary of the signs. The following information shall be included in the diary:

i) a schematic of the location of each existing sign by station.

ii) a schematic of the placement and re-location of all construction signs during each stage of construction by station.

iii) traffic accidents including time of inspection, location of incident and photographs.

iv) time of daily sign inspections.

v) for mobile/moving operations the signing shall be in accordance with the Ontario Traffic Manual (OTM), Book 7 - Temporary Conditions.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Niagara Region

The following section of this special provision applies to work within Niagara Region ROW:

Permitted Times for Lane Closures

Lane closures for construction will only be allowed during the following times:

Martindale Road

Closure	Monday to Friday	Saturday	Sunday
One Lane Closure	00:00 – 24:00	00:00 – 24:00	00:00 – 24:00
Full Closure	Not Permitted	Not Permitted	Not Permitted

Local Access shall be maintained at all times.

Closure Notification

Prior to the Contractor closing lanes, the Contractor shall:

1. Inform the Contract Administrator of any closure, 1 week prior to the start date of the closure.
2. Inform the Contract Administrator of emergency closures as soon as any details are known.

MTO

The following section of this special provision applies to work within Niagara Region ROW:

Special Provision No. 100F08M June 2017

Open Excavations

The Contractor shall schedule the Work so that there will be 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. Excavations within 4 m of lanes carrying traffic shall be backfilled with the specified material up to profile grade and compacted prior to closing down operations each day.

Location and Storage of Materials and Equipment

Materials shall not be stored within 4 m of the traveled portion of any roadway except in the medians where the minimum clearance required is 2.5 m. Equipment shall not be stored within 4 m of the traveled portion of any roadway.

Notwithstanding the foregoing, the Contractor shall, at the Contractor's expense, remove any vehicle, equipment or material which, in the opinion of the Contract Administrator, constitutes a traffic hazard or obstruction to maintenance operations.

Delivery and Trucking

The Contractor shall plan and schedule the routes of vehicles transporting all materials to, from or within the job, so that vehicular movements are accomplished with minimum interference and interruptions to traffic according to the sections entitled “Restrictions on Construction Operations” and “Permitted Times for Lane and Ramp Closures”. This will necessitate vehicles to “slip-off” or “slip-on” in the direction of traffic, in order to merge with and thereby avoid crossing traffic lanes.

Access to and from the highway right-of-way will be restricted to ramps at the interchanges unless otherwise provided for in the Contract.

Median cross-overs shall not be used except where single axle vehicles are entering a passing lane that is closed to traffic.

The Contractor shall obtain the Contract Administrator's prior approval for the location of any "slip-off" or "slip-ons". The Contract Administrator reserves the right to alter, reject or close same as considered necessary. The Contractor shall notify suppliers of materials and equipment of the above requirements.

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
Highway 406 Northbound	00:00 – 07:00 19:00 – 24:00	00:00 – 07:00 19:00 – 24:00	00:00 – 07:00 19:00 – 24:00	00:00 – 07:00 18:00 – 24:00	00:00 – 07:00 18:00 – 24:00
Highway 406 Southbound	00:00 – 09:00 19:00 – 24:00	00:00 – 09:00 19:00 – 24:00	00:00 – 09:00 19:00 – 24:00	00:00 – 15:00 20:00 – 24:00	00:00 – 15:00 18:00 – 24:00

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:

Holiday	2019	2020
New Year’s Day	January 1	January 1
Family Day	February 18	February 17
Good Friday	April 19	April 10
Easter Monday	April 22	April 13
Victoria Day	May 20	May 18
Canada Day	July 1	July 1
Civic Holiday	August 5	August 3
Labour Day	September 2	September 7
Thanksgiving Day	October 14	October 12
Christmas Day	December 25	December 25
Boxing Day	December 26	December 26

or after noon on days which precede holiday weekends. These days are:

Holiday	2019	2020
New Year’s Day	December 31	December 31
Family Day	February 15	February 14
Good Friday	April 18	April 9
Easter Monday	N/A	N/A

Victoria Day	May 17	May 15
Canada Day	June 28	June 30
Civic Holiday	August 2	July 31
Labour Day	August 30	September 4
Thanksgiving Day	October 11	October 9
Christmas Day	December 24	December 24

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: Highway 406 Northbound

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 – 07:00 19:00 – 24:00	00:00 – 07:00 19:00 – 24:00	00:00 – 07:00 19:00 – 24:00	00:00 – 07:00 18:00 – 24:00	00:00 – 07:00 18:00 – 24:00
Full Closure	Not Permitted	Not Permitted	Not Permitted	Not Permitted	Not Permitted

Section Description: Highway 406 Southbound

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 – 09:00 19:00 – 24:00	00:00 – 09:00 19:00 – 24:00	00:00 – 09:00 19:00 – 24:00	00:00 – 15:00 20:00 – 24:00	00:00 – 15:00 18:00 – 24:00
Full Closure	Not Permitted	Not Permitted	Not Permitted	Not Permitted	Not Permitted

Full mainline closures will be permitted for installation of overhead sign structures, bridge girders, hydro wire installations/modifications and removal of concrete panels during bridge demolition by saw cutting methods only. The installation over the traveled portion of the highway

will require the stoppage of traffic across the full width of the affected set of traffic lanes as well as the closure of the adjacent lane on the other side of the median where applicable.

Closure of a full set of lanes shall only be carried out as follows:

- Ontario Provincial Police must be employed to perform the full closures;
    - The closure shall take place between the hours of 22:00 – 05:30;
- The duration of nightly closures is restricted to fifteen (15) minutes per any 1 hour period or until the end of the traffic queue passes.

Penalty for Early Closing

On each occasion when the Contractor closes lanes to traffic earlier than the specified times, the Contract Administrator will assess the Contractor an initial penalty of $ 1000.00.

Thereafter, a further penalty of $ 100.00 per minute will be assessed against the Contractor for every minute outside the permitted closure window that the traffic lanes are not open to traffic. The Contract Administrator will be the sole judge of the length of time of the delay.

Penalty for Late Opening

On each occasion when the Contractor fails to reopen the traffic lanes by the specified time, the Contract Administrator will assess the Contractor an initial penalty of $ 1000.00

If traffic lanes are not open within 15 minutes of the specified time, a further penalty of $ 1000.00 will be assessed against the Contractor.

Thereafter, a further penalty of $ 100.00 per minute will be assessed against the Contractor for every minute that the traffic lanes are not open to traffic. The Contract Administrator will be the sole judge of the length of time of the delay.

Closure Notification

Prior to the Contractor closing lanes and/or shoulders, the Contractor shall:

1. Inform the Contract Administrator of any closure, 1 week prior to the start date of the closure.

2. Inform the Contract Administrator of any closure lasting more than one week, at least 2 weeks prior to the start date of the closure.

3. Inform the Contract Administrator of emergency closures as soon as any details are known.

4. Obtain a Closure Notification Number from the Contract Administrator for each closure.

5. Inform the Contract Administrator of any closure that is being canceled subsequent to 1. and 2. above.

6. Notify the MTO Central Region Road Work Scheduling and Coordination Unit (RWSCU) by web (www.mtorss.ca) with a completed Closure & Right-of-Way Usage Notification at least two full business days prior to the start date of the closure. The successful bidder 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. Please refer to the Central Region Closure and Right-of-Way Protocol for more details.

7. Notify the Roadwork Scheduling and Coordination Unit (RWSCU) of any closure that is being cancelled.

8. Notify the MTO Compass Operations Centre by phone [416 327-8373] immediately prior to the set-up of any closure stating the Closure Notification Number and details of the closure.

9. 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.

10. Notify the MTO Compass Operations Centre immediately upon removing the closure stating the Closure Notification Number and details of the closure.

Lane Closures and Speed Control by OPP Officers (Paid Duty)

In addition to the requirements listed in the Ontario Traffic Manual (OTM) Book 7, Temporary Conditions; the Contractor has the option to use O.P.P assisted lane closures and speed control activities in order to execute the work.

However, for the following operations it is mandatory to use O.P.P assisted lane closures and speed control activities:

N/A

Basis of Payment

Section 706.10.02 of OPSS 706 is amended by the addition of the following

All costs associated with all O.P.P assisted lane closures and speed control activities as described above is deemed to be included in this tender item and no additional payment will be made.

If an authorized third party stipulates that additional OPP-assisted lane closures or speed control activities are required, the Owner will compensate the Contractor for the cost of the OPP services as a Change in the Work.

SSP 29 EARTH EXCAVATION (GRADING)

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The requirements of OPSS MUNI 206 and Niagara Peninsula Standard Contract Document shall apply to this item except as modified herein.

The Contractor shall review all of the Geotechnical Investigation reports, available on website as noted elsewhere. The Contractor shall not claim any misunderstanding with regards to subsurface chemical conditions.

The Contractor shall be responsible for all cost associated with offsite disposal of surplus material as per recommendations for onsite and offsite reuse contained within this report. The Contractor shall be responsible for all the cost of any additional testing which may be required.

The Contractor shall remove all excavated material off site as fill requirements are minimal.

The volume of asphalt removal shall be paid under separate tender item.

Management of Excess Earth with Salt Impacts

The Contractor shall note that excess earth from road 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 Property Owner's Release as per OPSF 180-3. The volume anticipated to be placed at each location shall be identified prior to disposal and of completion of project.

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.

The contractor shall, upon request, be required to document the volume of material transported and placed at each disposal site.

The contractor shall proof-roll all exposed earth subgrade under the direction of the contract administrator, to locate any obvious soft or loosened zones, topsoil, compressible or otherwise deleterious material. All costs for proof-rolling shall be included in the contract price.

No additional payment shall be made for this work.

SSP 30 DISPOSAL OF CONTAMINATED SOILS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The Contractor shall complete excavation, management, and disposal or all contaminated soil in accordance with Region of Niagara Specifications, OPSS 180, 206 and associated OPSSs, as well as the requirements described herein.

All contaminated soil generated from this operation shall be taken to an appropriately approved waste disposal site identified by the Contractor.

Design and Submission Requirements

Permission of Waste Disposal Site Operator

A copy of all approvals and agreements for this operation shall be provided to the Contract Administrator prior to the management of contaminated soil.

Submission of Certificate of Approval (Waste Disposal Site)

A copy of the Certificate of Approval for a Waste Disposal Site for the waste disposal site(s) used to manage contaminated soil from this operation shall be submitted to the Contract Administrator prior to the management of contaminated soil.

Conditions on the Management of Contaminated Soil

Contaminated soil shall be managed as non-hazardous waste. The management of contaminated soil shall be subject to the following conditions:

Waste shall be transported directly from the construction area to a site that has a Certificate of Approval for a Waste Disposal Site that is valid for the contaminated soil.

Waste shall be transported by a hauler with a Certificate of Approval for a Waste Management System that is valid for the following:

- the entire period of work;
- the entire area within the limits of the contract and the entire haul route;
- the equipment to be utilized; and
- non-hazardous waste.

Verification of Waste Disposal

A copy of the weight ticket(s) or receipts provided by the waste disposal site operator shall be submitted to the Contract Administrator.

Groundwater and Other Free Liquids

In the event that groundwater or other free liquids are encountered during the management of contaminated soil, the Contract Administrator shall be notified immediately. The Contractor shall control the liquid within the excavation area to avoid discharge to any surface watercourse or drainage system.

Construction

The Contractor shall carefully excavate the contaminated soil.

Transport and dispose of the contaminated soil as described above.

Minimize exposure of the contaminated soil to the environment. Excavated soils shall not be temporarily stockpiled prior to off-site disposal unless approved by Contract Administrator.

Measurement for Payment

Measurement for payment is by tonne using weigh tickets from the approved waste disposal site.

SSP 31 REMOVALS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The provisions of OPSS.MUNI 510 and Special Provision B27 shall govern except as amended or extended herein.

The unit price shall include all labour, material and equipment to remove the specified item. It shall also allow for saw cutting the asphalt/concrete at the limits of removal in a neat and straight line, unless the limit of removal is along an existing construction joint. Dispose of the material in accordance with the requirements of OPSS 180 and Special Provisions, G11.

Included under fence removal shall be the reinstatement of the fence, including installation of new post to match existing and connection of existing fencing as directed by the Contract Administrator.

Measurement for payment will be per bid unit for each of the specified items, as described in the schedule of quantities and as measured in the field.

SSP 32 REMOVAL OF CONCRETE DRIVEWAYS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The work shall include the sawcutting as per Special Provision – General G13, removal and disposal of concrete driveways including reinforcing steel or wire mesh.

All cuts shall be made at an existing joint in the driveway or at a location agreed to with the property owner and the Contract Administrator.

SSP 33 REMOVAL OF CATCHBASINS, DITCH INLETS, MANHOLES REMOVAL OF SEWERS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The above tender items shall include all plugging of existing opening following the removal of the pipes and/or appurtenances. As directed by the Contract Administrator, sections of the existing sewer are to be plugged with watertight seal plugs and the full length of pipe grouted with unshrinkable fill.

Prior to the removal of any culverts, the contractor shall verify any existing connections, including residential sump pumps. Should the contractor discover such connections, the contractor shall notify the Contract Administrator to determine the appropriate method of discharge.

Should connections to storm sewers or drainage structures be required, the provisional items for connection shall be applied.

Measurement for payment will be per bid unit for each of the specified items, as described in the schedule of quantities and as measured in the field.

The unit price bid for this item shall be complete compensation for all labour, material and equipment necessary to complete the work.

SSP 34 REMOVE, SALVAGE AND RELOCATE CONCRETE PILLAR

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The unit price bid shall include the removal, storage and reinstallation of the above tender items as directed by the Contract Administrator.

Any concrete footing work that is required shall be deemed to be included in this item.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 35 SUPPLY AND APPLICATION OF TACK COAT

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 308F02 February 2017

Amendment to OPSS 308, April 2012

Painting Material, Application Options, and Samples for Testing

308.05 MATERIALS

308.05.01 Tack Coat and Joint Painting Material

Clause 308.05.01 of OPSS 308 is deleted in its entirety and replaced with the following:

Tack coat and joint painting material shall consist of SS-1 or SS-1HH emulsified asphalt diluted with an equal volume of water. The undiluted material shall be according to OPSS 1103.

308.07 CONSTRUCTION

308.07.01 Application of Tack Coat

Subsection 308.07.01 of OPSS 308 is amended by the addition of the following:

The surface of all binder courses

308.08 QUALITY ASSURANCE

308.08.01.03 Samples for Testing

Clause 308.08.01.03 of OPSS 308 is amended by deleting the second paragraph in its entirety and replacing it with the following:

The minimum quantity of each of the QA and referee samples shall be 1 litre.

SSP 36 SUPPLY AND PLACE HOT MIX ASPHALT

Niagara Peninsula Standard Contract Document (NPSCD) for asphalt shall not apply. The provisions of OPSS. MUNI 310 November, OPSS.MUNI 1101 November 2016 (as amended

herein) and OPSS.MUNI 1151 November 2017 shall apply except as amended or extended herein.

The pavers shall be equipped with automated grade controls and shall be operated at the same time within 50m of the next paver so that a hot joint is obtained between the lanes of hot mix asphalt being placed. Should one paver break down while placing the surface course, the contract administrator may permit the day's work to be completed with the remaining paver. However, the contractor shall supply and have ready for use a back-up paver in the event of any extended break down.

The supply of asphalt to the site shall be such that the pavers shall operate continuously at a uniform speed necessary to match the output of the HMA plant. In no case shall the paver exceed 18m/min.

All traffic control required for this operation, including but not limited to control through the work zone and traffic control personnel at intersections shall be deemed to be included in the appropriate tender item.

The compaction train (rollers) shall meet the requirements of OPSS.MUNI 310 November 2017. Each paver shall be accompanied by a rolling train for the purposes of production/compaction consistency. Back up equipment shall be on site prior to the start of paving in the event of breakdown.

General

This specification covers Hot Mix Asphalt (HMA) to be used for the construction of roads, laneways, parking lots, and bikepaths and includes provisions for Quality Control (QC) and Quality Assurance (QA) testing. Unless otherwise amended herein, materials, production, and placement of HMA shall conform to Ontario Provincial Standard Specifications (OPSS). For the purposes of this specification, "Owner" means the Region, which is the party to the contract for whom the work is being performed.

References

This specification refers to the following standards, specifications, or publications:

- **Ontario Provincial Standard Specifications, Material**
    - OPSS.MUNI 1003 November 2013 - Material Specification for Aggregates - Hot Mix Asphalt
    - OPSS.MUNI 1101 November 2016 - Material Specification for Performance Graded Asphalt Cement

- OPSS.MUNI 1151 November 2017 - Material Specification for Superpave and Stone Mastic Asphalt Mixtures

- **Ontario Provincial Standard Specifications, Construction**

  - OPSS.MUNI 310 November 2017 Construction Specification for Hot Mix Asphalt

- **Ministry of Transportation (MTO) Laboratory Testing Manual, Relevant Bituminous and Aggregate Test Standards, with Revisions**

- **MTO Designated Sources of Materials (DSM) List**

Mix Classifications

The Superpave and Stone Mastic Asphalt (SMA) hot mix types and typical uses are provided in Table 1.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

TABLE 1
SUMMARY OF ASPHALT MIX TYPES AND TYPICAL USES

HOT MIX ASPHALT TYPE	TYPICAL HOT MIX USE AND PROPERTIES
Superpave 4.75	Fine, surface and leveling mixes similar to the traditional sand mixes for miscellaneous applications.
Superpave 9.5	Fine, surface, padding, and leveling mixes for Traffic Category A and B roads and driveways.
Superpave 12.5	Surface mix for Traffic Category B and C roads. Superpave 12.5 is similar to the traditional HL 3, HL 3 Fine, and HL 4 mixes according to OPSS 1150
Superpave 12.5 FC1	Surface mix for use on Traffic Category C roads that provides superior rutting resistance and skid resistance through aggregate selection. Superpave 12.5 FC1 is similar to the traditional HL 1 mix according to OPSS 1150.
Superpave 12.5 FC2	Surface mix for use on Traffic Category D and E roads that provides superior rutting resistance and skid resistance through aggregate selection. Superpave 12.5 FC2 is similar to the traditional DFC mix according to OPSS 1150.
Superpave 19.0	Binder course mix for Traffic Category A, B, C, D and E roads. Superpave 19.0 is similar to the traditional HL 4, HL 8 and HDBC mixes according to OPSS 1150.
Superpave 25.0 and 37.5	Large stone binder course mixes for use when thicker binder lifts are required.
SMA 9.5 and 12.5	Gap-graded premium surface course mix with high frictional resistance, enhanced rutting resistance, water spray reduction, and potential noise reduction for Traffic Category D and E roads. 100% crushed aggregates from the DSM are used for both fine and coarse fraction.
SMA 19.0	Gap-graded premium binder course mix with enhanced rutting resistance for Traffic Category D and E roads. 100% crushed aggregates are used for both fine and coarse fraction.
Note: A. Traffic categories are according to Table 1 of OPSS.MUNI 1151 November 2017.	

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Asphalt Cement

Asphalt cement shall conform to OPSS MUNI 1101 November 2016.

Asphalt Cement Grade

The asphalt cement grade for virgin aggregate mixes that do not contain Reclaimed Asphalt Pavement (RAP) shall be PG 58-28, unless otherwise specified. For mixes incorporating up to and including 20 % RAP, the asphalt cement grade shall be PG 58-28. Irrespective of the traffic loading conditions, mixes containing 21% RAP to 30% RAP shall incorporate PG 52-34 asphalt cement. A change in grade of asphalt binder may be considered if the request is submitted in writing to the Owner prior to paving, and only if the grade of asphalt is at least one grade higher than the original grade submitted with the approved mix design.

PG Grade Bumping

Bumping the grade of asphalt cement shall be carried out only by **polymer modification** if the sum of the upper grade and lower grade is equal to or greater than 92.

Aggregates

Asphalt aggregate physical properties shall conform to OPSS.MUNI 1003 November 2013, Tables 2, 4 and 5. Aggregate physical properties shall be reported on forms provided in OPSS.MUNI 1003 November 2013, Appendix E and F. Consensus properties listed in OPSS.MUNI 1151 November 2017 Table 3 shall be met and reported on the form provided in OPSS.MUNI 1151 November 2017 Appendix G. The consensus properties listed in Table 3 are for the aggregate blend as in the mix design and for the specified traffic category.

Gradation Properties

Hot mix asphalt aggregate gradation control points shall be as listed in Table 2 of OPSS.MUNI 1151 November 2017 for Superpave mixes and Table 3 for SMA mixes.

Reclaimed Asphalt Pavement

1151.04.01.01 of OPSS MUNI 1151 November 2017 is amended as follows:

Up to 15% by mass of RAP is permitted for Superpave 19 and 25 mixes. The amount of RAP added to the mixes shall be inspected by a representative of the Region. If requested, the Contractor shall provide a print out from the asphalt plant production to verify the amount of added RAP.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

RAP is not permitted in SMA 9.5, 12.5, 12.5FC1 and 12.5FC2 mixes.

Mix Designs

Superpave and SMA mixes design traffic categories (by ESAL's) are listed in Table 1 of OPSS.MUNI 1151 November 2017.

Mix designs shall be completed in accordance with OPSS.MUNI 1151 November 2017.04. 02.

Submission of mix designs for review, approval, or rejection, shall be contingent upon the information listed in OPSS.MUNI 1151 November 2017.04.05 being submitted to the owner. Submitted documentation should include a Superpave HMA Volumetric Properties verification and report by an independent CCIL certified laboratory.

The need for anti-stripping additives shall be determined in accordance with OPSS.MUNI 1151 November 2017.04.06.

The owner reserves the right to make the mix design approval contingent upon the successful duplication of the mix design Superpave and SMA properties by the owner's designated QA testing laboratory.

Design Properties

Table 9 of OPSS.MUNI 1151 November 2017 lists the Superpave compactive effort for each traffic category. Table 5 of OPSS.MUNI 1151 November 2017 lists the Superpave HMA Volumetric properties. They are summarized in Table 2 below.

TABLE 2
SUPERPAVE HMA VOLUMETRIC PROPERTIES

Ontario Traffic Category	% of Theoretical Maximum Specific Gravity			Voids in Mineral Aggregate (VMA) % minimum (Note 4)						Voids Filled With Asphalt (VFA) %	Dust to Binder Ratio (Note 1)
				Nominal Maximum Aggregate Size mm							
	N_{inital}	N_{design}	N_{max}	37.5	25	19	12.5	9.5	4.75		
A	≤91.5	96.0	≤98.0	11	12	13	14	15	16	70-80 (Note 2)	0.6-1.2
B	≤90.									65-78	

C D E	≤89.0									65-75 (Note 3)	

Notes:

1. For Superpave 4.75 mixes, the dust-to-binder ratio shall be 0.9 to 2.0. Superpave mixes with gradations that pass beneath the PCS Control Point specified in Table 4, the dust-to-binder ratio shall be 0.8-1.6.

2. For Traffic Category A, Superpave 25.0 mixes shall have a VFA range of 67% to 80%.

3. Superpave 4.75 mixes shall have a VFA range of 75% to 78%.
Superpave 9.5 mixes shall have a VFA range of 73% to 76%.
Superpave 37.5 mixes shall have a VFA range of 64% to 75%.

4. Density testing of the coarse and fine aggregate shall be carried out in accordance with LS-604 and LS-605 respectively using the procedure for blended aggregates.

SMA mixes shall be designed in accordance with AASHTO MP 8 and AASHTO PP41. Table 6 of OPSS.MUNI 1151 November 2017 lists SMA HMA Volumetric Properties. They are listed in Table 3 below.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

TABLE 3
SMA HMA VOLUMETRIC PROPERTIES

% Air Voids (Note 1)	Voids in Mineral Aggregate (VMA) % minimum			Voids in Coarse Aggregate (VCA) of the Compacted Mix (%)	Maximum Draindown at Production Temperature (Note 2) (%)
	Nominal Maximum Aggregate Size (mm)				
	19	12.5	9.5		
4	17			Less than the VCA in the dry rodded condition.	0.3

Notes:
1. SMA mixes shall be designed with 100 gyrations unless the mix aggregates have a LS-603 value greater than 30%, then the SMA mix shall be designed with 75 gyrations.

2. Tested according to AASHTO T 305.

Superpave and SMA Mix Verification

1151.04.02.02 of OPSS.MUNI 1151 November 2017 is amended by adding the following:

After receiving the asphalt mix design from the Contractor or asphalt supplier, the Contractor shall provide asphalt mix verification test results in accordance with the following criteria:

The tests must be performed by a laboratory independent from the firm producing the asphalt mix design.

The laboratory performing verification testing must have a valid “Certificate of Conformance” issued by the Canadian Council of Independent Laboratories (CCIL) Asphalt Laboratory Certification Program and be qualified under the following categories:

i) Asphalt Mix Design– Marshall and Superpave Methods (Type A)

ii) Asphalt Mix Compliance – Marshall and Superpave Methods (Type B)

All verification testing must be reviewed and accepted by the Region prior to the start of any paving operations.

The mix design shall be submitted for acceptance at least two weeks before construction. The mix design must be reviewed and approved by the Region. **Before construction, a trial batch shall be submitted to the Project Manager for verification and approval.** The unit prices bid under the Hot Mix item shall be deemed to have made allowance for the required trial batches.

The submitted mix design shall include, besides JMF, the documents listed in Sections 1101.04.01 of OPSS.MUNI 1101 November 2016 and 1151.04.05 of the OPSS.MUNI 1151 November 2017 specifications. The mix design that does not include the required documents will not be reviewed and accepted.

A sample of Performance Graded asphalt cement(s) specified for the subject project shall be submitted with the mix design for future testing. Random sampling may also be undertaken during HMA production.

Minimum Asphalt Cement (AC) Content in HMA Mix Design

Mix Design Requirements

The asphalt cement content of mix designs for mix design shall be as shown in Table 4 below. The asphalt cement content of the JMF must be equal to or greater than those shown in the following table:

TABLE 4
Asphalt Cement Contents for Mix Design JMF

Mix Type	Minimum Asphalt Cement Content for Mix Design JMF (%)
Superpave 9.5	5.5
Superpave 12.5	5.1
Superpave 19mm	4.9
Superpave 25mm or greater	4.6

Engine Oil Residue (EOR)

The addition of Engine Oil Residue (EOR) or Re-refined Engine Oil Additive or Reclaimed Engine Oil Residue to any asphalt cement is not allowed.

As part of the Quality Control (QC) and Quality Assurance (QA) procedures samples of the asphalt cement will be obtained from the asphalt plant from asphalt tank(s) during asphalt production. One sample will be taken for the Contractor, one for the Region of Niagara and one for referee testing. The samples shall be 1 litre each and stored in glass containers.

If there is any concern about the quality of the asphalt cement in the mix, the samples of the asphalt cement will be tested using a Gas Chromatography Mass Spectrometer (GCMS) or other testing for the presence of deleterious components not anticipated in good quality asphalt cement.

Reclaimed Asphalt Pavement (RAP)

The percentage of RAP added to the asphalt base mixes (SP19 and 25) must not exceed 15% and/or project specification. A person designated by the Region of Niagara will inspect the asphalt plant during HMA production to check the amount of RAP added. Also, the Region of Niagara may request a record from the plant production where the added amount of RAP is identified.

Coarse and Fine RAP shall be properly processed and from certified stockpiles. For a RAP stockpile to be certified the following requirements shall be met:

- The source of RAP shall be clearly identified;
- The age of RAP shall be identified or at least the year the RAP material was obtained; and
- Quality control/assurance testing should be as for other asphalt aggregates

The contractor/producer shall submit quality control report/testing prior to asphalt production

Construction of Hot-Mix Asphalt (HMA) Pavement

Construction of HMA pavement shall be carried out in accordance with OPSS.MUNI 310 November 2017 except as amended herein.

Pre-pave Meeting

At least one (1) week prior to any scheduled milling or paving operation to occur, a mandatory pre-pave meeting shall be held. The contractor shall ensure that all required documentation relating to the milling and paving operations has been submitted for review and approved prior to the meeting. The items shall include, but are not limited to, the following:

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

1. Notwithstanding the provisions of OPSS.MUNI 1101 November 2016, PGAC documentation, for each grade of PGAC specified in the contract documents, the contractor shall supply the following additional items to the contract administrator prior to the commencement of HMA production:

    a. PGAC documentation from the asphalt cement supplier in the form of Bill of Lading and Certificate of Analysis, confirming the grade of PGAC. The Bill of Lading and Certificate of Analysis shall also be supplied for each subsequent delivery of PGAC that will be used for the HMA production.
    b. Documentation identifying the PGAC storage tank that the PGAC will be supplied from for the HMA production. The contractor shall notify the contract administrator and provide updated documentation prior to changing the storage tank that is being used to supply PGAC for the HMA production.
    c.
2. Approved mix designs and Job Mix Formulas;
3. Proposed milling and paving dates and paving equipment to be used;
4. Asphalt placement and compaction rolling patterns;
5. Roadway, lane closures and vehicle access restrictions;
6. Tack coat scheduling and application patterns.

Tack Coat

Prior to the **application** of any surface or binder course asphalt tack coat shall be applied unless otherwise directed by the contract administrator.

Binder and Surface Course Asphalt

Any type of asphalt having a thickness of 80mm or more shall be placed in a minimum of 2 lifts unless otherwise directed by the Project Manager.

The finished elevation of the surface course asphalt shall be placed so as to be flush with the lower edge of curb at the depressed portion of all wheelchair ramps. The surface course asphalt shall slope down and away from the curb to form a gutter line in front of the wheelchair ramp.

Commencement Of Paving

This section amends OPSS.MUNI 310 November 2017.07.06 with the following.

Unless otherwise approved by the owner, asphalt surface course paving shall not be carried out after the end of the first full week of October.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Binder course asphalt paving shall not proceed after the third full week of November unless approved by the owner.

Placement Of Asphalt Mixture

OPSS.MUNI 310 November 2017.07.06.01 is amended by the following:

The temperature of the HMA prior to placement shall be within the temperature range that corresponds to the PGAC manufacturer's recommended mix temperature.

The temperature of the HMA immediately after spreading and prior to initial rolling shall not be less than 120 °C.

An HMA course shall not be placed on a previously laid course until a minimum four (4) hours has elapsed, following final compaction of the previous course, and the temperature of the previous course is 50°C or less.

Binder Course Asphalt – Temporary Ramping

When the surface course asphalt is to be delayed or placed the following year, temporary asphalt ramps shall be placed at all wheelchair ramps and driveway approaches. The top of the temporary asphalt ramps shall be placed so as to be flush with the lower edge of curb at the depressed portion of all wheelchair ramps and driveway approaches. The temporary asphalt ramps shall be removed at the time of placement of the surface course asphalt at no additional cost.

Use of Paving Equipment – Paving in Echelon

OPSS.MUNI 310 November 2017.07.07 is amended with the addition of the following paragraph:

Paving in Echelon is mandatory for the placement of binder and surface course asphalt. The pavers shall be operated at the same time and maintain a distance of not more than 50 m from each other so that a hot joint is obtained between the lanes of mixtures being placed. The contractor shall supply sufficient personnel to adequately control both spreading operations simultaneously.

Where the entire width of the proposed pavement platform cannot be paved in echelon with 2 pavers, one longitudinal construction joint is permitted. Each half of the road shall be paved in echelon resulting in only one longitudinal joint in the binder and surface courses located at the centerline of the road. The joint shall be located to ensure that it does not align with the wheel path of traffic.

Asphalt Material Transfer Vehicle

OPSS.MUNI 310 November 2017 Section 07.07 is amended with the addition of the following paragraph:

A Material Transfer Vehicle (MTV) is required for all paving operations, including paving using only one paver (side streets). The use of an MTV will be paid for by the tonne under the appropriate asphalt tender item.

Re-Heating and Compaction of Longitudinal Joints

OPSS.MUNI 310 November 2017 Section 07.07 is amended with the addition of the following paragraph:

For surface course, the contractor shall use an approved method of re-heating and compacting all centerline longitudinal cold joints. Pricing shall be based on an infra-red heating system capable of maintaining a minimum temperature of 93° C to produce a welded joint, without scorching or burning the mix.

All re-heating methods shall be approved prior to the start of any asphalt placement.

The density of the mix at any longitudinal joint shall be within 1.5 percent of the mainline mat density. Compaction of longitudinal joint shall be measured within 0.3 m from the joint.

Quality Assurance

The hot mix asphalt quality will be determined on the basis of QA test data.

Field Adjustment

Field adjustments (changes to the Job-Mix Formula (JMF) and Mix Design) will be permitted but have to be carried out in accordance with OPSS.MUNI 1151 November 2017.04.02.04. Permitted field adjustments to a JMF are given in Table 10 of OPSS.MUNI 1151 November 2017. Only one field adjustment per mix type on a project will be permitted.

The hot mix asphalt compaction shall be assessed on the basis of nuclear density gauge testing. Nuclear density gauge data alone will not be used to reject asphalt mix compaction. Each nuclear density gauge used on a project shall be calibrated against a minimum of three cores of binder course and surface course mixes placed in the same project.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Compaction

Asphalt compaction testing during the placement and rolling stage shall be by nuclear density gauge. OPSS.MUNI 310 November R 2017 Table 10 is amended and the criteria for assessing mix compaction by nuclear density gauge is given in Table 5. The specified compaction is expressed as a percentage of the Maximum Relative Density (MRD), as established from the approved asphalt mix design for the project, and verified by QA testing and asphalt core correlation.

The frequency of nuclear gauge testing in OPSS.MUNI 310 November 2017.08.04.02 is amended such that compaction of a given area of pavement shall be assessed by a minimum of five nuclear density test readings. The pavement area to be assessed should be a maximum of 0.5 lane-km of pavement (i.e. 250 m of 2 lane pavement). The average of at least five nuclear readings for a given area shall not be less than the specified percent compaction given in Table 5, with no individual test results being more than 3 % below the specified percent compaction.

Nuclear density test results will be used as a guide to assessing in-place compaction and will not be used to reject the mix compaction. Where compaction results by nuclear gauge do not meet the specifications, the owner may elect to have cores (minimum 100 mm diameter) taken to assess the in-place mix density. The core density and compaction data shall be determined according to OPSS.MUNI 310 November 2017.08.04.03. Where compaction results from core densities do not meet specifications and are below the specified values of 93% MRD for Superpave 9.5, 12.5 and 12.5 FC1 and 92% MRD for Superpave 19 and 25, the coring and testing will be at the contractor's expense.

TABLE 5
COMPACTION CRITERIA BY NUCLEAR GAUGE
FOR ACCEPTANCE OR REJECTION

MIX TYPE	AVERAGE OF COMPACTION RESULTS BASED ON NUCLEAR DENSITIES (% MRD)			
	MEETS SPECIFICATION	ACCEPTABLE	BORDERLINE	REJECTABLE
Surface Course: Superpvae 9.5, 12.5, 12.5 FC1 and 12.5 FC2	≥ 93 %	< 93 % & ≥ 92 %	< 92 % & ≥ 91 %	< 91 %
Binder Course: Superpave 19 and 25	≥ 92 %	< 92 % & ≥ 91 %	< 91% & ≥ 90 %	< 90 %

Joint Compaction

The measured joint compaction using a nuclear density gauge should not be lower than that provided in Table 6. Joint compaction should be measured within 0.3 of the joint.

TABLE 6
MINIMUM REQUIRED JOINT COMPACTION

LAYER	MINIMUM LONGITUDINAL JOINT COMPACTION
Surface Course	91.5 %
Binder Course	90.5 %

QA Field Sampling

OPSS.MUNI 310 November 2017.08.01 is amended to include the following:

Field samples for QA testing shall be plate samples (minimum 300 mm x 300 mm) obtained during asphalt placement and compaction procedures. Samples obtained from the spreader hopper or truck box shall not be used for QA testing.

Alternatively, samples can also be obtained from the Mechanical Transfer Vehicle (MTV) during placement of HMA and prior to transferring the mix to the paver. For MTV sampling, the mix is dumped directly from the MTV into a specially designed funnel which splits the mix into four containers, each holding approximately 45kg of mix. The mix from one of the containers is then poured into a separate splitting apparatus (QuarterMaster), which is placed on a level surface. This apparatus splits the sample into four buckets, each with 11.3kg capacity. The split is repeated once or twice until a uniform sample is obtained. Sampled material is then transferred to carton boxes and then into bags for security sealing and shipment to the laboratory. The success of the sampling process depends primarily on the leveling of the sampling device and should be conducted while the MTV is under full operation (sampling should be avoided if the MTV is not thoroughly heated).

Samples shall be collected by the contractor at locations generated by random numbers and/or as agreed with the owner, for longitudinal chainage and transverse offset from edge of pavement. These samples shall be representative of the main lane paving operations. At each location, the contractor shall take three samples (within a 3 m longitudinal length) and the samples shall be packed in separate cardboard boxes supplied by the contractor. The box samples shall be numbered in sequence for a given contract, and shall be marked “A”, “B”, and “C” and include the following minimum identification: date; longitudinal chainage or municipal address opposite the sample location; offset in metres from edge of pavement; contract number, and street name. A typical sequence of samples would be identified as 1A, 1B, 1C, and 2A, 2B, and 2C.

Two of the samples from each sample location shall be the property of the owner. The contractor shall obtain and complete a Bituminous Sample Identifier Forms for each sample. The asphalt mix samples designated for the owner shall be given directly to the owner's representative at the paving site.

QA Sampling And Testing Frequency

OPSS.MUNI 310 November 2017.08, Table 6, is amended and replaced by Table 7 in this specification.

TABLE 7
CRITERIA FOR SAMPLING AND TESTING TO DETERMINE
IN-PLACE ASPHALT CEMENT CONTENT

MIX TYPE	MINIMUM TEST SAMPLES BASED ON ASPHALT PLANT'S DAILY MIX PRODUCTION		
	≤ 500 tonnes/day	> 500 tonnes & < 1000 tonnes/day	≥ 1000 tonnes/day
Surface Course	3	3	2 per 500 tonnes
Binder Course	3	3	2 per 500 tonnes
HMA in Driveways, Boulevards and Pathways	Field decision by Owner's representative		

Tolerance for Asphalt Production

The tolerances for asphalt mix production compared with the Job Mix Formula gradation and asphalt cement content are as in Table 7 of OPSS.MUNI 310 November 2017 with the exception of the asphalt cement content. The tolerances are summarized in Table 8 below.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

TABLE 8
TOLERANCES FOR THE JOB-MIX FORMULA
GRADATION AND ASPHALT CEMENT CONTENT

MIX	ATTRIBUTE	MINIMUM TEST SAMPLES BASED ON ASPHALT PLANT'S DAILY MIX PRODUCTION		
		Acceptable	Borderline	Rejectable
Surface Course	DLS, 4.75 mm Sieve Size	< 5.0	5.0 to 7.5	> 7.5
	600 µm Sieve Size	< 3.5	3.5 to 5.0	> 5.0
	75 µm Sieve Size	< 2.0	2.0 to 3.0	> 3.0
Binder and Levelling Courses	DLS, 4.75 mm Sieve Size	< 7.0	7.0 to 10.0	>10.0
	600 µm Sieve Size	< 4.5	4.5 to 6.0	> 6.0
	75 µm Sieve Size	< 2.0	2.0 to 3.0	> 3.0
All Mixes	Asphalt Cement Content	< 0.20	0.20 to 0.30	> 0.30

Note:
1. Tolerance on the job-mix formula apply as both plus and minus from the job-mix formula

Aggregate Gradation and Asphalt Cement Content Acceptance

OPSS.MUNI 310 November 2017.08.04 is deleted and replaced by the following:

If the HMA is borderline for aggregate gradation or asphalt cement content specified in Table 8, the Contractor shall take immediate corrective action through process control at the HMA plant. A total of three consecutive borderline test results for any attribute representing up to 1,000 tonnes of HMA production shall result in the work being deemed rejectable and shall be removed and replaced with acceptable HMA.

Rejected HMA due to aggregate gradation, such as non-compliance on the DLS 4.75mm, 600 µm, or 75 µm sieve sizes, or non-compliance due to the asphalt cement content specified in Table 8, shall be removed and replaced with acceptable HMA.

Asphalt Cement Price Adjustment Based on Price Index

The owner will adjust the payment to the contractor based on changes to the Ministry of Transportation's performance graded asphalt cement Price Index, and as set out in OPSS.MUNI 310 November 2017, Appendix 310-B. The Price Index will be used to calculate the amount of the payment adjustment per tonne of asphalt cement accepted into the Work. Payment will be made based on the month the asphalt is laid.

Notes:

1. Contractors should bid the hot mix asphalt item using the cost of the PGAC in effect at the time of tender closing unless specified in the Contract Document. The asphalt cement Price Index is only a tool for qualifying hot mix prices and is not intended as a standard asphalt cement price to be incorporated into the contract bid.

2. The payment adjustment calculated is full compensation for any and all PGAC grades specified.

Payment For Asphalt Mix

Unless otherwise specified in the tender documents, payment for asphalt satisfactorily placed and compacted will be by the tonne. Where price adjustment provisions are invoked for the contract, the final payment shall reflect the adjustments for asphalt cement content and/or compaction. For all mixes the pay quantity by the tonne will be based on the weigh tickets for mix supplied to the job site and in accordance with OPSS 102.

Dispute Resolution

The following outlines the methodology for resolving disputes regarding testing and evaluation of mixes for price adjustment based on asphalt cement content, and compaction based on core densities.

Price Adjustment Based On Asphalt Cement Content

Where there is disagreement on the findings of the test results by the owner's designated QA laboratory, the contractor has the option of requesting the services of a referee laboratory. The referee laboratory shall have current CCIL Type A certification and the selection of the laboratory shall be mutually agreed upon by the owner and the contractor.

Samples for referee testing shall be from the triplicate plate samples taken during paving. The owner shall arrange for transfer of referee samples to the designated referee laboratory.

The results of the referee laboratory will be binding on both the owner and the contractor. Payment for the costs of the referee testing and sample delivery will be the responsibility of the contractor if the test results confirm that the mix material does not meet specification. If the referee laboratory test results indicate that the mix material satisfies the specifications with respect to asphalt cement content, the costs will be borne by the owner.

Acceptance Or Rejection Of Mix Compaction Based On Core Densities

Where there is disagreement on the compaction findings from the core test results by the owner's designated QA laboratory, the contractor has the option of requesting additional cores and using the services of a referee laboratory. The cores shall be taken at locations selected jointly by the contractor and the owner. At each core location, a parallel core shall be taken by the contractor and provided to the owner. The contractor and the owner shall agree on the CCIL certified laboratory to carry out the core testing.

The results of the referee laboratory will be binding on both the owner and the contractor. Payment for the costs of the coring, referee testing and core sample delivery will be the responsibility of the contractor if the test results confirm that the mix material does not meet the compaction specification. If the referee laboratory test results indicate that the mix compaction satisfies the specifications, the costs will be borne by the owner.

SSP 37 SUPERPAVE 19.0

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The unit price bid for this item shall include the construction of temporary ramps at the limits of construction, bridge approaches, at all intersecting streets and at all pedestrian crossings.

No extra payments will be made for any hand work involved in spreading or compacting the hot mix asphalt around radius, intersections, trench areas or areas between the existing asphalt and new gutters, curbs.

Also included shall be temporary asphalt curb and gutter.

SSP 38 SUPERPAVE 12.5 FC2

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The top course asphalt paving on Martindale Road, except at the bridge structure, shall be completed in 2020. Top course asphalt over the new Martindale Rod Southbound structure shall be completed in 2019 as part of the bridge construction. The unit price bid for this item shall include all costs to do the following in 2020:

- Paving in echelon shall be required and shall take place at night
- Supply and place the asphalt
- Remove and dispose of all temporary ramps
- Mill the existing asphalt 0.5 m wide and 50 mm deep at the limits of construction and at all intersecting streets
- Sweeping and cleaning of streets

No extra payments will be made for any hand work involved in spreading or compacting the hot mix asphalt around radius, intersections, trench areas or areas between the existing asphalt and new gutters, curbs.

SSP 39 GRANULAR 'A' CRUSHED LIMESTONE/ GRANULAR 'M'

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

All granular shall be of new, virgin material.

SSP 40 CONCRETE CURB AND GUTTER, ALL TYPES

Niagara Region

The following section of this special provision applies to work within Niagara Region ROW:

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The above tender item shall include both straight and circular sections, including dropped curb sections. Curb types shall be as specified by the OPSD numbers on the contract drawings.

The above tender item shall include reinstating concrete curb for driveways and sewer trench restoration to match existing adjacent curb type at locations as specified on the contract drawings.

Hand Work Premium

For concrete sidewalk where required to be hand formed, as agreed to or as directed by the Contract Administrator, the labour shall be paid as a premium, in addition to the concrete curb and gutter, under the Concrete Curb and Gutter Hand Work premium item.

Basis of Payment

Payment at the contract price for the above tender item shall include full compensation for all labour, equipment and material required to do the work.

MTO

The following section of this special provision applies to work within MTO ROW:

MTO Special Provision No. 353S02 July 2007

OPSS 353, September 1996 Construction Specification for Concrete Curb and Gutter Systems is amended as follows:

353.05.01 Concrete

Subsection 353.05.01 of OPSS 353 is deleted and replaced with the following:

Concrete shall be according to OPSS 1350 and the following:

Minimum specified 28-Day compressive strength:	30 MPa,
Coarse aggregate:	19 mm nominal maximum size.

353.07.08.03 Concrete Curing

Clause 353.07.08.03 of OPSS 353 is deleted and replaced with the following:

Formed and slipformed concrete shall be cured according to OPSS 904. The use of white pigmented curing compound is permitted except that curing with curing compound shall not be used on any construction joint or when cold weather concreting is in effect.

353.07.13 Field Sampling and Testing of Concrete

Subsection 353.07.13 of OPSS 353 is deleted and replaced with the following:

Field sampling and testing of concrete shall be according to OPSS 1350.

SSP 41 PATTERNED COLOURED CONCRETE DRIVEWAY

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

Existing driveway of patterned coloured concrete are within the contract limits as indicated on the contract drawings. The new concrete shall match the pattern and colour of the existing concrete to the satisfaction of the Contract Administrator and property owner. If necessary, the Contractor will hire a sub-contractor who specializes in this type of work in order to match the existing driveway.

Basis of Payment

Payment at the contract price for the above tender item shall be full compensation for all labour, equipment and material to do the work.

SSP 42 CONCRETE SIDEWALK, COMMERCIAL GRADE SIDEWALK AND BUS STOP PAD

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

This item shall include sidewalk of thickness from 125mm to 200mm in accordance with OPSD 310.010, 310.020 and 310.030.

This item shall also include any concrete bus pads and private sidewalks to match the layout and width of the existing private walkways.

Commercial Grade Sidewalk

This item shall include sidewalk of thickness 200mm, or greater, including wire mesh as per NPSCD B29.

Payment

Payment at the contract price shall be full compensation for all labour, equipment and materials required to do the work.

SSP 43 COLOURED CONCRETE ISLANDS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

Included as part of the tender item shall be colored concrete median at locations as detailed on the contract drawings.

The colour concrete shall be Colortech synthetic oxide pigment by QC Construction Products Canada, Salsa Red 4 lbs CC16 or an approved equivalent.

Control joints are to be spaced 2.0m o/c with bituminous fiber expansion joints at every third joint. Additional expansion joints shall be placed at the junctions of paving with all raise walls and fixed structures including utility caps. Control joints are to be 20mm deep.

If the area to be paved exceeds 2.5m in width, an intermediate control joint shall be introduced at the mid-point at right angles to all other control and expansion joints.

Subsections 314.07.10, 351.07.17 and 353.07.13 Management of Excavated Material are amended by the addition of the following:

Under this item of Work, the disposal of all surplus or unsuitable material shall be the responsibility of the Contractor in accordance with the requirements of OPSS 180. No separate payment will be considered for the disposal of all surplus or unsuitable material, regardless of the amount of disposed surplus material.

SSP 44 PIPE SUBDRAIN

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The unit price includes extra trench excavation regardless of the depth.

100 mm diameter subdrain shall be used on Martindale Road and all sideroads within Region's property.

The subdrain placed on Martindale Road shall be 100 mm diameter CL 300 (BIG 'O'-BOSS 2000) perforated rigid high density corrugated polyethylene pipe with geotextile sock meeting Class 324430C and ASTM D3350, with connectors.

150mm diameter subdrain shall be used on Highway 406 in accordance with OPSS 405.

The unit price bid shall also include all fitting connections to install the subdrain in its proper location and connection to catch basin outlets.

Existing subdrains on the side streets shall be connected to the new subdrains or plugged, as directed by the Contract Administrator. Payment will be made for this work by the linear metre as bid in the Schedule of Quantities and Unit Prices.

SSP 45 ADJUSTING AND REBUILDING MANHOLES, CATCH BASINS AND DITCH INLETS

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 407S06 April 2014

Amendment to MTC Form 407, March 1984

Aggregate Requirements, Lift Rings, Adjustment Units and Resilient Connectors

407.02 REFERENCES

Section 407.02 of MTC Form 407 is amended by the addition of the following under **Ministry Material Specifications**:

OPSS 1854 Material Specification for High Density Polyethylene (HDPE) and Expanded Polystyrene (EPS) Adjustment Units for Maintenance Holes, Catch Basins, and Valve Chambers

407.03 DEFINITIONS

Section 407.03 of MTC Form 407 is amended by the addition of the following:

Adjustment Units means circular and rectangular units used between the structure and the frame to adjust the elevation of the frame for grates and covers.

Lift Rings means circular and rectangular prefabricated units used to adjust the elevation of the grates and covers only. They are inserted between the frame and the grates or covers.

407.05 MATERIALS

407.05.02 Precast Reinforced Concrete Manholes, Catch Basins, and Ditch Inlet Components for Both Precast Concrete Units, and Corrugated Steel Pipe Units

Subsection 407.05.02 of MTC Form 407 is deleted in its entirety and replaced by the following:

Precast concrete units shall be according to OPSS 1351 amended as follows:

1351.02 REFERENCES

Section 1351.02 of OPSS 1351, is amended by the addition of the following under **American Society for Testing and Materials:**

ASTM C 923 - 00 - Standard Specification for Resilient Connectors Between Precast Reinforced Concrete Manhole Structures, Pipes and Laterals

1351.05 MATERIALS

Section 1351.05 of OPSS 1351 is amended by the addition of the following subsection:

1351.05.11 Resilient Connectors

Resilient connectors shall conform to the requirements of ASTM C 923 M - 89.

407.05.07 Adjustment Units

Subsection 407.05.07 of MTC Form 407 is deleted in its entirety and replaced with the following:

407.05.07.01 Precast Concrete Adjustment Units

Precast concrete adjustment units shall be according to OPSS 1351 as amended in this Special Provision.

407.05.07.02 Prefabricated Recycled Rubber Adjustment Units

Prefabricated recycled rubber adjustment units shall be according to the following requirements:

Durometer Hardness	maximum 15 Shore A variance
Tensile Strength	1 MPa minimum
Compression Deformation	6% +/- 2%
Compression Set	4% maximum

407.05.07.03 High Density Polyethylene (HDPE) and High Density Expanded Polystyrene (EPS) Adjustment Units

High density polyethylene and high density expanded polystyrene (EPS) adjustment units shall be according to OPSS 1854.

407.05.08 Frames, Grates, Covers and Lift Rings

Subsection 407.05.08 of MTC Form 407 is deleted in its entirety and replaced by the following:

Metal frames, grates, covers and lift rings shall be according to OPSS 1850.

Plastic lift rings shall be made of high density polyethylene and shall be according to the loading requirements of OPSS 1850.

407.07.07 Installation of Inlet or Outlet Pipe

407.07.07.01 Concrete, Clay or Plastic Pipe

Clause 407.07.07.01 of MTC Form 407 is amended by the addition of the following paragraph:

Resilient connectors, installed according to the manufacturer's instructions, may be used to connect inlet and outlet pipes to concrete drainage structures.

407.07.09 Installation of Frames, Grates or Covers

Subsection 407.07.09 of MTC Form 407 is deleted in its entirety and replaced by the following:

The manholes and catch basins shall be constructed or installed so that the surface on which the bricks or adjustment units are to be placed is at least 75 mm but not more than 150 mm below the bottom of the frame and grate or cover assembly.

Any combination of bricks, precast concrete adjustment units and rubber adjustment units may be used to set the frames and grates/covers on manholes and catch basins at the required position and elevation.

A minimum of one rubber adjustment unit shall be used in all installations where the frame and grate/cover is located within the driving area of the pavement. The total height of the rubber adjustment unit(s) must be greater than 25 mm and less than 75 mm.

Rubber adjustment units can be used in combination with concrete adjustment units or brick; the rubber adjustment unit must form the final surface for the seating of the frame and grate/cover assembly. Bricks or concrete adjustment units must not be placed on top of rubber adjustment units.

Rubber adjustment units shall be bonded to adjacent surfaces by laying a continuous strip of butyl tape on the top surface of the concrete adjustment units or brick course. The rubber adjustment unit shall be seated firmly in place, ensuring that it is centred over the structure opening. If more than one rubber unit is used, a continuous strip of butyl tape is to be laid between each rubber adjustment unit. A continuous strip of butyl tape shall be applied to the top surface of the rubber adjustment units and to the bottom of the frame. The frame shall then be set firmly in place ensuring that it is properly centred over the structure opening.

HDPE and high density EPS adjustment units shall be installed and sealed according to manufacturer's recommendations.

If only brick or concrete adjustment units are used, or any combination of both, the frames for grates and covers on manholes and catch basins shall be set in a full mortar bed.

If bricks are used, the inside and outside surfaces of the bricks shall be parged with a 12 mm thick mortar coat.

Gratings for ditch inlets shall be installed and fastened down as specified in the contract.

Frames and grates which are within the flow lines of the curb and gutter system shall be installed in accordance with OPSS 353 and shall not be part of the work of constructing cast-in-place manholes or catch basins or supplying and installing precast manholes and catch basins.

407.07.11 Adjustment and Rebuilding of Manholes, Catch Basins and Ditch Inlets

407.07.11.01 General

Clause 407.07.11.01 of MTC Form 407 is deleted in its entirety and replaced by the following:

The work to be carried out shall include changes of elevation of any of the above structures, regardless of type or size.

Prior to adjustment or rebuilding, the existing frame and grate/cover, lift rings and rubber adjustment units shall be removed and salvaged. When salvaged components are in reusable condition, they shall be cleaned of all mortar, sealants, rust and dirt. The manhole, catch basin or ditch inlet shall be adjusted or rebuilt using these salvaged components; otherwise, new components shall be installed so that the frame and grate/cover is set to the correct elevation.

When manhole covers are to be raised only to accommodate resurfacing of the adjacent pavement, the Contractor may use manhole cover lift rings to raise the manhole grate or cover a sufficient height to accommodate the thickness of resurfacing material. Lift rings may be placed on top of each other to a maximum height of 140 mm. Only one type of lift ring or lift device shall be used for each structure.

Bricks may be used to raise structures by a maximum of 300 mm which includes any extension of structures previously constructed using bricks. The inside and outside surfaces of the bricks shall be parged with a 12 mm thick mortar coat.

Precast concrete adjustment units may be used to raise structures a maximum of 1.0 m which includes the extension of structures previously constructed using precast concrete adjustment units or a combination of bricks and precast concrete adjustment units.

A minimum of one rubber adjustment unit shall be used in all installations where the frame and grate/cover is located within the driving area of the pavement. The total height of the rubber adjustment unit(s) shall be greater than 25 mm and less than 75 mm, which includes any extension of structures previously constructed using rubber adjustment units.

The maximum total extension of structures shall not exceed 1.0 m which includes any extension of structures previously constructed using any combination of adjustment units and bricks.

All existing mortar and brickwork shall be removed from the top of the existing structures prior to adjustment or rebuilding with adjustment units.

Additional manhole steps shall be required when the distance from the adjusted elevation of the structure to the first step would be in excess of 0.6 m.

Where bituminous or concrete pavement must be removed to adjust or rebuild a structure, the pavement shall be removed according to OPSS 510.

407.07.11.02 Cast-in-Place Units

Clause 407.07.11.02 of MTC Form 407 is amended by deleting the three paragraphs under "Adjustment" and replacing them with the following:

The adjustment of manholes, catch basins, or ditch inlets by raising will apply where the tops are to be raised by 1.0 m or less.

The adjustment of manholes, catch basins, or ditch inlets by lowering will apply when the tops may be lowered to the required elevation by the removal of bricks, the removal of adjustment units, the removal of the mortar bed in which the frame was set, and by the removal of a maximum of 50 mm of the concrete walls of the structures.

Where tops are to be lowered, the concrete shall be carefully removed to the required elevation.

407.07.11.03 Precast Units

Clause 407.07.11.03 of MTC Form 407 is amended by deleting the three paragraphs under "Adjustment" and replacing them with the following:

The adjustment of precast manholes, catch basins, or ditch inlets by raising will apply where the tops are to be raised by 1.0 m or less.

The adjustment of manholes, catch basins, or ditch inlets by lowering shall only apply where the tops may be lowered to the required elevation by the removal of bricks, the removal of adjustment units, and the removal of the mortar bed in which the frame was set.

Adjustment units, bricks or manhole cover lift rings shall be removed or added as required, to adjust the structure to the proper elevation.

Subsection 407.07.11 of MTC Form 407 is amended by the addition of the following clause:

407.07.11.04 High Density Polyethylene (HDPE) and High Density Expanded Polystyrene Adjustment Units

HDPE or high density EPS adjustment units may be used to set the frame with grate or cover at the required position and elevation up to a maximum height of 100 mm where a minimum of one adjustment unit is required at each structure.

HDPE and high density EPS adjustment units shall be installed and sealed according to manufacturer's recommendations.

Rubber adjustment units shall not be used in conjunction with HDPE or high density EPS adjustment units.

407.10 BASIS OF PAYMENT

407.10.01 Manholes, Catch Basins and Ditch Inlets

Subsection 407.10.01 of MTC Form 407 is deleted in its entirety and replaced by the following:

Payment at the contract price for the various tender items, "Manholes, Catch Basins and Ditch Inlets" shall be full compensation for all labour, equipment, and materials; for all earth excavation; for the removal of pavement, curb and gutter, and sidewalk except where there is a separate item for removal of pavement, curb and gutter, and sidewalk which overlaps pavement, curb and gutter and sidewalk removal required for placement of manholes, catch basins, and ditch inlets; for the management of surplus excavated materials; for the placing and compacting of granular bedding and backfill; for the construction or installation of the cast-in-place, precast or corrugated steel pipe units, and for the installation of inlet and outlet pipe, for the installation of concrete manhole tees with concrete risers, for the installation of corrugated steel pipe manholes with saddle plates and corrugated steel pipe risers and sewers larger than riser; for the installation of the frame and grate or frame and cover; for the placing of the full mortar bed; for the placing and parging of bricks; for the application of butyl tape; and the placing of adjustment units; except where such installations are part of the work of constructing curb and gutter and for all other work necessary to complete the structure in accordance with the contract.

407.10.02 Adjusting and Rebuilding Manholes, Catch Basins and Ditch Inlets

Subsection 407.10.02 of MTC Form 407 is deleted in its entirety and replaced with the following:

Payment at the contract price for the tender item "Adjusting and Rebuilding Manholes, Catchbasins, and Ditch Inlets" shall be full compensation for all labour, equipment, and materials for the removal and management of bituminous or concrete pavement where required,

for all necessary excavation, including removal of any concrete and management of surplus excavated material, for handling, placing, and compacting of backfill materials, for salvaging and installing the salvaged or new frame and grate or cover, for all protection required against the elements, and for all other items of work necessary for the satisfactory completion of the work, except for the removal of asphalt or concrete curb and gutter, which work shall be paid for at the contract price(s) for the item(s) concerned.

SSP 46 ADJUST MANHOLES AND CATCHBASINS INCLUDING CONCRETE COLLARS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

All concrete for permanent adjustments shall be 32 MPa and in accordance with OPSS 1350 and Form 700 with polypropylene fibres reinforcement Fibermesh 300 or approved equivalent. Fibre reinforcement to be applied per the manufacturer's specifications. Adjustments completed shall be done using one continuous pour of 32 MPa concrete extending from the underside of the frame and cover to 150mm below the top of the chamber on the outside. The minimum horizontal concrete thickness shall be 150mm.

All concrete collars shall be installed as per OPSD 551.032.

All concrete placed to finish grade shall be a heavy broom finish.

All forming and removal and disposal of forms and all debris shall be included in the cost of the adjustment items.

This items shall cover all depths for concrete collars, and any related adjustment associated with this item.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 47 PAVEMENT MARKING OBLITERATING – BY ABRASIVE BLASTING

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 710S03 September 2011

Removing and Obliterating Pavement Markings

Amendment to OPSS 710, November 2010

710.02 REFERENCES

Section 710.02 of OPSS 710 is amended by the addition of the following, under:

Ontario Ministry of Transportation Publications

Designated Sources for Materials (DSM)

710.06 EQUIPMENT

Section 710.06 of OPSS 710 is amended by the addition of the following subsection:

710.06.04 Removal Equipment

Pavement markings shall be removed by abrasive blasting, using equipment and material as specified in the DSM listing for Line Removal Systems, Pavement Markings.

710.07 CONSTRUCTION

710.07.03 Pavement Marking Obliterating

Subsection 710.07.03 of OPSS 710 is amended by the addition of the following:

The depth of the removal shall be the minimum required to totally remove the existing pavement markings, to a normal depth, typically averaging 3 mm.

Pavement marking obliterating shall be carried out using a soft abrasive blast cleaning system at the locations specified in the contract.

The Contractor shall control the operation so that the asphalt pavement is not damaged in any way and to ensure that no pavement marking remains visible upon completion.

The Contractor's operation shall be carried out in accordance with approved methods as specified in the DSM listing for Line Removal Systems, Pavement Markings, so as to control any dust or effluent generated by the operation.

710.09 MEASUREMENT FOR PAYMENT

Clause 710.09.02.01 of OPSS 710 is amended by the addition of the following item:

Pavement Marking Obliterating – By Abrasive Blasting

710.10 BASIS OF PAYMENT

Subsection 710.10.01 of OPSS 710 is amended by the addition of the following item:

Pavement Marking Obliterating – By Abrasive Blasting

SSP 48 PAVEMENT MARKING

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The provisions of OPSS 710, OPSS 1713 (Thermoplastic), OPSS 1714 (Field Reacted Polymeric) or OPSS 1716 (Waterborne Paint) shall apply except as amended herein.

Line marking shall be applied to conform to the provisions of Book 11 – Pavement, Hazard and Delineation Markings, of the Ontario Traffic Manual.

Pavement markings where specified as paint shall be yellow and white reflectorized water-borne traffic paint or approved equal.

Reflectorized Field reacted polymeric also known as durable shall be used at intersections for crosswalks, stop bars and all lines from the beginning of lane tapers or if no taper 30 meters from the stop bars.

Pavement pre-marking shall be undertaken by the Contractor and approved by the Region's Supervisor Signs & Pavement Marking Operations prior to the application of permanent markings. The unit price bid shall be deemed to have made allowance for pavement pre-marking and co-ordination of pavement pre-marking with the Region.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Contact: Regional Niagara – Public Works
Supervisor Signs & Pavement Marking Operations
Telephone: 905-685-1571, extension 2221

Pavement marking removal where required shall minimize damage to the existing pavement surface. The method of removal (soda blast, shot blast or grinding) shall be approved by the Region.

The contractor is responsible for temporary pre-marking immediately following asphalt operations.

SSP 49 PAVEMENT MARKING (MTO)

The following special provision applies to work within MTO ROW:

AMENDMENT TO OPSS 710, NOVEMBER 2010 - Sample and Application Requirements

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MTO Special Provision No. 107S02 February 2017

710.04 DESIGN AND SUBMISSION REQUIREMENTS

710.04.01 General

Subsection 710.04.01 of OPSS 710 is deleted in its entirety.

710.07 CONSTRUCTION

710.07.01 General

Subsection 710.07.01 of OPSS 710 is amended by deleting the second paragraph in its entirety and replacing it with the following:

Pavement marking and symbols shall be applied according to the Contract Drawings, when provided, and the Ontario Traffic Manual (OTM).

710.07.09 Application

710.07.09.01 General

Clause 710.07.09.01 of OPSS 710 is amended by the addition of the following after the first paragraph:

Lane lines, continuity lines and edge lines on tangent sections of constant width shall be placed parallel to one another, maintaining their correct offset from the edge of pavement and from one another and shall be straight and true.

Markings placed to delineate changes in the number of lanes, variations in roadway width or adjustments in lane width shall be straight and true.

Markings placed on curves shall accurately follow the change in direction prescribed by the roadway. Transition from adjacent tangent sections shall occur smoothly and at a constant rate over the specified distance.

Markings shall always maintain the specified lane width.

Where longitudinal pavement joints and markings coincide, the markings shall be uniformly offset a minimum of 50 mm, to a maximum of 150 mm.

710.07.09.04 Thermoplastic Pavement Marking Material

Clause 710.07.09.04 of OPSS 710 is amended by the deletion of the last sentence of the first paragraph.

Section 710.07 of OPSS 710 is amended by the addition of the following subsection:

710.07.10 Sampling and Delivery of Samples

Sampling of pavement marking materials shall be according to Table A.

Samples of traffic paints shall not be thinned or heated. The material shall be well mixed and homogeneous and shall be acquired approximately mid-way through the operation. The sample container shall be filled within 5 mm of the bottom of the lid rim.

The sample data label (PH-CC-360) shall be completed and submitted with each sample.

TABLE A
Pavement Marking Material Sampling

Material	Sample Size	Container Material	Source	Frequency
Organic solvent based traffic paint	125 ml	Metal	Outlet valve (not spray gun)	Daily or from each manufacturer's batch used, for each colour applied.
Water borne traffic paint	125 ml	Plastic or plastic lined	Outlet valve (not spray gun)	Daily or from each manufacturer's batch used, for each colour applied.
Field reacted polymeric materials				
- Resin (Note 1)	250 g	Metal or plastic	Pail	Daily or from each manufacturer's batch used, prior to addition of catalyst.
- Catalyst (Note 1)	50 g	Metal or plastic	Pail	Daily.
Glass beads	250g	Metal or plastic	Bead gun	Daily during application.
Preformed tape	1 m	Container not required	Roll	Daily or from each manufacturer's batch.
Thermoplastic materials	250 g	Steel panel	Applicator (Note 2)	Daily or from each manufacturer's batch.

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.

710.08 QUALITY ASSURANCE

710.08.01 General

Subsection 710.08.01 of OPSS 710 is deleted and replaced with the following:

The samples of the pavement marking materials supplied to the Ministry will be tested for conformance with the requirements in the Materials section.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 50 PAVEMENT MARKING, TEMPORARY, FIELD REACTED POLYMERIC - FLUORESCENT ORANGE

MTO Special Provision No. 710F09 February 2012

Amendment to OPSS 710, November 2010

710.07 CONSTRUCTION

710.07.08 Selection of Materials

Subsection 710.07.08 of OPSS 710 is amended by deleting the third paragraph and replacing it with the following:

The Contractor's choice of material for the item Pavement Marking, Temporary, Field Reacted Polymeric - Fluorescent Orange is restricted to agglomerate field reacted polymeric spray pavement material.

710.07.09.05 Field Reacted Polymeric Pavement Marking Materials

Clause 710.07.09.05 of OPSS 710 is deleted and replaced with the following:

710.07.09.05 Agglomerate (Textured) Field Reacted Polymeric Pavement Marking Materials

One application of fluorescent orange agglomerate field reacted polymeric pavement marking material shall be applied. The material shall be applied so that the surface profile created with this material shall be random pattern of raised agglomerates. The agglomerate marking material shall be applied at maximum dry film height of 7.6 mm and with coverage of 60 - 80% of the pavement line surface.

The glass bead product that is listed on the DSM with the chosen marking material shall be used. Reflectorizing glass beads shall be applied at the rate specified by the manufacturer to allow for proper embedment and retroreflectivity. The reflectorizing glass beads shall be coated with a methacrylate compatible silane coupling agent.

The field reacted polymeric pavement marking materials shall be applied when the road surface temperature is between 4°C and 36°C. The maximum relative humidity shall be 80%. Pavement marking material shall not be applied over longitudinal joints.

Markings shall be applied as per manufacturer's specification(s). Applicators will be certified by the material supplier/manufacturer and upon request, the applicator shall supply a certificate to the Contract Administrator.

SSP 51 REMOVE AND REINSTALL SIGNS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

For the unit price bid, the Contractor shall remove, store with care and reinstall the signs at the locations shown on the drawings. Signs shall be kept in good condition.

The sign shall be removed from the existing post and installed on a new post of the same size. The post shall be installed to a minimum depth of 1.0 m below the final ground surface. Any additional hardware required to do the work shall be included.

Telspar posts shall be used.

SSP 52 NEW PERMANENT SIGNS

Niagara Region

In addition to the conditions stipulated OPSS 703 and in the Niagara Peninsula Standard Contract Document, the following shall also apply:

Roadside signs will be supplied by the Region and installed by the contractor. The contractor will supply and erect 9 foot sections of 1-3/4" x 1-3/4" galvanized square Telespar sign post tubing set into a three-foot anchor assembly. The anchor assembly (2" x 2") will be and installed as per manufacturer's instruction. A 150mm PVC sleeve will be set in hard surfaces (concrete or asphalt) to allow placement of the sign posts.

Contact: Regional Niagara – Public Works
Supervisor Signs & Pavement Marking Operations
Telephone: 905-685-1571, extension 2221

Location: Public Works Centre
3547 Thorold Townline Road
Thorold, ON
Time: 9:00 a.m. – 2:30 p.m., Monday to Friday (Except Holidays)
Phone No: 905-685-1571 Ext. 2205 or 2206

Payment shall be made for each sign erected including supply and installation of the steel post as specified and the installation of the sign board.

MTO

All permanent sign work within MTO ROW shall follow OPSS 703.

As part of this tender item shall include installation of Ground Mounted Sign with MTO Sign Support System on Highway 406. The sign layout shall be in accordance with Ontario Traffic Manual Book 8. Support for the sign shall be in accordance with MTOD MTOD0987.2100 and MTOD0987.3100. The contractor shall be responsible to determine the sign support requirement, subject to approval by the Contract Administrator.

Payment

Payment at the contract price for the above tender item shall be full compensation for all labour, equipment and material to do the work.

SSP 53 ADVANCED NOTIFICATION/WARNING/DETOUR ROUTE TC-64 SIGNS

MTO Special Provision

SCOPE

This Special Provision covers the requirements for placing Advance Notification/ Warning/ Detour Route TC-64 Signs as well as amending existing Ground Mounted and Overhead Signs.

CONSTRUCTION

The Contractor shall install, maintain, relocate, and remove Advanced Notification/ Warning/ Detour Route TC-64 Signs as indicated in the contract. In addition, the Contractor shall install and remove all temporary overlays to amend existing Ground Mounted and Overhead Signs as indicated in the contract.

All Advanced Notification/Warning/Detour Route TC-64 Signs, as well as any temporary overlays to amend existing signs, shall conform to the guidelines specified in the "*Temporary Conditions Traffic Management*" (April 2001) manual as revised by the following.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

The Advanced Notification TC-64 Sign phase shall be installed a minimum of ____7__ calendar days prior to any lane reductions or closures. If any changes to the message details (i.e. dates, times, etc.) are required, as a result of the contractor's operations during the construction period they shall be completed with no additional payment to the Contractor.

Placement and removal of tabs, permanent and temporary overlays, shall be as indicated in the contract.

Temporary overlays placed on Ground Mounted and Overhead Signs shall be installed with self-tapping #3 Teks screws placed at 30cm centres.

There shall be no more than 2 overlays on Advanced Notification/Warning/Detour Route TC-64 Signs at any one time.

MEASUREMENT FOR PAYMENT

Measurement is by Plan Quantity as may be revised by Adjusted Plan Quantity for each sign installed.

BASIS OF PAYMENT

Payment at the contract price for the above tender item shall be full compensation for all labour, equipment, and material required to do the work. Progress Payments shall be made on the following basis:

60% for initial installation;
20% for maintenance, relocation, placement and removal of tabs and overlays;
20% for removal.

On each occasion when the Contractor fails to install the Advanced Notification/Warning/Detour Route TC-64 Signs in accordance with the above requirements, fails to revise the TC-64 signs as required by the TCTM manual, or fails to remove the TC-64 signs within two hours of re-opening of the affected roadway, the Ministry will assess a penalty of $2,000.00. A further penalty of $2000.00 per calendar day or part thereof, with no maximum penalty, shall be assessed until such time as the situation is rectified.

To obtain a copy of the above noted manual, contact:

Ministry of Transportation of Ontario
Central Region Traffic Office
1201 Wilson Avenue
Building D, 6th Floor
Toronto, Ontario
M3M 1J8

Telephone: 416-235-5595

SSP 54 SINGLE RAIL STEEL BEAM GUIDE RAIL

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 721S05 October 2018

Amendment to OPSS 721, November 2015

721.07 CONSTRUCTION

721.07.03 Steel Beam Guide Rail

721.07.03.01 Installation

Clause 721.07.03.01 of OPSS 721 is amended by deleting the second paragraph in its entirety and replacing it with the following:

Steel posts used on steel beam guide rail installations shall use either plastic blocks or routed wooden blocks. Where wooden breakaway posts are required, they shall be installed with routed wooden blocks.

Clause 721.07.03.01 of OPSS 721 is further amended by the addition of the following:

Type M steel beam guide rail mounting heights shall be within the following ranges:

a) 710 to 810 mm during construction and seasonal shutdown.

b) 760 to 810 mm upon completion of the work.

Where curb with gutter is required with Type M steel beam guide rail, mounting heights shall be measured vertically at the inside edge of the concrete gutter.

Where sidewalk is required with Type M steel beam guide rail, mounting heights shall be measured vertically at the face of Type M steel beam guide rail.

Subsection 721.07.03 of OPSS 721 is further amended by the addition of the following clause:

721.07.03.05 Single Rail Steel Beam Guide Rail, Relocation

Relocation of the single rail steel beam guide rail shall include the dismantling, storage, transportation, and re-installation of steel beam guide rail systems as specified in the Contract Documents.

721.09 MEASUREMENT FOR PAYMENT

721.09.01 Actual Measurement

Clause 721.09.01.05 of OPSS 721 is deleted in its entirety and replaced with the following:

721.09.01.05 Single Rail Steel Beam Guide Rail
Single Rail Steel Beam Guide Rail with Channel
Double Rail Steel Beam Guide Rail
Single Rail Steel Beam Guide Rail, Relocation

Measurement of steel beam guide rail, including relocation, shall be by length in metres along the centreline of the system from end to end of each steel beam guide rail installation. The length includes all treatments, transitions, and connections, but does not include terminal systems.

Steel beam guide rail systems that are temporarily surplus and are required for future stages shall be paid for as one relocation for the combined moves into and out of storage, including any off-site storage required due to on-site restrictions.

721.10 BASIS OF PAYMENT

Subsection 721.10.01 of OPSS 721 is amended by the addition of the following:

721.10.01 Single Rail Steel Beam Guide Rail, Relocation - Item

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 55 STEEL BEAM ENERGY ATTENUATING TERMINAL SYSTEM

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 732S03 January 2018

Amendment to OPSS 732, April 2016 - SBEAT System Options Available to Contractors

732.02 REFERENCES

Section 732.02 of OPSS 732 is amended by the deletion of the following under **Ontario Provincial Standard Specifications, Material**

OPSS 1601 Wood, Preservative Treatment, and Shop Fabrication

732.07 CONSTRUCTION

732.07.01 General

Subsection 732.07.01 of OPSS 732 is amended by deleting paragraphs two through five in their entirety and replacing them with the following:

When an SBEAT system is specified in the Contract Documents, the Contractor has the option of using one of the following systems that meet Manual for Assessing Safety Hardware (MASH):

a) MASH SoftStop Terminal System

b) MASH Sequential Kinking Terminal (MSKT) System

c) MASH Max-Tension Terminal System

732.07.02 Posts and Steel Foundation Tubes

Subsection 732.07.02 of OPSS 732 is amended by deleting the second, third, and fourth paragraphs in their entirety.

732.07.03 Steel Beam Guide Rails

Subsection 732.07.03 of OPSS 732 is amended by deleting the second paragraph in its entirety and replacing it with the following:

SBEAT system mounting heights shall be measured vertically from the top of the steel beam guide rail to the ground or gutter line. SBEAT system mounting heights shall be within the ranges in Table 3.

OPSS 732 is amended by deleting Tables 1 and 2 in their entirety and replacing it with the following:

TABLE 3
SBEAT System Mounting Heights

System	Height During Construction and Seasonal Shutdown (mm)	Height for Completion of the Work (mm)
MASH SoftStop Terminal	760 to 810	760 to 810
MSKT	760 to 810	760 to 810
Max-Tension Terminal	760 to 810	760 to 810

SSP 56 ENERGY ATTENUATOR
TEMPORARY ENERGY ATTENUATOR
STEEL BEAM ENERGY ATTENUATING TERMINAL SYSTEM

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 799S05 October 2018

Certification of Safety Items

A competent and authorized representative of the Contractor shall certify each installation has been supplied and installed in general conformance with the Contract Documents by completing Form PH-CC-877, Certification of the Installation of Safety Items, prior to opening the roadway to public traffic. This form shall be submitted to the Contract Administrator within 48 hours of the time of certification. At Completion of Work, each permanent installation shall be certified again by completing and submitting a new Form PH-CC-877.

The Contract Administrator may review the installation of these tender items. For products with buried posts, the Contract Administrator may request the removal of up to two posts and associated underground hardware, as applicable, per installation to verify that the installation complies with the Contract Documents. The Contractor shall provide, at no cost to the Owner, such assistance and equipment required to complete this review.

Should this review of buried posts and associated underground hardware identify any failure to generally conform to the requirements of the Contract Documents, the Contract Administrator may request a complete inspection of the installation, which may include the removal of all posts and underground hardware. Deficiencies identified by the complete inspection shall be corrected at no cost to the Owner and any Form PH-CC-877 previously issued for that installation shall be considered void. The Contractor shall provide a new Form PH-CC-877 for that installation and the Contract Administrator may initiate another review of that installation. No additional payment will be made for labour and equipment provided by the Contractor for the completion of the inspection, and the Contractor will be charged for the complete inspection at the rate of $500 per day, or part thereof. If the complete inspection confirms that the installation was constructed in compliance with the Contract Documents, the Contractor will be reimbursed for time and material supplied to carry out the complete inspection, and for charges assessed.

SSP 57 **ENERGY ATTENUATOR - TEMPORARY**
ENERGY ATTENUATOR - RELOCATION

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 723S01 August 2018

Amendment to OPSS 723, November 2015

TABLE 2 of OPSS 723 is deleted in its entirety and replaced with the following:

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

TABLE 2
Energy Attenuator, Temporary (EAT)

Energy Attenuator	NCHRP Report 350 Test Level		Temporary Installation					
	TL-2	TL-3	Reduced Exposure (RE) (Note 1)	Narrow (NA)	Wide (WI)	Extra Wide (EW)	Super Wide (SW)	Dual Duty (DD)
TAU-II System	Yes	Yes	No	Yes	No	No	No	No
TAU-II Wide System	Yes	Yes	No	No	Yes	No	No	No
TAU-II Extra Wide System	Yes	Yes	No	No	No	Yes	No	No
ABSORB 350 System	Yes	Yes	Yes	No	No	No	No	No
Quadguard System	Yes	Yes	No	Yes	No	No	No	No
Quadguard Wide System	Yes	Yes	No	No	Yes	No	No	No
Quadguard Extra Wide System	Yes	Yes	No	No	No	Yes	No	No
Quadguard Super Wide System	No	Yes	No	No	No	No	Yes	No
ACZ 350 System	Yes	Yes	Yes	No	No	No	No	No
Smart System	Yes	Yes	No	Yes	No	No	No	Yes
TRACC System	Yes	Yes	No	Yes	No	No	No	No
SLED System	Yes	Yes	Yes	No	No	No	No	No

Note:
1. ABSORB 350 energy attenuator system shall be used when Movable Temporary Concrete Barrier is specified.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 58 CONCRETE BARRIER
TALL WALL BARRIER

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 740S01 September 2011

Amendment to OPSS 740, November 2010

740.05.04 Concrete Pad for Precast Concrete Barrier

Subsection 740.05.04 of OPSS 740 is deleted in its entirety.

740.07.01 Concrete Barrier

740.07.01.01 Foundation Preparation

Clause 740.07.01.01 of OPSS 740 is amended by the deletion of the third paragraph.

740.07.01.02 Tolerances

Clause 740.07.01.02 of OPSS 740 is amended by deleting the third paragraph and replacing it with the following:

When a 3 m long straight edge is placed on the top and faces of the concrete barrier surface, the surface of the concrete shall not vary more than 6 mm from the edge of the straight edge.

740.07.01.03 Surface Finish

Clause 740.07.01.03 of OPSS 740 is amended by deleting the first paragraph and replacing it with the following:

The surface of the concrete barrier placed with conventional forms shall have a surface finish according to OPSS 904.

740.07.01.04 Curing

Clause 740.07.01.04 of OPSS 740 is deleted in its entirety and replaced with the following:

Curing shall be according to OPSS 904 with the exception that white pigmented curing compound is permitted with slipformed concrete.

Curing for formed surfaces shall be according to OPSS 904.

When joints are made after the application of curing compound the exposed face of the barrier in the vicinity of the joint shall be retreated with curing compound.

When white pigmented membrane is used as curing compound on slip formed barrier, it shall also be used on adjacent preformed barrier sections for colour uniformity.

740.07.01.05 Cold Weather Concreting

Clause 740.07.01.05 of OPSS 740 is deleted in its entirety and replaced with the following:

740.07.01.05 Concrete Subject to Cold Weather

Concrete shall not be placed by slipforming when the ambient air temperature is below 0 °C.

When the concrete is placed at temperatures of 5 °C or less, the concrete in the barrier wall shall be maintained at a minimum temperature of 5 °C for 3 days. The compressive strength cylinders shall be cast and cured with the barrier wall. The 3-day compressive strength cylinders shall be at least 80% of the minimum specified 28-day compressive strength of the wall. If the Contractor cannot meet these conditions, then the concrete shall be protected according to OPSS 904, for slabs on the grade.

740.07.01.07 Construction Joints

Clause 740.07.01.07 of OPSS 740 is deleted in its entirety and replaced by the following:

Construction joints shall be vertical and square with a rough joint face. The joints shall be created by sawcutting the hardened concrete to a depth of 45 ± 5 mm around the outside of the barrier and removing the remaining loose and excess concrete.

Curing compound shall be applied to the joint face.

Transition sections between barrier and treatments for high mast lighting poles, overhead sign structures and bridge piers in median shall be one piece construction of the same class of concrete as the barrier. No portion of the transition shall be slipformed.

Dowels shall only be used at transitions.

Continuity between transition sections and barrier wall sections shall be accomplished by using three size 25M by 1.0 m long, epoxy coated smooth reinforcing bars placed horizontally in the

wall. The three bars shall be embedded 500 mm into the squared end of the constructed wall and shall be located on the barrier centre line, commencing 150 mm from the top of the barrier and equally spaced vertically at 150 mm intervals. Construction joints at transition sections for Tall Wall concrete barrier shall consist of five horizontal epoxy coated smooth reinforcing bars installed and greased as indicated above.

Prior to constructing the addition, the exposed horizontal bars and the squared end of the barrier wall shall be greased to inhibit bonding.

Transitions for high mast lighting poles and overhead sign structures shall be one-piece construction of the same class of concrete as the barrier wall.

740.07.01 Concrete Barrier

Subsection 740.07.01 of OPSS 740 is amended by the addition of the following clause:

740.07.01.09 Isolation and Contraction Joints

All joints shall be formed in the plastic concrete immediately following the slipform equipment. The joints shall be formed using a grooving tool with a minimum 40 mm deep bit and shall be continuous along the front and back vertical face, excluding the top of the barrier. Tooling marks or other surface defects adjacent to the newly formed joint shall be trowelled smooth. The Contractor may submit a proposal to sawcut the contraction joints in lieu of scoring, which may be permitted subject to a demonstration of the proposed technique and prior approval by the Contract Administrator.

Isolation joints shall be placed on each side of the outside perimeter of all sub-surface structural elements such as storm-water and maintenance access structures to accommodate vertical differential movement.

Contraction joints shall be equally spaced along the barrier wall at 4 m intervals. This interval may be locally modified to a length between 3 to 5 m to avoid being within 3 m of any other joint.

The construction joint at the end of the day shall coincide with a contraction or isolation joint.

Cracks outside the joints are unacceptable. The section containing the crack(s) shall be removed and replaced at the Contractor’s expense. The limits of removal shall extend to the nearest joint on each side of the crack.

740.10 BASIS OF PAYMENT

Subsection 740.10.01 of OPSS 740 is amended by deleting the second paragraph.

SSP 59 **CONCRETE BARRIER**
AMENDMENT TO OPSS 740, NOVEMBER 2010

The following special provision applies to work within MTO ROW:

MTO Special Provision No. 107S04 February 2013

740.05 **MATERIALS**

740.05.08 **Reinforcing Steel**

Subsection 740.05.08 of OPSS 740 is deleted in its entirety and replaced with the following:

740.05.08 **Steel Reinforcement**

Steel reinforcement shall be according to OPSS 1440. Dowel bars shall be according to OPSS 1442.

SSP 60 **MOVEABLE TEMPORARY CONCRETE BARRIER**
MOVABLE TEMPORARY CONCRETE BARRIER, RELOCATION
MOVABLE TEMPORARY CONCRETE BARRIER, SHIFT

MTO Special Provision No. 741S02 August 2016

Amendment to OPSS 741, November 2014

741.02 **REFERENCES**

Section 741.02 of OPSS 741 is amended by the addition of the following:

Ontario Provincial Standard Specifications, Construction

OPSS 723 Energy Attenuators

Section 741.02 of OPSS 741 is further amended by the addition of the following under **Ontario Ministry of Transportation Publications:**

Designated Sources for Materials (DSM)

OPSS 741 is amended by the addition of the following sections 741.03, 741.04, and 741.06:

741.03 DEFINITIONS

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

Relocation means the movement of a movable temporary concrete barrier system from one location to another, which typically occurs when construction operations move from one stage to the next.

Shift means the lateral displacement of a movable temporary concrete barrier system, which is typically completed to facilitate the opening or closing of traffic lane(s). The lateral displacement may vary throughout the length of a barrier installation.

741.04 DESIGN AND SUBMISSION REQUIREMENTS

741.04.01 Submission Requirements

Installation of the movable temporary concrete barrier shall not commence until the Working Drawings and a copy of the manufacturer's specifications and installation instructions have been submitted to the Contract Administrator.

741.06 EQUIPMENT

741.06.01 Barrier Transfer Machine for Movable Temporary Concrete Barrier

Barrier transfer machines required to shift the movable temporary concrete barrier shall be supplied by a supplier of moveable temporary concrete barrier listed on the DSM listing for Traffic Barriers, Temporary Concrete Barrier.

741.07 CONSTRUCTION

Section 741.07 of OPSS 741 is amended by the addition of the following subsection:

741.07.06 Movable Temporary Concrete Barrier System

The movable temporary concrete barrier system shall be installed and relocated at the locations specified and according to the Contract Documents, the Working Drawings, and the manufacturer's installation instructions and specifications.

Movable temporary concrete barrier shall be installed on a paved surface having a maximum crossfall of 6% measured perpendicular to the installation and shall be in place prior to the opening of traffic operations.

Gaps between barriers shall be kept clear of debris at all times.

The movable temporary concrete barrier system shall be removed from the Working Area when no longer required.

741.07.06.01 Shifting of Movable Temporary Concrete Barrier

The shift of movable temporary concrete barrier, including the shift of energy attenuators, shall be at the locations specified in the Contract Documents. The method and procedure for the shift shall be according to the manufacturer’s installation instructions. The movable temporary concrete barrier and energy attenuators shall be shifted back to the original location when required. Shifting of the movable temporary concrete barrier and energy attenuators at the locations specified in the Contract Documents shall be completed as many times as is necessary to complete the work requiring the shift.

741.07.06.02 End Treatment

One end or both ends, as specified in the Contract Documents, of the movable temporary concrete barrier installation shall be protected with ABSORB 350 energy attenuator according to OPSS 723.

741.07.06.03 Quality Control

The Contractor is responsible to supply and install the movable temporary concrete barrier units and certify that they meet the acceptance criteria listed under Acceptance Criteria for Movable Temporary Concrete Barrier. The Contractor shall do an initial inspection of the units prior to installation and a further inspection of the units after each subsequent relocation. Every installation and relocation of units shall be certified by submitting to the Contract Administrator a completed Owner Standard Form PH-CC-876, Certification of Temporary Concrete Barrier Installations, within 24 hours of installation or relocation of the units. Certification shall be by an authorized representative of the Contractor.

Installed or relocated units that do not meet the acceptance criteria for movable temporary concrete barrier shall be removed and replaced with units that meet the acceptance criteria within 48 hours.

Units damaged while in service shall be replaced within 48 hours of the damage occurrence or awareness of the damage.

741.07.06.04 Acceptance Criteria for Movable Temporary Concrete Barrier

Any movable temporary concrete barrier unit that fails one or more of the following acceptance criteria shall be rejected:

a) Dimensions of each unit shall not deviate from those specified by more than the following tolerances:

   i. For specified dimensions up to 300 mm, the tolerance shall be ± 5 mm.
   ii. For specified dimensions greater than 300 mm, the tolerance shall be ± 10 mm.

b) Steel elements of each connecting device shall be free of visible fracture, distortion, and perforation.

c) Top or head of each unit shall not expose mesh or rebar nor have damage greater than 75 mm deep.

d) Bottom or foot of each unit shall not have:

   i. Damage greater than 250 mm long measured parallel to roadway.
   ii. Damage greater than 75 mm wide measured perpendicular to roadway.
   iii. Damage greater than 150 mm high.

e) All cracks wider than 0.3 mm shall neither extend through the unit nor be longer than 300 mm.

f) The unit shall be free of honeycombing.

741.09 MEASUREMENT FOR PAYMENT

741.09.01 Actual Measurement

Subsection 741.09.01of OPSS 741 is amended by the addition of the following subsections:

741.09.01.05 Movable Temporary Concrete Barrier

Measurement of barriers shall be by length in metres along the centreline of the movable temporary concrete barrier, from end to end, up to the maximum length of barrier required to be placed at any one time during the Contract.

741.09.01.06 Movable Temporary Concrete Barrier, Relocation

Measurement of barriers shall be by length in metres from end to end of each individual relocation, along the centreline of the movable temporary concrete barrier.

Movable temporary concrete barrier that is temporarily surplus for an intermediate stage, but will be required for a later stage, shall be paid as one relocation for the combined moves into and out of on-site storage, including any off-site storage due to on-site restrictions.

741.10 BASIS OF PAYMENT

Subsection 741.10.01 of OPSS 741 is amended by the addition of the following items:

Movable Temporary Concrete Barrier - Item
Movable Temporary Concrete Barrier, Relocation - Item

Section 741.10 of OPSS 741 is amended by the addition of the following subsection:

741.10.02 Movable Temporary Concrete Barrier, Shift - Item

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

Payment shall be prorated over the time requiring shifting of movable temporary concrete barrier.

SSP 61 <u>100 mm IMPORTED TOPSOIL AND SOD</u>

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

OPSS 802 and 803, and Special Provisions, Contract Items, Clauses B21 shall apply to these items, except as amended herein.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Under this Item, the Contractor shall place the topsoil, and sod in accordance with the Contract Drawings or as directed by the contract administrator and as specified herein. In addition to the conditions stipulated in the Niagara Peninsula Contract Document, the following shall also apply:

All areas to be sodded shall be re-graded to provide proper drainage. Any areas on private property shall also be included.

All unnecessary damage to front lawns, boulevards or grass areas caused by the contractor's carelessness shall be reinstated at their own expense.

The unit price bid shall also include all final grading of the boulevards, weed removal and all work required to ensure growth within the one year maintenance period.

Topsoil:

Topsoil shall be a **PREMIUM BLEND** with a pH of 6.5 to 7.5, weed free and naturally sterilized through composting. The blend shall consist of 50% Triple Mix (a 30% mixture of topsoils, sands and shredded wood mulch, a 30% mixture of black organic compost and manure and a 30% mixture of peat loam) and 50% Premium Topsoil (a 50% mixture of topsoils, sands and shredded wood mulch, a 25% mixture of black organic compost and a 25% mixture of composted cow manure). In general, the resulting topsoil mix should meet the following parameters :

pH : 6.5 - 7.5
Potassium : 100 - 120 ppm
Phosphorous : 15 - 30 ppm
Magnesium : 100 - 120 ppm
Organic Matter : $\geq$ 3%

Unless otherwise specified, the minimum depth of applied Premium Blend Topsoil shall be 100 mm.

Topsoil Testing:

Prior to commencement of the project, the Contractor shall supply two samples of topsoil from each stockpile to be used to the Contract Administrator. Additionally, the Contract Administer may randomly sample topsoil arriving on-site. The samples will be tested by Agri-Food Laboratories (AFL) using the AFL Basic III test package plus % sand, % silt and % clay. These tests will rate the soil in accordance with AFL and Ontario Ministry of Agriculture and Food (OMAF) recommendations. Topsoil with tests resulting in "low, very high or excessive" ratings for the various parameters will be rejected.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Preparation and Timing:

As soon as practically possible after the main construction is completed, the Contractor shall rough grade and level all of the affected areas to the sub-grade elevation. The contractor must ensure that all granular and foreign material is removed from areas adjacent to any driveway or sidewalk and from behind new curbs prior to the placement of topsoil. If the areas are lower than the required depth, the contractor may use suitable native fill material properly compacted to prevent undo settlement.

All 'cut-in' areas adjacent to the existing sod shall be squared off and removed by means of a mechanical sod cutter. An additional 25 mm of existing topsoil shall be removed to accommodate a 25 mm dressing thickness of Premium Blend Topsoil to ensure new sod growth at abutting sod areas.

In the event of inclement or hot weather conditions the Contract Administrator may delay the placement of sod until more appropriate weather conditions prevail. Nevertheless, the Contractor shall still prepare and apply the topsoil to all of the affected areas as soon as construction is completed to tidy up the construction zone and reduce the possibility of weed infestation. Removal of weeds prior to sod placement shall be required as needed and directed by the Contract Administrator.

Fertilizer:

A granular starter fertilizer of 0-20-0 shall be applied at a rate of 2.0 kg per 100 m^2 spread on the topsoil immediately prior to sodding. In addition, an application of 20-20-20 water soluble fertilizer shall be applied 21 days after the sod is laid.

Sod:

Sod shall be placed in accordance with OPSS 803. Sodded areas shall be rolled with a light roller to ensure a good bond between the sod and topsoil and to remove minor depressions and irregularities. Heavy rolling to correct irregularities in grade will not be permitted.

Initial watering of all sod shall be completed within 12 hours after placement and shall be sufficient to penetrate the root zone of the sod and wet the surface of the topsoil. The Contractor shall apply all water required during for a one year maintenance period to ensure growth. The Contractor shall distribute an information door hanger to each affected residence outlining turf care information. The door hanger shall be supplied by the Owner.

In accordance with OPSS 571.07.05, the one year maintenance period shall commence once all of the sod has been placed. At the end of the one year maintenance period, the Contractor shall

arrange a suitable time with the Contract Administrator to inspect all of the sod that has been placed. Deficient areas shall be resodded as outlined in OPSS 571.08.

Measurement for Payment:

The Contractor shall contact the Contract Administrator to arrange a suitable time to review the limits and calculate areas for payment on site.

If the placement of sod has been delayed due to weather yet the area to be sodded has been prepared and topsoiled as specified, payment at 50 % of the unit price bid for topsoil and sod will be made. The balance will be paid upon satisfactory completion of the sodding.

Measurement will be by the square metre of topsoil and sod placed as measured in the field by the Contract Administrator.

Warranty for sod shall commence upon completion of installation and shall continue for 1 year.

SSP 62 CATCHBASINS AND MANHOLES

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

Payment shall include adjustment to base asphalt course grade.

The catchbasins and manholes on Martindale Road shall be adjusted to final grade in 2020.

Final adjustment to 2020 final grade shall be paid for under the appropriate tender item, when installing concrete collars.

SSP 63 OIL GRIT SEPARATOR

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The above tender items shall include the installation of In-Line Stormceptor as detailed on the contract drawings. Equivalent Stormceptor systems may be installed as approved by the Contract Administrator, however, the contractor shall be responsible to obtain any necessary MOECP approvals and with no delays to the project schedule as determined by the Contract Administrator, if alternative proposed.

Locations and details, including sizing, of the Stormceptor shall be as per the contract drawings.

Shop drawings of the Stormceptors shall be submitted, reviewed and approved by the Contract Administrator prior to construction.

Contractor shall be aware that the Region is currently in process of obtaining the MECP ECA permit for the oil grit separator. The construction of the OGS shall only commence upon Region's receipt of the Permit. Contractor shall schedule the construction of the OGS in 2020.

No claims will be accepted by the Region for any delays caused as a result of the permit approval process.

Included under this tender item shall be clearing after the one year maintenance period.

SSP 64 WATERMAIN

The provisions of the Niagara Peninsula Standard Contract Documents, Item D1, shall apply except as amended or extended herein.

Bionax PVCO AWWA C909, NSF/ANSI 61, PR235 is an acceptable alternative to PVC DR18 pipe. No additional payment will be made if the Contractor chooses to use Bionax pipe instead of PVC DR18 pipe.

The owner shall employ the services of a certified operator. For functions that must be performed by a certified operator under the current regulations, including, connect to existing watermains and perform "wet taps", the Contractor must arrange with the owner for a certified operator to be present.

Minimum pipe cover to mains and services shall be 1.70 metres unless noted otherwise on the drawing or at the direction of the Contract Administrator.

A minimum of 48 hours advance notice must be provided to the owner to arrange for a certified operator on site.

SSP 65 RELOCATE EXISTING HYDRANT AND SECONDARY VALVE

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The Contractor shall remove and relocate the hydrants at the locations identified on the contract drawings. The hydrant lead is to be extended so that the hydrant can be reinstalled at the proposed location. The supply of all additional materials required to complete the work shall be included.

SSP 66 HYDRANT SETS

The provisions of the Niagara Peninsula Standard Contract Documents, Item D3, shall apply except as amended or extended herein.

Steamer nozzle shall be 100mm Storz connection as per National Fire Protection Association (NFPA) standard for fire hose connections. Storz connections shall be black in colour.

SSP 67 WATER SERVICES

The provisions of the Niagara Peninsula Standard Contract Documents, Item D4, shall apply except as amended or extended herein.

OPSS.PROV 401 or OPSS.MUNI 401 shall also apply to this item.

Water services shall either be Type “K” soft copper pipe or Municipex (PEXa) pipe conforming to CSA B137.5 and NSF Standard 14 &61, and current AWWA standards. Installation shall be in accordance with manufacturers specifications, or equivalent. Homes within 3m of the Property Line will be required to use cooper water service material exclusively.

All watermain tapping for main stops and stainless steel saddles shall be dry tapping.

Existing water services larger than 25mm shall be replaced using similar size of copper pipe, or PEXa pipe, main stop and curb stop.

Water services over 100mm in diameter and over shall be PVC DR18 and all related fittings, bends, adapters, etc. shall be included, and shall be installed and constructed under the appropriate watermain item.

All existing lead, iron, deteriorated or other water services if and as shown on the project drawings shall be replaced with new 25mm copper or PEXa water services from the new watermain to the property line, or as directed by the Contract Administrator. A new curb stop and curb box shall also be installed reconnecting to the existing service on private side of the property line using appropriate adapters.

For non-metallic services, the Contractor shall include the installation of a 10-guage, 7 strand insulated wire placed along the spring-line of the service and connected to the fittings as specified by the manufacturer.

All water services shall have an approved zinc anode installed. (12lb anode on curb boxes are required.), anodes will be paid under the appropriate unit rate.

Boring & Jacking and Horizontal Direction Drilling (HDD)

OPSS 416 shall also apply to Boring and Jacking.

OPSS 450 shall also apply to Horizontal Directional Drilling.

For the installation of water services and watermains 100mm in diameter or larger, a full bore augering method shall be used rather than a “torpedo” or soil displacement method.

The size of the bore and the method of pulling the pipe through the bore shall be in accordance with the pipe manufacturer’s specifications. Skids shall be used to support the pipe and prevent it from resting on the bells.

SSP 68 RECONNECT WATER SERVICES

The provisions of the Niagara Peninsula Standard Contract Documents, Item D8, shall apply except as amended or extended herein.

The Contractor shall reconnect all water services to the new watermain with approved 25mm water service pipe. The size of the connecting pipe, (up to 2.0m) main stop and saddle, must be a minimum of 25mm but match the existing service if it is larger than 25mm.

The new water service pipe shall be reconnected to existing services with suitable couplings as required.

SSP 69 TEMPORARY WATER SUPPLY

The provisions of the Niagara Peninsula Standard Contract Documents, Item D12, shall apply except as amended or extended herein.

Temporary distribution and service supply piping shall be certified for potable water use as per ANSI/NSF Standard 14 and Standard 61. Temporary distribution piping shall be a minimum 50mm diameter or larger as necessary if temporary fire hydrants are installed, Aqua Mine high

impact, ASTM PVC 1120, D2241, SDR17, 1720 kPa or approved equivalent. Temporary service piping shall be minimum 19mm diameter Kuritec or approved equivalent. The temporary water supply shall be adequately sized to provide water at pressures normal to the existing water distribution system to all affected properties.

The temporary water supply shall be properly disinfected prior to commissioning. Prior to installation, a detailed plan of the system shall be provided by the Contractor for approval by the Contract Administrator. The plan shall detail connection points to the municipal system, sampling points and the proposed location, size and material of all temporary mainline and service piping. An approved reduced pressure zone backflow preventer shall be used at the connection to the existing distribution system.

The temporary distribution piping shall be installed behind the sidewalk and service piping shall be installed along the edge of existing driveways to avoid grass-cutting conflicts. All above ground piping shall be installed with appropriate ramping or burial such that the piping will not be endangered by equipment or vehicular traffic, not pose a hazard for pedestrians (tripping, etc), provide a barrier-free access and be constructed to safeguard against vandalism and tampering. Isolation valves shall be installed at the source water connection, branches (2 on 3 way, 3 on 4 way) and at every service.

Service connections to individual buildings shall be at an outside hose bib. A WYE type connector shall be installed with a vacuum breaker installed on the side opposite the service connection. In the event that this scenario is not possible, it is the responsibility of the Contractor to determine how to provide temporary water service to the satisfaction of the property owner.

The temporary water system shall remain in service and not be removed until the Contract Administrator has approved the final connection of the new watermain to the existing system and authorized removal of the temporary water system.

The unit bid price for this item shall include all costs for installation, disinfection, maintenance, decommissioning and removal of the temporary supply system.

SSP 70 TRACER WIRE

The provisions of the Niagara Peninsula Standard Contract Documents, Item D14, shall apply except as amended or extended herein.

Installation of a tracer wire as per Niagara Peninsula Standard Contract Document – Item D14 is required and to be considered a part of the watermain installation.

Before final acceptance of the new watermain, the Contractor shall test the tracer wire in presence of the Contract Administrator or his/her representative. Any improper installation or discontinuity in the tracer wire system shall be corrected by the Contractor at its own cost. Cost for this requirement shall be deemed to have been included in the overall unit price for this item.

Tracer wire is only required to be brought to the surface at each valve box and hydrant. Additional tracer wire test stations are not required. Completion of the Tracer Wire Inspection Sheet as provided in Niagara Peninsula Standard Contract Document – Item D14 is also not required.

All costs associated with installation of the tracer wire shall be included in the watermain installation item. Testing of the tracer wire is covered and paid under this item.

SSP 71 WATERMAIN DISINFECTION AND TESTING

The provisions of the Niagara Peninsula Standard Contract Documents, Item D13, shall apply except as amended or extended herein.

For disinfecting new watermains the initial chlorination should ideally be 50ppm, but the allowable chlorination limits are from a minimum of 25ppm to a maximum of 125ppm. Chlorination to less than 25ppm or over 125ppm will not be acceptable and will need to be adjusted within the allowable limits for the disinfection process to begin. After the 24 hours waiting period the chlorine residual should be either a minimum of 60% of the initial chlorination or showing a maximum drop of 50ppm from the initial chlorination level. A chlorine residual of lower than these limits will require the test to be repeated by starting at chlorination to ≥ 25ppm and ≤ 125 ppm.

For bacteriological testing a background count of 200 and over shall be considered as a failed test and the watermain shall be disinfected again starting at re-chlorination to ≥ 25ppm and ≤ 125 ppm.

Connection to an Existing Distribution System

A reduce pressure zone backflow preventer is required on the temporary supply lines used for filling and flushing of all proposed watermains and water services. Piping arrangements on the temporary supply lines will be as per St. Catharines Std. drawing 110-4003. Existing hydrants could also be used for connecting to the existing distribution system. Advance notice and filling out of a Hydrant Use Application form is required. If available, City crew will install a City owned backflow prevention devise on the selected hydrant. If a backflow prevention device is not available the Contractor will be responsible for providing an appropriate backflow prevention device that City crews will install on the selected hydrant. The backflow prevention device shall be certified by a licensed plumber to be in a good working order at the time of installation. A

backflow prevention device supplied by a Contractor without a valid certification by a licensed plumber will not be eligible to be connected to the City's water distribution system. Only the following backflow preventer valves are approved:

Conbraco 40-200 series	19mm to 50mm
Watts 009	16mm to 50mm
Zurn/Wilkens 975XL	19mm to 50mm

All pipe sections and associated fittings associated with the final connections and tie-ins shall be spray disinfected or swabbed with a 1-5% solution of chlorine.

All costs arising from these requirements shall be included in the respective unit prices.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road) from Fourth Avenue to Barton Street In the City of St. Catharines

City of St. Catharines
stcatharines.ca
50 Church Street, P.O. Box 3012
St. Catharines, ON L2R 7C2
Tel: 905-688-5600
TTY: 905-688-4TTY (4889)

Revision: September 12, 2017

New Watermains or Water Services Installation Inspection, Testing & Disinfection Requirements

	Watermains in Roads or Easements		Water Services in Roads or Easements		Water Services on Private Property	
	≥ 50mm Ø < 75mm Ø	≥ 75mm Ø	< 75mm Ø	≥ 75mm Ø	< 75mm Ø	≥ 75mm Ø
Installation Inspections	CONST. INSP.	CONST. INSP.	CONST. INSP.	CONST. INSP.	PBS	PBS
Testing & Disinfection	TES	TES	TES	TES	PBS	TES
Final Connections	TES	TES	TES	TES	PBS	PBS
Swabbing	No	Yes	No	Yes	No	Yes
Pressure Testing	Yes	Yes	No	Yes	Yes (1)	Yes
Disinfection	Yes	Yes	No	Yes	No	Yes

- CONST. INSP. – A Project Site Inspector who is either a Consultant or a City Inspector.
- TES – Transportation & Environmental Services Department – Construction Inspectors who are also Licensed Water Operators.
- PBS – Planning & Building Services Department – Plumbing Inspectors.
- Yes – Swabbing, Pressure Testing and Disinfection as per OPSS 441, NPSCD SPC Item D13 and the City of St. Catharines New Watermain Commissioning Flow Chart (Revised August, 2017).
- Yes (1) – Pressure testing as per requirements of the most current Ontario Building Code and not as per the OPSS, NPSCD or the City's Watermain Commissioning Flow Chart.
- Where different sections of a water service under different requirements, as per the above, are being tested together then the more stringent set of the rules will apply to all sections.
- Final connections at property line are inspected by TES Construction Inspectors.

Requirement for a Testing & Sampling Plan and General Responsibility for Coordination

Any new watermains or water services or sections thereof needing swabbing, pressure testing or bacteriological sampling requires a Watermain Testing & Sampling Plan to be submitted to the City's Project Manager prior to beginning of construction. The Testing & Sampling Plan is preferred to be in the form of a sketch showing the watermain or water service being constructed, source water for flushing, swabs in and out locations, sampling points and any other relevant notes. Standard procedures are not necessary to be repeated on Testing & Sampling Plans.

It is responsibility of the Contractors to fully inform themselves about all the requirements and to contact appropriate personnel at the appropriate time for inspections and sampling of new watermains or water services. Any delays or extra costs caused due to a lack of coordination or a lack of proper inspections will be the sole responsibility of the Contractor. The City will only be responsible for delays or extra costs if it fails to provide a service that was pre-arranged with sufficient notice and confirmed.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road) from Fourth Avenue to Barton Street In the City of St. Catharines

Water for Swabbing, Testing, Disinfection and Flushing

- Water from either a potable water truck or the City's existing water distribution system must be used.
- A potable water truck can obtain water from a private potable water source or from the City's Bulk Water Filling Station on Burbank Drive. An account with the City needs to be set up for obtaining water from the Bulk Water Filling Station.
- A potable water truck cannot obtain water from a hydrant.
- For taking water directly from the City's existing distribution system, the use of a backflow prevention device (BFPD) is required. The BFPD could be installed on an existing hydrant or connected to a temporary connection to a watermain or a water service.
- It is preferred that a City supplied BFPD is installed by City Crews on the selected water source. For requesting a City supplied BFPD a Hydrant Use Form needs to be filled out which is available as a hard copy at the TES front counter at City Hall or online at http://www.stcatharines.ca/en/livein/resources/Fire_Hydrant_Use_Application_2017.pdf
- If a City BFPD is not available then City Crews can install a privately owned BFPD provided the device is duly certified by a Licensed Plumber within 7 days prior to installation confirming that the device has been inspected and is working properly.

Inspection Requirements for New Watermains or Water Services

- Construction of all watermains or water services within road allowances and easements.
- All connections within road allowances and easements or at property lines.
- Swabbing, pressure testing and disinfection of watermains or water services within road allowances and easements and large water services (≥75mm Ø) on private property.

Inspection by Transportation & Environmental Services Department (TES)
(Inspection by Construction Inspectors)
Contact Mike DiPaola at 905-688-5601 ext. 1668 or mdipaola@stcatharines.ca for booking inspections (minimum 24 hrs. notice required).

- All water services on private property irrespective of the service pipe diameter.
- All connections on private property.
- All final connections to buildings.
- All plumbing works inside buildings.
- See underlined text on the left side. Note that services ≥ 75mm Ø require inspections by Plumbing Inspectors but testing by Construction Inspectors.

Inspection by the Planning & Building Services Department (PBS)
(Inspection by Plumbing Inspectors)
Call PBS at 905-688-5601 Ext. 1660 for booking inspections (minimum 24 hrs. notice required + availability subject to scheduling).

The City's Operations Department (Water Crews) provide services necessary for the commissioning of new watermains and/or water services.

- All City owned water valves and hydrants can only be operated by City Crews.
- Live tapping of existing watermains or large water services (≥ 100mm Ø on City side of the water meter) is done by City Crews. Contractors prepare the area to facilitate tapping.
- City Crews can be consulted to determine which existing water users may get affected by shutting down particular sections of existing watermains in order to facilitate new connections.

Call CitizensFirst at 905-688-5600 for booking City Water Crews for any of the above tasks.

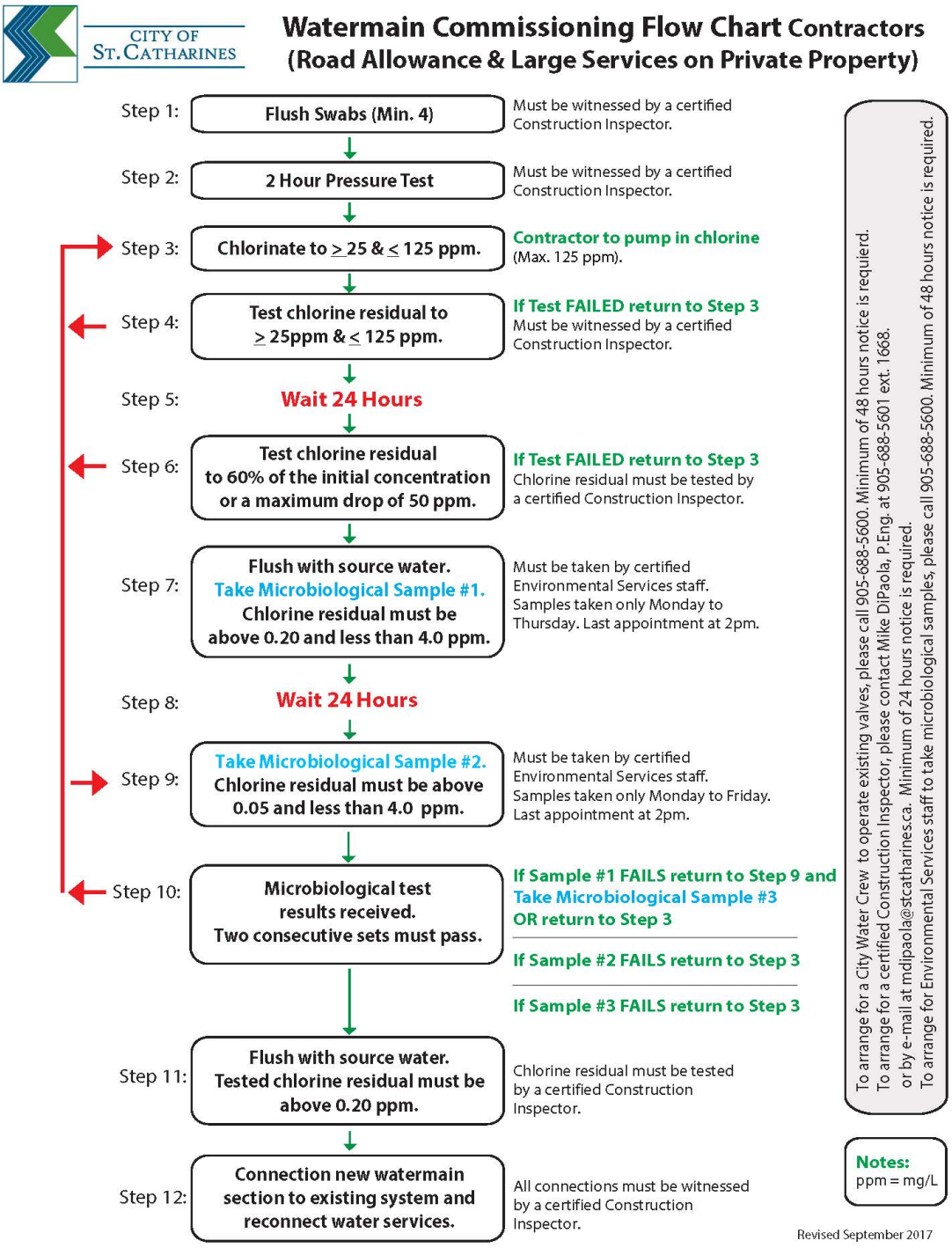
Bacteriological Testing for New Watermains or Water Services

Samples for Bacteriological testing are collected by Staff from the Environmental Services Department. Samples are only collected Monday to Friday with last appointment at 2:00 p.m. each day. Samples can be collected on Saturdays, however, sample collection on a Saturday will result in extra costs in Staff time and possible extra costs from the testing laboratory.

Call CitizensFirst at 905-688-5600 for booking Bacteriological Sampling appointments.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines



Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Under Section 12. (1) of The Safe Drinking Water Act:

No person shall operate a municipal drinking-water system unless the person holds a valid operator's certificate issued in accordance with the regulations.

Only a certified operator can perform the following functions (these functions can only be done by contractors when a certified operator is present):

- Isolate watermains and reconnect isolated watermains;
- Open or close valves;
- Perform wet-taps;
- Flush hydrants;
- Disinfect or treat the water using chemicals;
- Add chlorine or other chemicals to the distribution system;
- Control the flow or pressure of the water in the drinking water system;
- Conduct water tests for the 24 operational parameters listed under O.Reg 248/03 (e.g. chlorine residual, turbidity, alkalinity, pH);
- Maintain logs or other forms of record keeping relating to the treatment and distribution activities in the system;
- Disinfect or treat the water through adjustments to the treatment equipment;
- Monitor gauges, meters or control valves relating to disinfection, treatment or distribution of drinking water;
- Start/stop pumps, engines & generators to control and adjust flow and treatment.

SSP 72 INSTALLATION OF JUNCTION BOXES (JUNCTION BOXES WILL BE SUPPLIED BY REGION)

The provisions of OPSS 602 (Junction Box referred to as Handhole) and NRS 2020 apply except as extended or amended herein.

The installation work also includes junction boxes, large and small (if necessary) of concrete polymer material, couplings, sweep bends, and wiring as shown in the wiring drawings and construction drawings. Junction boxes must be placed on bricks at each corner with 150mm of clear stone as shown in NRS 2020. Alterations or cuts into the sides of the junction box are not permitted.

The location of junction boxes must be confirmed by the Region's inspector prior to placement.

Payment shall be made at the applicable unit price for each junction box installed, and shall be full compensation for all labour, materials and equipment required to complete the work as specified in the Contract Documents.

SSP 73 SUPPLY AND INSTALL RIGID DUCTS, DIRECT BURIED SUPPLY AND INSTALL RIGID DUCTS, EMBEDDED IN BRIDGE STRUCTURE C/W EXPANSION JOINTS & JUNCTION BOXES

The following outlines the specifications that must be satisfied when installing rigid ducts for the Region.

- Ducts manufactured by Sceptre (pre-approved by the Region) must be used. Refer to RAE listing.
- All ducts must be installed with 6.35mm (¼") diameter woven polypropylene rope fish.
- Ducts must be installed as shown in the contract drawings.
- All conduit connections are to be made by the glue method unless specified on drawings.
- The conduit is to be installed between 0.75m and 1.0m below finished grade. Conduit in new road base is to be installed in a trench just below the roadway subgrade elevation to prevent damage during granular compaction. Conduit in existing roads should be placed as close as possible to subgrade elevation.
- Where the existing pavement is disturbed, it must be reinstated according to OPSD-2103.03 with the exception that granular 'A' can be used for backfill and compacted to 100% as per OPSS 501.
- All ducts entering junction boxes should extend up 75mm from the bottom of the junction box and ensuring a minimum of 75mm separation from top of the protruding ducts to the junction box lid.

- All duct work is to be installed directly on the sub-grade elevation when trenching for the duct is constructed in an existing road.
- Where ducts have been installed as spares, they must be capped to ensure that they remain free of debris.

Concrete encased conduits shall be installed in accordance with Hydro details provided on contract drawings and OPSD 2100.06 and OPSD 2101.02.

Payment for this item will be for all labour, material and equipment required to install the conduit(s). Where it is determined that an extra conduit is required in the pole base, installation will be paid for under the unit price bid for the appropriate size conduit that is being installed.

Measurement for payment will be by the meter of horizontal length plus one meter at each end of the conduit run for the sweep riser sections at the pole or junction box.

This works shall be carried out in accordance with OPSS 913 – 2014 November.
The pole bases on bridge structure are excluded and shall be supplied and installed under structural item and will be paid for under those items.

CONSTRUCTION SPECIFICATION FOR EMBEDDED WORK IN STRUCTURES FOR ELECTRICAL SYSTEMS

TABLE OF CONTENTS
913.01 SCOPE
913.02 REFERENCES
913.03 DEFINITIONS - Not Used
913.04 SUBMISSION AND DESIGN REQUIREMENTS - Not Used
913.05 MATERIALS
913.06 EQUIPMENT - Not Used
913.07 CONSTRUCTION
913.08 QUALITY ASSURANCE - Not Used
913.09 MEASUREMENT FOR PAYMENT - Not Used
913.10 BASIS OF PAYMENT

APPENDICES

913-A Commentary

913.01 SCOPE

This specification covers the requirements for the installation of electrical and communication materials to be embedded in structures.

913.01.01 Significance and Use of Appendices

This specification has been developed for use in provincial- and municipal-oriented Contracts.

The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities and the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

913.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner.

Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices.

Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

913.02 REFERENCES

When the Contract Documents indicate that provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial oriented specification, the references below shall be considered

to be to the OPSS listed, unless use of a municipal-oriented specification is specified in the Contract Documents.

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipaloriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 603 Installation of Ducts
OPSS 616 Footings and Pads for Electrical Equipment

CSA Standards

C22.2 No. 85-14 Rigid PVC Boxes and Fittings
C22.2 No. 40-M1989 (R2009) Cutout, Junction, and Pull Boxes
C22.2 No. 211.2-06 (R2011) Rigid PVC (Unplasticized) Conduit
C22.2 No. 227.1-06 (R2011) Electrical Nonmetallic Tubing

913.05 MATERIALS

913.05.01 Junction Boxes and Fittings

Junction boxes and fittings shall be according to CSA C22.2 No. 85.

913.05.02 Rigid Ducts

Rigid ducts to be embedded shall be according to OPSS 603, Table 1.

Ducts less than 60 mm diameter shall be rigid PVC and according to CSA C22.2 No. 211.2. The associated cleaner and solvent cement shall be according to the duct manufacturer's recommendations.

913.05.03 Flexible Ducts and Fittings

Flexible ducts and fittings shall be according to CAN/CSA C22.2 No. 227.1.

913.05.04 Fish Line

Fish line shall be nylon or polypropylene materials with a minimum test strength of 400 N.

913.05.05 Anchorage Assemblies and Hardware

Anchorage assemblies and hardware shall be according to OPSS 616.

913.05.05.01 Anchor Assembly Struts

Anchor assembly struts shall be according to OPSS 616.

913.05.05.02 Studs, Nuts, and Washers

Studs, nuts, and washers shall be according to OPSS 616.

913.05.05.03 Ferrules

Ferrules shall be according to OPSS 616.

913.07 CONSTRUCTION

913.07.01 Embedded Work in Structure

All components shall be installed at locations specified in the Contract Documents. Components shall be secured and supported in place so that shifting or deflection of the components does not occur during the placing of concrete or under other such loads as may be encountered during construction.

913.07.01.01 Junction Boxes

Junction boxes shall be installed so that the outside faces of the covers are flush with the finished surface of the concrete, except for barrier walls. Junction boxes shall be recessed 50 mm in barrier walls and have grounded galvanized steel treaded covers according to CSA C22.2 No. 40 and the Contract Documents.

Junction boxes shall be drilled to accept conduit fittings as specified in the Contract Documents.

Ducts and conduit fittings shall be connected to junction boxes using appropriate solvent cement.

913.07.01.02 Ducts

Ducts shall be installed using CSA approved fittings, couplings, and accessories for the type of duct used. Adapter couplings shall be installed between ducts of dissimilar materials. Expansion and deflection fitting assemblies or wobble joints shall be installed at structural expansion joints.

Expansion and deflection coupling joints shall be according to the Contract Documents and manufacturer's specifications. Duct to couplings and fittings connections shall be made with a cleaner and solvent cement suitable for the type of duct installed.

Ducts ending at vertical concrete faces shall be terminated with fittings as specified in the Contract Documents.

Ducts shall be free of debris, water, breakage, and distortion and verified by pulling a mandrel through the ducts.

All open ends in ducts shall be plugged with plastic plugs.

913.07.01.03 Fish Line

A fish line shall be installed in all duct systems. A 1.5 m length of fish line shall be left coiled in each junction box and at each duct termination at a concrete face by bringing the fish line out of the duct beside the plastic plug.

913.07.01.04 Anchorage Assemblies

Anchorage assemblies shall be installed according to OPSS 616.

913.07.02 Embedded Work in Structure for Other Than Owner

The work for embedded work in structure for other than the Owner shall be according to subsection Embedded Work in Structure and as specified in the Contract Documents.

When material supplied by others to the Contractor is specified in the Contract Documents, the Contractor shall notify the Contract Administrator in writing of the need for the material a minimum of 30 Days in advance of the date when the material is required.

913.10 BASIS OF PAYMENT

913.10.01 Embedded Work in Structure – Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work.

SSP 74 SUPPLY AND INSTALL LOW VOLTAGE CABLES, IN DUCTS
SUPPLY AND INSTALL LOW VOLTAGE CABLES, AERIAL ON MESSENGER CABLE
INSTALL INTERCONNECT CABLES (CABLES SUPPLIED BY REGION)

Scope

This special provision covers the requirements of the supply and installation of low voltage cables in ducts / aerial.

According to The Region of Niagara standards for conductor colour schemes, the low voltage cables to be installed for lighting will have a neutral conductor coloured white, and live conductors coloured red and black.

Basis of Payment

Payment at the contract price for the above tender item shall be full compensation for all labour, equipment and materials required to do the work as described above.

SSP 75 SUPPLY AND INSTALL GROUND WIRES
SUPPLY AND INSTALL GROUND ELECTRODES INCLUDING ALL WIRES NECESSARY FOR CONNECTION

Grounding wire and grounding electrodes shall be constructed as per OPSS 609 except as amended or extended herein. The Contractor shall inspect the grounding cables, bonding jumpers, ground electrodes and connection components prior to and during installation to ensure that they meet the requirements of the contract. One (1) ground plate shall be installed at the power supply pole. Ground plate shall be 10”x16” with ground clamp manufactured by Thomas & Betts (model # 1016BTB).

When concrete poles are installed, the third pole located away from the power supply point is to be grounded using a 3m long copper clad ground rod. Every third pole thereafter is to be grounded in a similar fashion. In addition, the last pole in a distribution run shall be grounded.

The Contractor shall inspect and test the grounding to ensure that it meets the requirements of the contract. In particular, and without limiting the foregoing, the Contractor shall inspect the work to ensure that all electrical connections and splices have been properly installed in accordance with the requirements of the contract. The Contractor shall test all system and components grounding. The Contractor shall test the resistance to ground between the equipment enclosures and the grounding grid. In soils of low conductivity, ground plates and ground wires shall be added as required. Readings shall not exceed 25 ohms. These measurements shall be undertaken when frost penetration does not exceed 150 mm.

The Contractor shall notify the Contract Administrator and Regional signal staff of the time and location of all testing three working days prior to the start of each test.

Payment at the contract price for the above tender items shall be full compensation for all labour, equipment required to do the work as described above.

SSP 76 **INSTALL ALUMINUM POLES ON BRIDGE STRUCTURE**
INSTALL DIRECT BURIED SECTIONAL STEEL POLES
(POLES WILL BE SUPPLIED BY REGION)

The following outlines the specifications that must be satisfied when installing power supply mounting poles.

- The direct buried sectional steel poles, pre-approved by the Region, must be used.
- 9.8m Aluminum poles supplied by the Region, must be installed on bridge structure. Pole shall be installed in a way that pole hand hole facing towards the road side and handhole shall be at 1.7m height from base.
- The direct buried 7.3M and 10.5m sectional steel poles supplied by the Region, must be installed.
- The exact location of each power supply pole must be as outlined in the contract drawings.
- Where poles are perforated for cables or cut for any reason, they must be treated with a zinc rich compound and fitted with rubber grommets.
- All poles must be installed as per the manufacturer's specifications.
- Pole sections must be fastened to each section using one stainless steel ¼"x ¼" tapping screw.

Payment at the contract price for the above tender items shall be full compensation for all labour, equipment, and materials, required to do the work as described above.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 77 SUPPLY AND INSTALL ROADWAY LIGHTING LUMINAIRES AND RACKET ASSEMBLIES

The provisions of OPSS 617, NRS 2130 apply except as extended or amended herein.

The Contractor shall supply and install following approved luminaires by Niagara Region as follows. **No approved equal.**

i) 160W Philips Roadfocus LED Luminaire c/w 3.0m bracket

Above fixtures shall be manufactured by Philips and catalogue No. **RFM-160W48LED4K-T-R2M-UNIV-DMG-FAWS-RCD7-GY3**.

No approved equal. Photocell receptacle is provision only for future dimming and central monitoring.

The Contractor shall supply and install 3.05m (10ft) Aluminum Tapered Elliptical Brackets manufactured by “Valmont”

All the luminaires will be placed as per the contract drawings and confirmed by the Region Technical staff.

Payment for this item will include all labour to construct luminaire bracket and arm, and will be made at the contract price in the Schedule of Quantities.

SSP 78 SUPPLY & INSTALL OF POWER SUPPLY CONTROL CABINET ASSEMBLIES

The following outlines the specifications that must be satisfied when installing Supply Control Cabinet Assemblies for the Region of Niagara.

- All devices/components used for the power feed and disconnect must be pre-approved by the Region. Refer to RAE listing.
- The power feeds and disconnects must be installed as shown in NRS 2130 and NRS 2440.
- All devices/components must be approved by the Hydro Safety Authority. The contractor shall coordinate for ESA approval.
- The power feed must be connected by the Local Power Authority.
- Illumination shall be activated through a centrally-located photoelectric controller with a separate circuit breaker for re-lamping, as per NRS 2440.
- The photoelectric controller shall be mounted on the supply control cabinet pole as per NRS 2130.

A meter socket, acceptable to the Supply Authority, shall be installed where indicated in the contract. Cables, terminations and connections shall be installed in accordance with the requirements of OPSS 604. Service cables, from the point of service connection to the main disconnecting means shall meet the requirements of the Electrical Safety Code.

In supply control cabinet assemblies, the system ground wire and the service ground wire shall be connected to the neutral bus. All grounding work shall be carried out in accordance with the requirements of OPSS 609.

Photoelectric controls shall be installed on poles with photocell receptacle mounted on a 4x4x4 PVC enclosure and secured with stainless steel strapping. The photo-conductive cell window shall be set to face in a northerly direction but away from any nearby light sources.

The Contractor shall perform visual inspection on the installed power supply equipment, inspecting all components, as listed under Pre-installation Testing and Inspection. In addition, the Contractor shall perform Low Voltage System tests on wiring of the equipment in conformance to OPSS 604. The Contractor shall perform all tests on grounding of equipment in conformance to OPSS 609.

Qty.	Unit	Description
See Quantity Sheets	Each	Supply Control Cabinet Assembly, Type 1, 120/240 Volt, 100 Amp. , 1 Phase, complete with: 100 Amp. Main Circuit Breaker 5-30 Amp. Circuit Breakers. 100 Amp. meter socket as per Hydro standards.

Payment at the contract price for the above tender item shall be full compensation for all labour, equipment, and materials, required to do the work as described above.

SSP 79 **REMOVE AND DISPOSE OF EXISTING LUMINAIRE, ARM AND ASSOCIATED WIRING**

The provisions of OPSS 610 apply except as extended or amended herein.

All luminaires and arms identified for removal on hydro poles, shall be salvage and transported to Alectra. The contractor must contact the Alectra and make arrangements for delivery of salvaged materials.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Alectra address:
340 Vansickle Road,
St. Catharines
ON, L2S 0C9

All luminaires, arms and cabinets identified for removal shall be salvage and transported to the City of St. Catharines. The contractor must contact the City at the below telephone number and make arrangements for delivery of salvaged materials.

Lake Street Service Centre
383 Lake Street
St. Catharines
ON, L2N 4H5
Telephone: 905-688-5600

The store hours are from 8:00 a.m. to 2:00 p.m., Monday to Friday. The contractor must contact the City before starting the removals.

This equipment shall be removed immediately upon completion and switch over to the new illumination system and under no circumstances shall the existing illumination be removed before the new illumination is put into operation

All other excess materials, such as, Portland cement, concrete, natural wood, masonry, fabricated metal and plastic products, shall be managed as non-hazardous solid industrial or commercial waste, as specified in OPSS 180.

Payment for electrical removals will be at the contract price as outlined in the schedule of quantities and include all equipment and labour to remove, dispose of at approved site. No additional payment will be made for hazardous material disposal.

SSP 80 UNDERPASS LUMINAIRES

MTO Special Provision No. 611F01 February 2014

Amendment to OPSS 611, November 2013

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

611.05 MATERIALS

Subsection 611.05.01 of OPSS 611 is deleted in its entirety and replaced with the following:

611.05.01 Luminaires

Underpass luminaires shall be according to OPSS 2434 and the requirements as described in Table 1.

TABLE 1
Description of Underpass Luminaires

Description
LED underpass lighting luminaire(s) – 24 Watt, IES type 3M distribution, for 120 Volt operation. Manufacturer's Name & Photometric curve(s): Cree, Model SEC-EDG-3M-WM-02-E-UL-SV-350-40K, Test # ITL 78940.
Underpass luminaire - ____ -Watt high-pressure sodium, ____-Watt _____ type ballast, IES type ____ distribution, for ____ -Volt operation. Manufacturer's Name & Photometric curve(s): _____. The luminaire(s) shall be complete with _____ - Watt high pressure sodium lamp ANSI designation _____.
Underpass luminaire - ____ -Watt high-pressure sodium, ____-Watt _____ type ballast, IES type ____ distribution, for ____ -Volt operation. Manufacturer's Name & Photometric curve(s): _____. The luminaire(s) shall be complete with _____ - Watt high pressure sodium lamp ANSI designation _____.

SSP 81 SUPPLY CONTROL CABINET ASSEMBLIES

MTO Special Provision No. 614F01 April 2017

Amendment to OPSS 614, November 2012

614.05 MATERIALS

Subsection 614.05.01 of OPSS 614 is deleted in its entirety and replaced with the following:

614.05.01 Distribution Assemblies

Distribution assemblies shall be according to OPSS 2414 and the requirements as described in Table 1.

Table 1
Description of Distribution Assemblies

Description
Distribution Assembly, Pad Mounted, ___ kVA, ___ Volt, 3 Phase, complete with: ___ Amp. Main fused Disconnect ___Volt. ___ Amp. Main unfused Disconnect. ___ Amp. Main Lighting Breaker. ___ Amp. Main Auxiliary system fused Disconnect. ___ - ___ Amp., ___Volt Auxiliary system fused Disconnect. ___ - ___ Amp. Branch Breakers (for Lighting panel board). ___ - ___ Amp. Branch Breakers (for ____Volt panel board). ___ Amp. meter socket as per (Local Supply Authority) standards. Meter Socket Catalogue No. _____

Subsection 614.05.02 of OPSS 614 is deleted in its entirety and replaced with the following:

614.05.02 Supply Control Cabinet Assemblies

Supply control cabinet assemblies shall be according to OPSS 2414 and the requirements as described in Table 2.

Supply control cabinet assemblies shall include an Arc Flash and Shock Hazard warning label according to Figure 1. The warning sign shall be prominently displayed on the outside of each exterior door. The Contractor shall enter the location information in Figure 1 as indicated by the local MTO electrical coordinator.

The AC arc flash analysis and results in Figure 1 are applicable to ministry highway electrical systems with the following characteristics:

a) Single phase.

b) Nominal system voltage of 240 VAC or less.

c) Continuous current rating of main breaker of 100 A or less.

d) Size of upstream transformer of 100 kVA or less.

e) Condition of electrical plant shall be in good condition and well maintained.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Table 2
Description of Supply Control Cabinet Assemblies

Description
Supply Control Cabinet Assembly, Type 1, 120/240 Volt, 100 Amp., 1 Phase, complete with: 100 Amp. Main Circuit Breaker ___ Amp. Traffic Signal Circuit Breaker. 4 Nos. 40 Amp. Circuit Breakers. 200 Amp. meter socket as per (Local Supply Authority) standards. Meter Socket Catalogue No. _____

Figure 1
Arc Flash and Shock Hazard Warning Label



Arc Flash and Shock Hazard

Location: _____

Arc Flash		**Shock**	
Working distance:	460 mm (19 inches)	Nominal system voltage:	240 VAC
Incident energy:	2.1 cal/cm^2	Limited approach:	1000 mm (40 inches)
Arc Flash Boundary:	635 mm (26 inches)	Restricted approach:	300 mm (12 inches)

Minimum PPE Requirements: PPE according to CSA Z462 Arc Flash PPE Category 2

Analysis Date: October 2015

SSP 82 15MPa CONCRETE (PROVISIONAL ITEM)

This concrete shall have a minimum of 28-day strength of 15 MPa. The price indicated in the Form of Tender per cubic metre shall include supply and placement of concrete in trench at any depth for whatever purpose as directed by the Contract Administrator.

SSP 83 TEST PITS (PROVISIONAL ITEM)

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The contractor shall provide all necessary labour, materials and equipment to excavate and backfill exploratory test holes at locations and depths as directed by the Contract Administrator. Backfill shall be Granular "A" compacted to 100% Proctor Density and will be paid for under the appropriate item. Disposal of surplus excavated material is included under this item.

The purpose of these test holes shall be to verify existing infrastructure where a design change may be required due to possible conflicts during construction or for test digs on existing services (laterals) to determine their function or for any other reason required by the Contract Administrator.

SSP 84 UNSHRINKABLE FILL (PROVISIONAL ITEM)

This contract item shall be used to substitute unshrinkable backfill for native or granular backfill materials, where the Contractor has been directed to do so by the Contract Administrator. The contract price bid for this item shall cover all additional costs involved in substituting unshrinkable backfill for other backfill materials, including the removal and disposal of surplus materials that will not be used as backfill as a result of this substitution. Unshrinkable backfill shall be supplied, mixed and placed in accordance with OPSS 401 and 1359. Measurement for payment shall be by volume as specified within OPSS 401.09.01.

SSP 85 19 mm CLEAR STONE (PROVISIONAL ITEM)

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

If the bottom of the trench is found to be wet and unstable, 19 mm clear stone and filter cloth shall be used to provide a sound foundation, only upon direction of the Contract Administrator.

Payment shall be by the tonne for supply and installation and shall include filter cloth completely surrounding the stone.

SSP 86 MILLING BURIED ASPHALT (PROVISIONAL ITEM)

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

Buried asphalt may be encountered under existing granular base on Martindale Road north of Hannover Drive.

Buried asphalt shall be milled and used in trench backfill as directed by the Contract Administrator. The material shall not be removed from site.

Thickness of asphalt is approximately 100mm.

Payment at the contract price for the above tender item shall be full compensation for all labour, equipment and materials required to do the work.

SSP 87 TRENCH OR ROAD SUB-EXCAVATION (PROVISIONAL ITEM)

The provision of OPSS 314 shall apply as amended or extended herein.

The unit price indicated in the Form of Tender shall include all sub-excavation below the required trench bottom or unsuitable sub-grade material, any additional sheathing and shoring required, disposal of excavated material as specified. The supply and placement of 50mm crusher-run stone in the trench or sub-grade compacted to 100% Proctor Density shall be paid under separate tender item.

Payment shall be made by the cubic metre measurement based on the calculated volume of the theoretical trench width, the average depth and length of sub-excavation.

SSP 88 RECYCLED GRANULAR FOR TRENCH BACKFILL (PROVISIONAL ITEM)

Granular from road excavation may be used as trench backfill as approved by the Contract Administrator.

Material must be free of contaminants (earth) and approved by Contract Administrator.

Payment shall be by tonnes.

SSP 89 PAID DUTY POLICE (PROVISIONAL ITEM)

This Special Provision covers the requirements for the provision of a Paid Duty Police Officer for traffic control at mainline intersections.

The Contractor shall obtain the services of a paid duty police officer plus cruiser as necessary during the course of the construction at the request of the Contract Administrator.

As a guideline, paid duty police are required:

- At signalized intersections when the left turn has been eliminated and/or turning movements cannot be made in a safe manner.
- During switchover from temporary to permanent traffic signals (or vice-versa).
- When pedestrian movements cannot be made safely.
- Whenever there is a need to direct or stop two (2) lanes of traffic flowing in the same direction or opposite directions.

Measurement for Payment

The hourly rate noted in the Form of Tender shall be all inclusive with no further mark-up.

SSP 90 REPAIR EXISTING IRRIGATION SYSTEM AS REQUIRED (PROVISIONAL ITEM)

The above provisional tender item shall cover all work and material require for the repair of existing irrigation systems as directed by the Contract Administrator.

Payment shall be by each set of irrigation system being repaired.

Payment at the contract price shall be full compensation for all labour, equipment and material required to do the work.

SSP 91 TREE TRIMING AS REQUIRED (PROVISIONAL ITEM)

The contractor is to retain an approved Sub-Contractor to undertake tree removal, limb trimming and root trimming when requested by the Engineer.

Tree removal under this item will only apply to the removal of trees not identified for removal on the drawings.

Payment

Payment at the price bid in the "Quantity and Price Schedule" for the above items shall be compensation for all labour, equipment and materials required to complete the work as specified.

SSP 92 PVC PIPES (PROVISIONAL ITEM)

The above provisional tender item shall include the supply and installation of PVC pipes as required by the contract administration. As required by the work, the tender item shall include all connections of existing drain pipes, existing or proposed storm sewers, and to drainage structures as deemed required by the contract administrator. The connection pipes shall be in accordance with OPSS 410 and NPSD C4.

Payment shall be by meter pipe installed.

Payment at the contract price shall be full compensation for all labour, equipment and material required to do the work, and shall include all excavation and break-into as necessary.

SSP 93 ADJUST UTILITY MANHOLES AND CHAMBERS (PROVISIONAL ITEM)

For the price bid for this item, the Contractor shall adjust the utility manholes and/or chambers to match the finished grade, including all depths and heights. The supply of all material required to do the work shall be included in the price.

All work shall be done in accordance with the requirements of the utility owner.

SSP 94 ADJUST EXISTING HYDRANTS AND VALVES (PROVISIONAL ITEM)

For the price bid for this item, the Contractor shall adjust the existing hydrant and secondary valve to match the finished grade, including all depths and lengths. The supply of all material required to do the work shall be included in the price.

All work shall be done in accordance with the City of St. Catharine's latest standards and specifications.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 95 PLANT MATERIAL (PROVISIONAL ITEM)

The above provisional tender item shall be used as directed by the Contract Administrator. The contractor shall complete the landscape planting at location as directed by the Contract Administrator.

Products

Topsoil

Topsoil shall be a **PREMIUM BLEND** with a pH of 6.5 to 7.5, weed free and naturally sterilized through composting. The blend shall consist of 50% Triple Mix (a 30% mixture of topsoils, sands and shredded wood mulch, a 30% mixture of black organic compost and manure and a 30% mixture of peat loam) and 50% Premium Topsoil (a 50% mixture of topsoils, sands and shredded wood mulch, a 25% mixture of black organic compost and a 25% mixture of composted cow manure). In general, the resulting topsoil mix should meet the following parameters :

pH : 6.5 - 7.5
Potassium : 100 - 120 ppm
Phosphorous : 15 - 30 ppm
Magnesium : 100 - 120 ppm
Organic Matter : $\geq$ 3%

Baled Peat Moss

Peat moss shall consist of partially decomposed fibrous or cellular stems and leaves of sphagnum mosses, with a texture varying from porous fibrous to spongy fibrous. It shall be elastic and homogenous, with a pH value between 4.5 and 6.5. It shall be baled and be free of decomposed colloidal residue, wood, sulphur and iron, be brown in colour, be finely shredded, and be suitable for horticultural purposes. Shredded particles shall not exceed 16 mm in size.

Fertilizer

Fertilizer used at the time of planting shall be in granular form, dry, free flowing, free of lumps and shall consist of superphosphate, with a minimum analysis of 20% phosphoric acid.

All fertilizer shall be supplied in bags bearing the manufacturer's label indicating mass and analysis.

Stakes

All stakes shall be new wood with a hole drilled 50 mm from the top to accommodate a tie wire.

Stakes used for staking tees shall be 50 mm by 50 mm by 1.25 m.

Stakes used for guying trees shall be 50 mm by 50 mm by 600 mm.

Support Wire

Wire for staking trees shall be new No. 12 galvanized steel wire.

Wire for guying trees shall be new No. 10 galvanized steel wire.

Guy Wire Tighteners

Guy wire tighteners shall be galvanized turnbuckles or an acceptable manufactured device which twists and locks guy wires.

Support Hose

Support hose used for shielding wire bracing from tree trunks shall be new rubber hose or 13 mm traffic counter hose.

Anti-Desiccant

Anti-desiccant emulsion shall be a product specifically manufactured to provide a flexible surface film to reduce transpiration yet not impede passage of carbon dioxide and oxygen.

Mulch Material

Mulch shall be shredded pine bark mulch, or approved equal.

Tree Guards

Tree guards to protect deciduous trees from rodent damage shall be the following:

- a spiral plastic tree wrap, perforated and ultra-violet protected supplied in minimum 600 mm lengths.

Plant Material

All plant material shall comply with the "Canadian Standards for Nursery Stock".

Execution

Planting shall be performed within the time periods specified in Table 1.

Where plant type cannot be planted within the designated season or time period, because of limitations imposed by the timing of the contract award or construction staging, such planting shall be performed in the next year within the same designated season or time period.

The Contractor may, at no additional cost, substitute container grown or balled and burlapped plant material of the same species and variety in order to extend the planting time period for bare root plants.

Tree planting work shall be carried out in the presence of the Contract Administrator.

The locations of trees shall be staked.

Excavation shall commence following the Contract Administrator's inspection of staking.

TABLE 1 - TIME CONSTRAINTS FOR PLANTING

PLANT TYPE	**Southwestern Ontario** That area south of a line joining Grand Bend and Clarkson	**Southern Ontario** That area between the boundaries of Southwestern and Northern Ontario	**Northern Ontario** That area north of a line joining Waubaushene, Severn Bridge, Bancroft and Ottawa
Bare Root Deciduous Shrubs and Trees	Spring frost free conditions, to May 31	Spring frost free conditions, to June 7	Spring frost free conditions, to June 15
Balled and Burlapped or Container Grown Deciduous Shrubs and Trees	Spring frost free conditions, to November 15	Spring frost free conditions, to November 7	Spring frost free conditions, to October 31
Balled and Burlapped or Container Grown Coniferous Trees	Frost free conditions	Frost free conditions	Frost free conditions

Duration

The duration of the maintenance and warranty phase shall be one year from completion of this project.

Replacement

Units of plant material which are unacceptable shall be replaced by the Contractor at the earliest opportunity in accordance with the Trees and Shrubs Planting Specification of this contract.

Measurement will be by Plan Quantity, as may be revised by Adjusted Plan Quantity, of the number of plants supplied and planted.

Payment at the contract price for the various tender items shall be full compensation for all labour, equipment and materials required to perform the work.

Where replacement of plant material is required because of rejection, compensation for all costs associated with replacement shall be deemed to be included in the contract prices for the various tender items where such replacement is required.

SSP 96 BRIDGE DECK WATERPROOFING

MTO Special Provision No. 914F02 December 2014

Amendment to OPSS 914, November 2014

914.07.02.03 Existing Deck Surface Preparation

Clause 914.07.02.03 of OPSS 914 is amended by the addition of the following:

The surface of the concrete deck is as follows:

Name of Structure: Hwy 406 Underpass at Martindale - Rehabilitation

Textured surface	☐ yes X no
Sawcut grooves	☐ yes X no

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 97 DECK JOINT ASSEMBLIES, INSTALLATION

MTO Special Provision No. 920F03 May 2018

Amendment to OPSS 920, November 2016

920.07.02.04 Placing

Clause 920.07.02.04 of OPSS 920 is deleted in its entirety and replaced with the following:

920.07.02.04.01 General Requirements

The deck joint assemblies shall be placed according to Table 1.

TABLE 1
Method of Expansion Joint Installation on Bridges

Name of Structure	Method of Joint Installation
Hwy 406 Underpass at Martindale Road - Rehabilitations	After Asphalt Paving
Hwy 406 Underpass at Martindale – New Site:18-235/2	After Asphalt Paving

920.07.02.04.02 Joint Installation After Asphalt Paving

When specified in the Contract Documents, concrete shall be removed to prepare the blockout. Where new barrier or parapet walls are to be constructed, bulkheads shall be used to form blockouts. Steel reinforcement shall be placed in the blockout, as specified in the Contract Documents.

Prior to filling the blockout, the expansion joint gap shall be plugged to support the material placed in the blockout. The method used to plug the gap shall accommodate the anticipated movement of the structure and retain the blockout material until the joint is to be placed. Granular A shall be used to fill the blockout and then be compacted to 100% of the maximum dry density according to OPSS 501. Granular A shall be placed as follows:

a) When only construction vehicles and equipment are going to use the bridge and cross over the blockout prior to asphalt paving, the Granular A shall be placed from the top of the plug up to a height that is level with the top of the adjacent concrete.

b) When traffic is to be maintained on the bridge and cross over the blockout prior to asphalt paving, the Granular A shall be capped with 50 mm of cold mix or hot mix asphalt placed level with the top of the adjacent concrete. The top surface of the asphalt shall be maintained smooth and level with adjacent concrete and shall not ravel.

Prior to asphalt paving, the limits of the blockout shall be accurately marked and the markings shall be visible after paving so that the joint limits may be accurately identified.

The deck shall be waterproofed according to OPSS 914.

The paving operation, shall be continuous over the area from 20 m beyond the approach slab, across the bridge to 20 m beyond the end of approach slab of the opposite end. The asphalt pavement at the limits of blockout shall be sawcut full depth and the asphalt above the blockout shall be removed.

The saw-cut asphalt edges shall be adequately protected for the full depth of asphalt. Wood angles with a minimum thickness of 19mm shall be considered a minimum requirement.

All the material used to fill the blockout and to plug the expansion gap, including any supports or bracing, shall be removed to the depth of the bearing seat. Asphalt residue shall be cleaned from the steel reinforcement.

Concrete faces of the blockout shall be abrasive blast cleaned according to OPSS 929.

Reinforcing steel in the blockout shall be checked to ensure that it is not damaged. Damaged reinforcing steel shall be removed from the blockout and replaced with new reinforcing steel.

The deck joint assembly shall be placed in the blockout 3 mm below the elevation of asphalt pavement and in the position specified in the deck joint assembly Working Drawings.

Immediately prior to placing concrete, top setting devices shall be adjusted to give the setting width as specified in the Working Drawings.

Setting devices shall be tightened and the deck joint assembly secured at the correct width, line and grade by welding the loop anchors and stud anchors to the steel reinforcement. The location of these welds shall be not less than 100 mm below the top of the end dams and the spacing shall be approximately 500 mm on centre.

Concrete shall be placed in the in the blockout, no later than 48 hours after the blockout surfaces have been abrasive blast cleaned. All concrete surfaces to receive concrete shall be maintained in a wet condition for a period of 1 hour prior to placing any new concrete. Immediately prior to wetting the concrete surface, all dust and loose material shall be removed from the prepared

surface by using compressed air. Prior to placing concrete, excess water shall be removed from the surface using compressed air.

Concrete shall be placed and consolidated to minimize voids under the deck joint assembly and shall be hand-finished with a wooden float. All steel surfaces that are going to be in contact with the preformed seal shall be protected during concrete placement.

Exposed faces of the structural steel shapes shall be cleaned to remove any concrete and deleterious material.

The setting devices shall be flame cut at the gap between 2 to 4 hours after concrete placement. 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 filled with epoxy. All dust, debris, water, and any other foreign materials must be removed from boltholes immediately prior to filling it with epoxy.

After installation of the deck joint assemblies, a 20 mm wide groove shall be saw cut for the full depth of asphalt adjacent to each steel-nosing angle. If the previously saw cut face is undamaged and within 5 mm of the specified location, the Contractor may elect to form the groove. The grooves shall be cleaned, dried, and filled with hot poured rubberized joint sealing compound according to OPSS 914.

920.07.02.04.03 Joint Installation Prior to Asphalt Paving

Concrete shall be removed to prepare the blockout, as required. The blockout shall be formed to the lines and grades specified in the Contract Documents. Where new barrier or parapet walls are to be constructed, bulkheads shall be used to form blockouts. The dimensions of the blockout in the barrier or parapet wall shall not be greater than those of the blockout in the deck and ballast wall, except for the modular joints in structures. Steel reinforcement shall be placed as specified in the Contract Documents.

The top of formwork shall be set such that the top of the deck joint assembly is placed at the proposed top-of-asphalt elevations.

Concrete faces of the blockout shall be abrasive blast cleaned according to OPSS 929.

The joint assembly shall be placed in the blockout at the correct elevation and location.

Immediately prior to placing concrete, top setting devices shall be adjusted to give the setting width as specified in the Contract Documents.

Setting devices shall be tightened and the deck joint assembly secured at the correct width, line and grade by welding the loop anchors and stud anchors to the steel reinforcement. The location of these welds shall be not less than 100 mm below the top of the end dams and the spacing shall be approximately 500 mm on centre.

When an expansion joint system with an approved elastomeric concrete is specified, the mixing, placing and curing requirements shall be according to the manufacturer's specifications.

Concrete shall be placed in the blockout, no later than 48 hours after the adjacent concrete surfaces have been abrasive blast cleaned. All concrete surfaces to receive concrete shall be maintained in a wet condition for a period of 1 hour prior to placing any new concrete. Immediately prior to wetting the concrete surface, all dust and loose material shall be removed from the prepared surface by using compressed air. Prior to placing concrete, excess water shall be removed from the surface using compressed air.

Concrete shall be placed and consolidated to minimize voids under the deck joint assembly and shall be hand-finished with a wooden float. All steel surfaces that are going to be in contact with the preformed seal shall be protected during concrete placement.

Exposed faces of the structural steel shapes shall be cleaned to remove any concrete and deleterious material.

The setting devices shall be flame cut at the gap between 2 to 4 hours after concrete placement. 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 filled with epoxy. All dust, debris, water, and any other foreign materials must be removed from boltholes immediately prior to filling it with epoxy.

The deck shall be waterproofed according to OPSS 914. Waterproofing membrane shall extend 50 mm up the vertical face of the nosing angle of the deck joint assembly.

The final top of asphalt elevation immediately adjacent to the deck joint assemblies shall be 5 mm higher than the assembly, and shall taper to 0 mm over a distance of 1.0 m.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 98 BEARINGS

MTO Special Provision No. 922F01 November 2016

Amendment to OPSS 922, November 2016

922.07.11 Sampling for Quality Assurance Testing

922.07.11.01 Sampling of Bearings

Clause 922.07.11.01 of OPSS 922 is amended by the addition of the following:

The following elastomeric bearings shall be provided as test samples for destructive testing purposes, as noted in Table 1. These bearings are in addition to those required for installation on the Contract.

TABLE 1
Elastomeric Bearing Test Samples for Destructive Testing

Number of Samples to be Tested	Dimensions	Plain or Laminated	Number of Bearings Represented by Sample	Structure Identification	Bearings Location Represented by Test Sample
1	550x450x100	Laminated	8	Martindale Rehabilitation	Abutments
2	400x300x20	Plain	56	Martindale New Structure	Abutments
2	400x300x40	Laminated	24	Martindale New Structure	Pier
1	200x300x40	Laminated	4	Martindale New Structure	Pier

922.10 BASIS OF PAYMENT

922.10.02.01 Elastomeric Bearings with Steel Laminates

Clause 922.10.02.01 of OPSS 922 is amended by the addition of the following to the third paragraph.

For the purpose of administering this payment adjustment, where rotational bearings are included in this tender item Bearings, the total value of all elastomeric laminated bearings shall be considered to be one half of the total value of this tender item. Where only elastomeric bearings are included in this tender item, the total value of all elastomeric laminated bearings shall be considered the total value of this tender item.

SSP 99 CONCRETE REMOVAL - PARTIAL DEPTH CONCRETE REMOVAL

MTO Special Provision No. 928F01 August 1995

Half-Cell Survey

Concrete designated for removal shall include the areas where corrosion potential of the reinforcing steel has a value more negative than -0.35 volts for the following components:

Name of Structure(s)	Component(s)
Martindale Rehabilitation	Nil

SSP 100 CONCRETE REMOVAL -PARTIAL DEPTH TYPE C

MTO Non-Standard Special Provision January 2019

Scope

This special provision provides requirements for abrasive blast cleaning of concrete in the column and

References

N/A

Definitions

N/A

Submission

N/A

Construction

After repairs are carried out as specified elsewhere in the Contract, the entire surfaces of all locations where a sealer containing migrating corrosion inhibitors (MCI) is to be applied, the surfaces shall be abrasive blast cleaned prior to the sealer application.

Quality Control

N/A

Quality Assurance

N/A

Basis of Payment

Payment at the contract price for the above Tender Item shall also include full compensation for all labour, equipment and material required to complete the work.

SSP 101 DOWELS INTO CONCRETE

MTO Special Provision No. 999F29 March 2018

REQUIREMENTS FOR INSTALLATION OF METALLIC DOWELS INTO CONCRETE

1.0 SCOPE

This Special Provision covers the performance requirements for the installation of metallic dowels in concrete.

2.0 REFERENCES

This Special Provision refers to the following standards, specifications or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 905 Steel Reinforcement for Concrete

Ontario Provincial Standard Specifications, Materials

OPSS 1440 Steel Reinforcement for Concrete

Ontario Ministry of Transportation Publications

Pull Test Guide for Testing of Metallic Dowels, of Uncoated, Coated or Stainless Steel

Designated Sources for Materials (DSM) Manual

3.0 DEFINITIONS

For the purpose of this Special Provision the following definitions apply:

Dowel Adhesive means an adhesive used to secure the dowel in concrete.

Dowel means deformed reinforcing steel bar, or stainless steel reinforcing bar, placed into a hole of specified dimensions drilled into a concrete structure and bonded to the concrete by dowel adhesive.

Dowel Type means a dowel differentiated by bar size, orientation of embedment (horizontal, vertical or other), and embedment length.

Pull Test means a test consisting of the application of a specified tensile axial load for a specified time period to installed dowels selected for testing.

4.0 DESIGN AND SUBMISSION REQUIREMENTS

Submission requirements for the certification of the manufacturer of metallic dowels shall be according to OPSS 905.

5.0 MATERIALS

5.01 Dowels

Dowels specified in the Contract Documents shall be according to OPSS 1440.

Dowels shall be new, clean, and free of deleterious material.

5.02 Dowel Adhesive

Dowel adhesive shall be a material listed in the MTO Designated Source for Materials suitable for the application.

6.0 EQUIPMENT - Not Used

7.0 CONSTRUCTION

7.01 Dowels in Concrete

Dowel holes shall be drilled to the required dimensions and depth as specified in the Contract Documents. Core drilling of the dowel holes shall not be permitted.

Holes that are started but not completed shall be cleaned and filled with a proprietary patching material from the Owner's pre-qualified products list.

The installation and removal operations shall not cause spalling, cracking, or other damage to the surrounding concrete. Any damage shall be repaired in a manner acceptable to the Contract Administrator.

Steel reinforcement and other existing embedments shall not be cut or damaged by the drilling process. Existing steel reinforcement, utility ducts, post tensioning hardware, and any unsound concrete in the vicinity of the dowel locations shall be located prior to the drilling of any holes. If any of the above is encountered during drilling operations, the Contract Administrator shall be notified immediately.

Prior to dowel installation, drill holes shall be thoroughly cleaned with compressed air. Dowels shall be positioned as specified in the Contract Documents. The dowel adhesive shall be placed according to the manufacturer's recommendations and shall completely fill the drill hole once the dowel is installed. All excess adhesive shall be struck-off flush with the concrete surface and removed from the surrounding concrete surface area.

Dowels shall be maintained in the proper position and protected from being disturbed during the setting of the dowel adhesive and loss of dowel adhesive from the holes shall be prevented.

The Contract Administrator shall be notified in writing when a lot, as defined in the Lot Size clause, or the proof of process installation, is ready for testing. Five Business Days shall be allowed for the Contract Administrator to carry out the testing.

Access to the dowels for testing shall be provided to the Contract Administrator. The Contractor shall not install formwork or attach anything to the dowels (such as steel reinforcement or utility ducts) until the pull tests have been completed and the dowel lots are accepted into the work.

7.02 Inspection for Dowel Installation

A Request to Proceed shall be submitted to the Contract Administrator after the installation of all metallic dowels in a stage and prior to placement of concrete.

The next operation shall not proceed until the Contract Administrator has issued to the Contractor a Notice to Proceed.

8.0 QUALITY ASSURANCE

8.01 General

Installed dowels shall be accepted based on conformance to the visual acceptance criteria and pull testing criteria.

Dowels tested in-situ will be accepted on a lot basis.

All dowels, with the exception of dowels installed in the following applications, shall be subjected to in-situ pull testing for acceptance purposes:

a) Concrete box culvert extensions;

b) Re-facing of all structural elements (e.g. abutments, columns, wing walls) less than 2 m in height;

c) Widening of footings;

d) Concrete patches;

e) Concrete pavement repairs; and

f) Slip-formed barrier walls.

When the Contract Administrator determines that in-situ pull testing is not possible due to insufficient clearance for proper positioning of the testing device or dowels too short to fit the testing device grips, a proof of process installation and pull testing shall be carried out in lieu of in-situ pull testing. The purpose of proof of process installation and pull testing is to demonstrate to the Contract Administrator that the dowel installation material and methods used in the work

are capable of meeting the pull test requirements of the Contract Documents. The proof of process installation shall be installed at another location in the work subject to the approval of the Contract Administrator. The proof of process installation shall be carried out using the same personnel, equipment, materials and methods intended for use in the work, and shall be in the same orientation (vertical or horizontal) required for the work.

8.02 Visual Acceptance Criteria

Completed dowel installations shall be properly positioned as specified elsewhere in the Contract Documents and free of damage to the dowel or dowel coating. Excess dowel adhesive shall have been struck off flush with the concrete surface and removed from the surrounding area.

8.03 Pull Testing Criteria

8.03.01 General

Pull testing shall be carried out by the Contract Administrator according to the Pull Test Guide for Testing of Metallic Dowels, of Uncoated, Coated or Stainless Steel available from Materials Engineering and Research Office, Concrete Section.

The Contractor may be present during the testing procedure. When requested by the Contractor, the Contract Administrator shall provide documentation of equipment calibration.

An individual dowel shall not be subjected to more than one pull test.

Any spalling, cracking, or other damage to the surrounding concrete caused by the Contractor's installation or removal of dowels shall be repaired at no additional cost to the Owner and in a manner acceptable to the Contract Administrator.

8.03.02 Dowel Load Duration Time

8.03.02.01 Dowels Embedded Less than or Equal to 200 mm

Dowels with embedment depth less than or equal to 200 mm, shall be considered acceptable when they can hold the load specified in Table 1 without any change in the load for 15 seconds.

8.03.02.02 Dowels Embedded Greater Than 200 mm

Dowels with embedment depth greater than 200 mm shall be considered acceptable when they can hold the load specified in Table 1 without any change in the load for 30 seconds.

8.03.03 Lot Size - In-Situ Testing Only

A lot shall consist of no more than 200 dowels of the same type in a single stage. Where a single stage is less than 200 dowels of the same type the lot shall be the single stage.

8.03.04 In-Situ Pull Test Requirements

The Contract Administrator shall randomly select 10 dowels in each lot for testing.

Any damage to the dowel coating shall be repaired in a manner acceptable to the Contract Administrator.

If 2 or more dowels fail, the Contract Administrator shall conduct additional pull testing on 20 dowels in the lot. If 2 or more dowels fail, the lot shall be deemed unacceptable and the lot shall be removed and replaced at no additional cost to the Owner.

Replacement dowels shall be accepted by pull testing, proof of process installation, or other means, as directed by the Contract Administrator.

Additional pull testing shall be as detailed elsewhere in this Special Provision at no additional cost to the Owner.

All testing shall be completed before concrete is placed.

8.03.04.01 Replacement of Failed Dowels

Any installed dowels that fail the pull test shall be removed and replaced by the Contractor at no additional cost to the Owner. In lieu of removal, dowels can be cut off flush with the concrete surface.

The Contractor shall install the new dowel in a location approved by the Contract Administrator.

8.03.05 Proof of Process Installation

Where proof of process installation is carried out, the Contract Administrator shall select the location for proof of process installation in another area of the same structural element, or in another comparable structural element.

Dowels shall not be installed into the work until the Contract Administrator has accepted the proof of process installation procedure.

An approved proof of process installation procedure for dowel types shall be valid for the Contract for 120 days from the date of acceptance. After 120 days, proof of process installation shall be repeated using the same labour, materials, dowel type, and process to re-qualify the proof of process installation procedure.

The Contract Administrator may at any time require re-qualification of the proof of process installation procedure. When re-qualification process is required, and it has been deemed acceptable by the Contract Administrator, it shall be valid for 120 days from the date of re-qualification.

The number of dowels required for each proof of process installation shall be 5 dowels for each dowel type to be installed in the work.

Straight bars may be installed for proof of process installation.

If any dowel fails, the proof of process installation shall be considered unacceptable. The Contractor shall not be permitted to install any of the dowel types in the work until a successful proof of process installation procedure for the dowel type has been completed and accepted by the Contract Administrator.

Any installed dowels used for proof of process installation that fail the pull test shall be removed by the Contractor at no additional cost to the Owner. If directed by the Contract Administrator, remaining dowels shall be removed by the Contractor at no additional cost to the Owner. Cutting off dowels flush with the concrete surface is permitted.

Upon the successful completion of a proof of process installation procedure, the Contractor shall be permitted to install dowel types at locations specified elsewhere in the Contract Documents using the accepted installation procedure.

If the Contractor changes the accepted procedure for any dowel type from that used for the proof of process installation, the Contractor shall repeat the proof of process installation according to the changed procedures prior to incorporating any dowel types into the work.

9.0 MEASUREMENT FOR PAYMENT

For measurement purposes, a count shall be made of the number of dowels installed.

10.0 BASIS OF PAYMENT

10.01 Dowels Into Concrete - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work, except that payment for the reinforcing steel bars or stainless steel reinforcing bars used as the dowels shall be according to OPSS 905.

No payment shall be made for dowels that fail the pull test.

The cost of additional pull testing shall be at no additional cost to the Owner and shall be a lump sum of $1,000 per mobilization to the contract with an additional cost of $50 per dowel.

TABLE 1
Pull Test Loads

Dowel Size	Test Loads kN	
	Embedment Depth Less Than or Equal to 200 mm	Embedment Depth Greater Than 200 mm
10M	20	
15M	40	
20M	60	
25M	100	120
30M	140	
35M	190	

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 102 GLASS FIBRE REINFORCED POLYMER REINFORCING BAR

MTO Special Provision No. 999S02 March 2018

REQUIREMENTS FOR GLASS FIBRE REINFORCED POLYMER (GFRP) REINFORCING BAR

1.0 SCOPE

This Special Provision covers the requirements for the fabrication and placing of glass fibre reinforced polymer (GFRP) reinforcing bar as internal reinforcement of concrete components.

2.0 REFERENCES

This Special Provision refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 905 Steel Reinforcement for Concrete

Ontario Ministry of Transportation Publications

Structural Manual
Guidelines for Inspection and Acceptance of Glass Fibre Reinforced Polymer (GFRP) Reinforcing Bars

CSA Standards

S6-14 Canadian Highway Bridge Design Code
S806-12 Design and Construction of Building Components with Fibre- Reinforced Polymers
S807-10 Specification for Fibre Reinforced Polymers

ASTM International

D 570 - 1998 (R2010) Standard Test Method for Water Absorption of Plastics
D 578 - 2005 (R2011) Standard Specification for Glass Fibre Strands
D 2584 - 2011 Standard Test Method for Ignition Loss of Cured Reinforced Resins
D 2734 - 2009 Void Content of Reinforced Plastics
D 3171 - 2011 Standard Test Method for Constituent Content of Composite Materials
D 3418 - 2012 Test Method for Transition Temperatures of Polymers by Thermal Analysis (DTA or DSC).

D 5028 - 2009	Curing Properties of Pultrusion Resin by Thermal Analysis
D 5117 - 2009	Standard Test Method for Dye Penetration of Solid Fiberglass Reinforced Pultruded Stock
D 7205 - 2006 (R2011)	Standard Test Method for Tensile Properties of Fiber Reinforced Polymer Matrix Composite Bars
D 7617 - 2011	Standard Test Method for Transverse Shear Strength of Fiber-Reinforced Polymer Matrix Composite Bars
E 1131 - 2008 (R2014)	Standard Test Method for Compositional Analysis by Thermogravimetry
E 1640 - 2013	Standard Test Method for Assignment of the Glass Transition Temperature by Dynamic Mechanical Analysis

American Concrete Institute Publications

ACI 440.3R04	Guide Test Methods for Fiber-Reinforced Polymers (FRPs) for Reinforcing or Strengthening Concrete Structures

3.0 DEFINITIONS

For the purposes of this Special Provision, the following definitions apply:

Congruent Shape means shapes that are congruent in every way with the same number of bends and angles, except that the length of the straight portions could be different.

Glass Fibre Reinforced Polymer (GFRP) means a fibre-reinforced composite with a polymeric matrix and continuous fibre reinforcement of glass.

Glass Transition Temperature means the midpoint of the temperature range over which an amorphous material changes from a brittle and vitreous state to a plastic state, or vice versa.

Lot means glass fibre reinforced polymer reinforcing bars made from the same batch of resin from the resin supplier. In addition,

a) straight bars, bent bars, and anchor headed bars shall be divided into separate lots;
b) for straight bars, bent bars, and anchor headed bars, a lot shall consist of bars of the same grade and diameter;
c) for bent bars and anchor headed bars, a lot shall consist of no more than 2000 bars;
d) bent bars of congruent shape may be considered as the same lot for establishing the number of samples for QC and QA testing;
e) bars manufactured by different machines for multiple lines of production shall be considered as separate lots;

f) bars shall be considered as a separate lot if there is an interruption in production or change in batch of raw material; and
g) a lot shall consist of no more than seven 7 Days of continuous production.

Structural Component means a major portion of a bridge structure such as bridge deck, barrier wall, pier cap, etc.

Wet Glass Transition Temperature means the glass transition temperature, determined when the sample is fully saturated.

4.0 DESIGN AND SUBMISSION REQUIREMENTS

4.01 Design Requirements

Design shall be according to CSA S6 and the Structural Manual.

4.02 Submission Requirements

4.02.01 Manufacturer's Certificate of Conformance

A Manufacturer's Certificate of Conformance and two copies of the GFRP Quality Control report for all materials delivered to the site shall be submitted to the Contract Administrator upon completion of the fabrication and prior to each shipment of the GFRP reinforcement from the plant. The GFRP Quality Control report shall contain the following information:

a) Production information including:
   i. Supplier;
   ii. Lot number of bars;
   iii. Batch number of resin;
   iv. The start and end date of production for each production lot of material; and
   v. The total linear metres produced in each lot for straight bars or the total number of bars in each lot for bent bars and anchor headed bars.

b) Summary of all material test results listed in order as identified in Table 2 with the following information for each property:
   i. The actual number of samples tested for each lot;
   ii. The result of every test as specified in the Quality Control subsection of this Special Provision;
   iii. The average and standard deviation of test results; and
   iv. The minimum result for tensile strength, tensile elongation, transverse shear strength, and bend strength obtained from testing of the required samples.

4.02.02 Working Drawings

One hard-copy set and one electronic copy of GFRP Working Drawings, including supporting documentation, shall be submitted to the Contract Administrator for information purposes at least 7 Days prior to delivery of the bars. An Engineer's seal and signature shall be affixed on the Working Drawings verifying that they are consistent with the Contract Documents.

The Working Drawings shall include the following information:

a) Bar placing drawings that include quantity, bar size, location and spacing for all bars.
b) Bar schedule that includes quantity, bar size, type, length and bending dimensions.

The supporting documentation shall include the following information:

a) Manufacturer's instructions on how to deliver, handle, store, and protect the bars.
b) Manufacturer's recommended materials and procedures for removal of unacceptable material present on the bars.

A sealed and signed copy of the Working Drawings shall be kept at the site before and during the placing of bars.

When the Contractor intends to substitute bars, a proposal shall be submitted for approval by the Owner. Submission of the proposal and the Working Drawings shall be at least 3 weeks before bar installation.

4.02.03 Protection Plan for Placed and Partially Embedded Bars

At least 7 Days prior to the commencement of installation of the bars, a plan describing the methods to be used to protect bars shall be submitted to the Contract Administrator. The protection plan shall address the following hazards and situations:

a) Contamination of placed or partially embedded bars from concrete splatter from an adjacent concreting operation.
b) Movement of bars from concreting operations that will leave partially embedded bars out of tolerance for subsequent work.

5.0 MATERIALS

5.01 GFRP Bar Types

Bars shall be grade III.

All bars in the same structural component shall be supplied by the same manufacturer; there shall be no mixing of products from different manufacturers in a component unless permitted in the Contract Documents.

Where the Contract Documents specify a particular product, there shall be no substitution unless approved by the Owner. Companies and products that are conditionally prequalified might not have been in full production yet; it is the responsibility of the Contractor to ensure that the contractual requirements can be met, including all quality control testing and delivery schedule.

5.02 Material Requirements of Bars

The bars shall be according to the qualification requirements in CSA S807, and Tables 1 & 2 of this specification. In case of discrepancies between CSA S807 and Tables 1 & 2, the more stringent requirement shall apply. The physical and durability properties of the bars shall meet or exceed the requirements for a durability classification of D1 as per CSA S807.

Binding material for the bars shall be composed of thermoset vinyl ester resin that is homogeneous throughout the cross-section of the bar. Fibre reinforcement in the bars shall be continuous E-glass or E-CR glass fibres according to ASTM D 578.

5.03 GFRP Bar Identification

All bars to be used in the Work shall be legibly stamped by the manufacturer with the following information at no more than 2.0 m spacing for straight bars, and at least once per piece for bent bars and anchor headed bars:

a) Manufacturer’s name and symbol
b) Type of fibre
c) Designated bar diameter
d) Grade designation
e) Designated modulus of elasticity
f) Production lot or batch number

5.04 Associated Hardware

Fastening of the bars shall be with coated tie wire, stainless steel wire or nylon ties.

Bar chairs for supporting bars shall be plastic.

5.05 GFRP Workmanship and Finish

The bars shall be uniform in diameter/size and free of defects that would be detrimental to the mechanical properties and durability. The surface finish shall be uniform, free of voids and air pockets, and similar to the product tested for qualification. Defects include, but are not limited to, exposed fibres, cracks, kinks, surface pitting, and discoloration.

Fabrication tolerances shall be according to OPSS 905.

6.0 EQUIPMENT - Not Used

7.0 CONSTRUCTION

7.01 Delivery, Handling, Storage, and Protection of GFRP Bars

A Request to Proceed shall be submitted to the Contract Administrator upon completion of fabrication of the GFRP and prior to shipping from the plant.

The GFRP shall not be shipped from the plant until the Contract Administrator has received the Manufacturer's Certificate of Conformance and GFRP Quality Control report, Request to Proceed, and issued a Notice to Proceed.

The Notice to Proceed shall be specific as to which reports were verified and include reference to lot numbers and bar sizes, and other information, such as date of issue, where necessary for clarity.

Delivery, handling, storage, and protection of the bars shall be according to the manufacturer's instructions and the following to prevent damage:

a) The bars shall be lifted, transported, and stored using multiple support points to prevent damage to the bars from sagging. Support points shall be no more than 4.0 m from one another. Bars shall be lifted using nylon slings or padded wire rope slings. Lifting of bundles of bars shall be with a strong back, spreader bar, multiple supports or a platform bridge. Bars shall be bundled and supported to prevent damage during transportation. Bars shall be stored clear of the ground on suitable protective cribbing. Stacks or bundles of bars shall have adequate blocking to prevent contact between the layers of bundles. Bars shall be stored separately from reinforcing steel bars with the bar tags maintained and clearly visible until ready for placing.

b) The bars shall not be dragged, dropped or impacted. Bars shall not be struck by hammers or any other equipment at any time. Bars that have been subjected to any of the previous unacceptable actions, or that show obvious signs of damage, shall be rejected, removed and

replaced. Bars subject to removal shall be marked and removed in the presence of the Contract Administrator.

c) The bars shall be covered with opaque white polyethylene during storage. Bars installed in the structure or formwork, including those partially embedded in concrete, shall be protected from the elements by covering with opaque white polyethylene sheeting or equivalent protective material when the exposure time is expected to exceed or exceeds thirty (30) Days. The protection shall be adequately supported and secured in place. This protection shall be maintained until its removal is required for preparation for subsequent concrete placement.

d) The bars shall be protected from any abrasive blasting or pressure washing operation in their immediate vicinity by adequate covering or wrapping with protective material.

e) The bars, after placing, shall be protected from construction operations and traffic such that the bar and its finishing are not damaged. The surfaces shall be kept free of contamination and damage and the GFRP bars shall be protected from loading which may damage the bars.

7.02 Surface Condition of Bars

The bars shall be free of mud, oil, concrete or other contaminants, and surface finish defects that adversely affect bonding strength or other properties at the time the concrete is placed.

The bars shall be protected from contamination caused by concrete splatter during adjacent placements. Any concrete contamination shall be removed immediately while the concrete is still plastic without damaging the bars. Removal of other materials present on the bars shall be according to the materials and methods recommended by the bar manufacturer.

7.03 Placing of the GFRP

The bars shall be placed according to OPSS 905 with the following modifications unless otherwise specified in the Contract Documents:

a) The bars shall be accurately placed in the positions shown in the Contract Documents and held in the correct location during the operations of placing and consolidating concrete.

b) Bars shall be tied at least at every third intersection.

c) The maximum untied length of any bar shall be 900 mm.

d) Bar support chairs shall not exceed 900 mm average spacing in each direction.

e) Bars within the formwork shall be secured to prevent movement during concrete placement. The bars shall be supported or tied to resist settlement, floating upward, or movement in any direction during concrete placement. For overlays and other horizontal placement where there is no bottom mat of steel reinforcement to tie down the GFRP, the GFRP mat shall be anchored down directly to the concrete or formwork to prevent it from floating upward.

f) Field bending shall not be permitted.

g) Bent bars shall not be field cut. Field cutting of straight bars will be permitted only with the approval of the Contract Administrator. The field cutting shall be with a high speed cutter, fine blade saw, diamond blade, or masonry saw. The bars shall not be shear cut.

A Request to Proceed shall be submitted to the Contract Administrator upon completion of the placing of the GFRP.

The next operation after the completion of the installation of GFRP shall not proceed until a Notice to Proceed has been received from the Contract Administrator.

7.04 Quality Control

7.04.01 General

All GFRP materials shall meet the mechanical, physical and durability properties specified in this specification.

7.04.02 Number of Samples

The minimum number of samples required shall be 5 from each lot of straight bars, anchor headed bars and bent bars. If more than 5 samples are tested, then all the results are to be reported.

7.04.03 Determination of Properties

Manufacturer's quality control test requirements for mechanical, physical and durability properties of the bars for various tests and reporting shall be determined as specified in Table 2. The limits of the various properties shall be as specified in Table 2.

For any property, a lot shall be rejected and the associated GFRP shall not be included in the Work if any one of the samples fails to meet the specified limit when the number of test samples for a specific property is 19 or less; however, when the number of test samples is greater than 20, one test result may be beyond the specified limit.

8.0 QUALITY ASSURANCE

8.01 General

The acceptance of the bars shall be according to the requirements of this specification. Bars not meeting the requirements of the Contract Documents shall be rejected and shall not be included in the Work.

8.02 Sampling

Prior to placing the GFRP, the Contract Administrator shall randomly select 5 samples for quality assurance testing from each lot. The straight bar samples shall be cut to a length of 2.2 m by the Contractor. If a lot of straight bars does not contain any pieces that may be cut down to a length of 2.2 m, then the length requirement shall be waived and samples shall be taken from the available lengths as supplied. For bent bars and anchor headed bars, the Contract Administrator shall select 5 samples at random from each lot. Samples are not required for bent bars of a particular diameter and shape, or anchor headed bars, if the total number required in the Contract for each respective bar type is less than 50.

8.03 Testing

At the discretion of the Owner, quality assurance testing for any number of lots, and for any number of properties listed in Table 2 for each lot, shall be conducted by a laboratory designated by the Owner. The testing shall be performed according to the methods and requirements listed in Table 2, and shall be performed on the 5 quality assurance samples. The results will be provided to the Contractor when they are available.

8.04 Defects or Deficiencies

8.04.01 Test Results

A GFRP lot shall be rejected if any one of the tested quality assurance samples fails to meet the limits in Table 2 for the tested property.

8.04.02 Visual & Dimensional

GFRP that does not meet the specified finishing, surface conditions, or dimensional tolerances shall be rejected.

The MTO “Guidelines for Inspection and Acceptance of Glass Fibre Reinforced Polymer (GFRP) Reinforcing Bars” shall also be used as a basis for field inspection and rejection of the bars.

8.05 Consequences of Rejection

All rejected GFRP lots or bars shall be replaced. The replacements shall be subjected to the requirements of this specification.

If any work incorporates rejected GFRP lots or bars, then that work shall be rejected.

9.0 MEASUREMENT FOR PAYMENT - Not Used

10.0 BASIS OF PAYMENT

10.01 Glass Fibre Reinforced Polymer Reinforcing Bar - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment and Material to do the work.

Rejected GFRP lots or bars shall be replaced at no additional cost to the Owner.

Table 1
Tensile Strength and Modulus of Grade III GFRP Bars

Straight Bars			Bent Bars (Note 1)		
Designated Bar Diameters	**Minimum Specified Longitudinal Tensile Strength kN**	**Longitudinal Modulus of Elasticity Gpa (Min)**	**Designated Bar Diameters**	**Minimum Specified Longitudinal Tensile Strength kN**	**Longitudinal Modulus of Elasticity Gpa (Min)**
13	130	60	13	130	50
15	200		15	200	
20	280		20	252	
25	490		25	441	

Note:
1. Tensile strength and modulus are given for the straight portion of the bent bar.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Table 2
Quality Control Test Requirements

Quality Control Test RequirementsProperty	Standard for Test	Specified Limits
Cross-sectional area	CSA S806, Annex A, Determination of Cross-Sectional Area of FRP Reinforcement.	Minimum area not less than 95% of the nominal cross-sectional area. Maximum area not more than 120% of the nominal cross-sectional area for bar diameter 13 mm to 20 mm; 115% for bar diameter greater than 20 mm; and 145% for bar diameter less than 13 mm. Nominal cross-sectional area shall be according to CSA-S807.
Longitudinal tensile strength for straight bars and straight portion of the bent bars	ASTM D 7205; or CSA S806, Annex C, Test Method for Tensile Properties of FRP Reinforcements.	Minimum values defined in Table 1
Longitudinal tensile modulus and ultimate elongation (for straight bars and straight portion of the bent bars)	ASTM D 7205; or CSA S806, Annex C, Test Method for Tensile Properties of FRP Reinforcements.	Minimum values of tensile modulus defined in Table 1; the ultimate elongation shall not be less than 1.2%.
Transverse shear strength	ACI 440.3R-04, Test Method B.4, Test Method for Transverse Shear Strength of FRP Bars; or CSA S806, Annex L, Test Method for Shear Properties of FRP Rods; or, ASTM D 7617.	≥ 180 MPa for Grade III
Longitudinal tensile strength of FRP bent bars at bend locations	ACI 440.3R-04, Test Method B.5, Test Method for Strength of FRP Bent Bars and Stirrups at Bend Locations (Note 1) or ACI 440.3R-04, Test Method B.12, Test Method for Determining the Effect of Corner Radius on Tensile Strength of FRP Bars.	Minimum strength at the bend shall be at least 45% of the minimum strength of straight portion of GFRP bent bars. (Note 4)

Fibre content	The relevant of the following: ASTM D 3171 (Method I of Procedure G), ASTM E 1131, and ASTM D 2584.	Glass fibre content ≥ 70% by Weight.
Void content	ASTM D 2734 or ASTM D 5117	≤ 1% (ASTM D 2734); or if no voids or longitudinal cracks are observed after 15 min. of ASTM D 5117 test, this criterion shall be deemed to have been met.
Water absorption at 50 ºC for straight bars, straight portion and curved portion of bent bars and grids	ASTM D 570 Water Absorption of Plastics: Procedures 7.1 & 7.4, except that both tests shall be conducted at 50 ºC (Note 2)	< 0.25% for 24-hour immersion ≤ 0.45% after 1 week immersion (168 hours) for the long-term immersion test.
Cure ratio for straight bars, straight portion and curved portion of bent bars and grids	Test Method according to Appendix A of CSA S807; Calibration of DSC by Indium according to ASTM D 5028	≥ 95% of Cure Required for all straight bars and bent bars.
Wet glass transition temperature	ASTM D 3418 (Note 3) or ASTM E 1640	DSC ≥ 100 °C DMA ≥ 110 °C
Pullout Capacity of anchor headed bars	Embedded in concrete block (Note 1)	100 kN for 15 mm diam. bar with a maximum slip of 0.5 mm.

Table 2 Notes:
1. Test may be conducted with high early strength concrete after the concrete reaches 30 MPa strength.
2. Test is conducted at 50 ºC for both 24 hour immersion and long-term immersion, in order to shorten the time required for the test.
3. Samples shall be saturated according to ASTM D 570, except that the temperature of 50 ºC shall be used for conditioning. A hermetically sealed pan shall be used to prevent volatilization.
4. Minimum strength of straight portion according to Table 1.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 103 JACKING OF SUPERSTRUCTURE

MTO Special Provision No. 999F30 October 2018

REQUIREMENTS FOR JACKING OF BRIDGE SUPERSTRUCTURE

1.0 SCOPE

This specification covers the requirements for raising and lowering a bridge superstructure by the use of jacks.

2.0 REFERENCES

This Special Provision refers to the following standards, specifications or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 906 Structural Steel for Bridges
OPSS 919 Formwork and Falsework
OPSS 922 Installation of Bearings

Ontario Ministry of Transportation Publications

Structural Manual
Designated Sources for Materials (DSM) Manual

CSA Standards

G40.20-013/G40.21-13 General Requirements for rolled or welded structural quality steel / Structural quality steel.

ASTM International

A 563M-15 Standard Specification for Carbon and Alloy Steel Nuts
F 436M-16 Standard Specification for Hardened Steel Washers
F 3125M-15a Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 830MPa and 1040MPa Minimum Tensile Strength [Metric]

3.0 DEFINITIONS

For the purpose of this Special Provision the following definitions apply:

Jacking Design Engineer means an Engineer retained by the Contractor qualified to provide the services specified in the Contract Documents to both design and certify the provided jacking equipment and jacking methodologies will facilitate the jacking and lowering of the bridge in conformance with the Contract Documents.

Jacking System means all components required to perform the lifting and temporary support of the bridge superstructure. This includes but is not limited to; jacks, hydraulic hoses and fluid, valves, sensors, jacking systems, shims, temporary support systems, and all related appurtenances.

Survey means precise and detailed measurements and elevations taken, recorded, documented and certified by an Ontario Land Surveyor or an Engineer.

4.0 DESIGN AND SUBMISSION REQUIREMENTS

4.01 Design Requirements

4.01.01 General

Unless a detailed jacking system design is provided in the Contract Documents, the Contractor shall be responsible for the design of the jacking system. When certain aspects of a jacking system are provided in the Contract Documents, the Contractor shall incorporate these aspects into the design of the jacking system.

When jacking locations are provided in the Contract Documents, they shall be incorporated into the design of the Contractor's proposed jacking system and shall not be changed.

Where the replacement of bearings is called for in the Contract Documents, the design shall take into account the possible difference in bearings size between the new and the original and ensure that the placement of the temporary supports does not interfere with the proper placing of bearings.

The design shall account for the structural work and condition of the structure at the time of jacking, and the stages that may interfere with temporary supports or jacking locations. It shall take into account any deterioration and/or removals prior to and during the duration of the jacking and remedial work. The design of temporary supports shall account for articulation of the superstructure including thermal movements, as well as any potential slip in supports. Jack and support locations shall account for conflicts between structural work and temporary works designed by the contractor.

The Contractor shall be responsible for determining an appropriate amount of pre-loading to be applied to the jacks prior to the start of displacement controlled jacking. The pre-loading amount shall be no less than 15% of the specified jacking load and shall be sufficient to account for decompression of bearings, gaps between shims (if used) and any other geometric imperfections in the proposed jacking system.

Shims and blocking used to support the jacks shall also be designed for no less than 150% of the jacking loads specified on the Contract Drawings.

4.02 Submission Requirements

4.02.01 Jacking Drawings and Calculations

The Contractor shall submit three (3) sets of the jacking drawings and calculations and a digital PDF format copy shall be submitted to the Contract Administrator 7 Days prior to the commencement of the jacking operations, for information purposes only. Submissions shall bear the seals and signatures of the jacking design Engineer and a design checking Engineer.

The jacking drawings and calculations shall include the following:

a) Jacking methodology and sequence.

b) Location, number, type and capacity of the jacks to be used.

c) Description of the control system, complete with all design, schematics and equipment to be used.

d) Location and material to be used for temporary blocking and shimming.

e) Proposed pre-loading to be applied to jacks.

f) Schematic showing the configuration of all jacks, stop valves, gauges, manifolds and hydraulic pumps.

g) Current calibration certificates for all jacks, gauges, and lifting/lowering controller.

h) Full details of the temporary support system including forces to be transmitted and method of transferring the loads to the substructure or founding strata, including considerations for thermal expansion and contraction.

i) Strengthening of the existing structure where necessary.

j) Restrictions on traffic and construction traffic.

Any required modifications to accommodate the proposed jacking system that may affect the final configuration of the bridge shall be submitted as a written proposal to the Contract Administrator prior to commencing jacking operations.

The Contractor shall have a copy of the signed and sealed jacking drawings at the site during jacking setup and operations.

4.02.02 Revised Submissions

When jacking design considerations or field conditions necessitate amendments to the jacking drawings, revised jacking drawings shall be submitted according to the Jacking Drawings and Calculations subsection.

5.0 MATERIALS

5.01 Structural Steel

All structural steel shall be according to CSA G40.20/G40.21.

5.02 High Strength Bolts, Nuts and Washers

High strength bolts shall be according to ASTM F 3125M.

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 shipped together as an assembly from the manufacturer. The requirements outlined in the Test Reports for Fasteners clause found in OPSS 906 shall apply.

5.03 Mechanical and/or Adhesive Anchors

Mechanical and/or adhesive anchors shall be suitable for dynamic loads and shall be installed according to the manufacturer’s recommendations.

5.04 Grout

Cement based non-shrink grout shall be supplied from sources named in the DSM manual.

6.0 EQUIPMENT

6.01 Synchronized Jacking System

A synchronized jacking system shall consist of either a Programmable Logic Controller (PLC) controlled system or a volumetric controlled system. The system shall be capable of adjusting pressures and hydraulic volumes in order to achieve a uniform lift and/or lowering to a tolerance of not more than 1.0 mm from the leading to lagging cylinders.

6.01.01 Programmable Logic Controlled Jacking System

A PLC controlled system shall include a central unit which continuously monitors the relative and absolute position of each individual jacking point.

6.01.02 Volumetric Controlled Jacking System

A volumetric controlled jacking system shall be fully calibrated and designed to precisely deliver the same volume of hydraulic oil to each individual jack at the same time when the same make and model of jacks are used at all locations.

When different makes and models of jacks are used, the system shall be capable of adjusting for differing amounts of fluid required at different jacks in order to comply with the specified lifting and lowering tolerances.

6.02 Displacement Sensors

The synchronized jacking system shall display real-time data for each jack location showing vertical displacement, hydraulic pressure, and applied force for monitoring purposes during the jacking operation. The data shall be automatically recorded at 1 second intervals in a data log file for the entire duration of the jacking/lowering operation(s) and stop only after the bridge is firmly on the temporary supports or permanent bearings.

Each jacking location shall have either a digital displacement sensor or linear transducer accurate to 0.1mm to monitor displacements. The displacement sensors can be either integrated into the jacking system or independently monitored such that displacement sensors, stroke sensors or calibrated volumetric control system is capable of achieving the relative lift/lowering tolerances specified in the Contract Documents. For jacks supported on temporary fixtures (such as jacking corbels), independent displacement sensors shall be used, and measurements shall be made relative to a fixed location on the adjacent bearing seat.

A data log file shall be submitted to the Contract Administrator within 7 days of any jacking operation in Microsoft Excel format (or Approved equivalent). Data log file format is to be in a

table with individual columns representing each displacement sensor reading in millimetres, hydraulic pressure, and applied force at each jacking location. Individual rows shall represent the time in Hr:Min:Sec format.

7.0 CONSTRUCTION

7.01 Pre-Construction Surveys

Prior to the start of any work related to the jacking operation, the Contractor shall carry out field measurements of all components of the existing structure that might impact the installation of the jacking system and ensure that any necessary adjustments to the jacking drawings and calculations based on these field measurements are made accordingly. The jacking design Engineer and the design checking Engineer shall then determine whether any adjustments to the jacking system based on the field measurements will be required. If adjustments to the jacking drawings and calculations are required, the jacking drawings and calculations shall be resubmitted to the Contract Administrator along with a request for approval.

The Contractor shall take measurements of the underside of deck or girders at bearing locations prior to jacking the structure as part of this detailed survey and shall be relative to an adjacent fixed point on the substructure which will not move during construction. This shall include a minimum of one local fixed marking on the abutment or pier immediately adjacent to each lift point and bearing location. This marking must be located such that it will not be moved or compromised by the construction operations. Measurements to the underside of each girder and lifting point shall be made relative to the corresponding fixed marking, which shall be recorded accurate to 1mm.

The Contractor shall submit these measurements to the Contract Administrator prior to jacking.

7.01.01 Detailed Survey

Prior to the start of any work related to the jacking operation, the Contractor shall perform a detailed survey to establish geodetic elevations of the existing bridge deck, curb, and crown along deck joints to remain. The survey shall be in addition to the pre-construction survey, and the Contractor shall submit the results to the Contract Administrator prior to jacking.

The need for a detailed survey for each structure shall be as follows:

Site No. and Structure Name	Detailed Survey Required
Hwy 406 Underpass at Martindale Road SITE:18-235/1	No

7.02 Structural Steel

All structural steel fabrication, delivery and erection shall be according to OPSS 906.

7.03 Formwork and Falsework

All formwork and falsework shall be according to OPSS 919.

7.04 Installation of Bearings

When jacking is required for the installation, replacement or adjustment of bearings, the requirements of OPSS 922 shall apply.

7.05 Jacking

7.05.01 General

The Contractor shall ensure that all existing expansion joints are free to move vertically prior to jacking. Bolts securing the handrail posts to the parapet walls, if present, shall be loosened to permit jacking without damaging the handrails.

Upon completion of the fabrication and installation of the components of the temporary works and prior to jacking, the jacking design Engineer shall conduct an inspection to verify that the fabrication and installation of the temporary works has been carried out according to the jacking drawings.

Traffic shall be allowed on or below each bridge during jacking as follows:

Site No. and Structure Name	Traffic Permitted on Bridge During Jacking	Traffic Permitted Under Bridge During Jacking
Hwy 406 Underpass at Martindale Road SITE:18-235/1	No	Yes

7.05.02 Jacking Points and Loads

Jacks shall only be placed at the jacking points specified in the Contract Documents. Jacks with a rated capacity of no less than 150% of the jacking loads specified on the Contract Drawings shall be used.

At no point shall the applied jacking loads exceed 200% of the jacking loads specified on the Contract Drawings.

7.05.03 Inspection Prior to the Commencement of the Jacking Operation

A Certificate of Conformance shall be submitted to the Contract Administrator prior to commencing each jacking operation.

7.05.04 Jacking Operations

The Contractor shall inform the Contract Administrator in writing at least 3 Days prior to the commencement of the jacking operations.

The lifting or lowering of the entire width of the structure shall be carried out in one uniform and synchronized operation using a synchronized jacking system. At no time during the lifting or lowering of the structure shall the elevation difference between any jacking points exceed 1.0 mm as measured at the centre line of the bearings.

Jacking operations shall be carried out under the direct supervision of the jacking design Engineer. Prior to the commencement of jacking operations, the accuracy of all transducer read-outs, relative to manual measurements shall be demonstrated to the Contract Administrator.

The lift and/or lowering at each jacking point shall be monitored continuously during the jacking operation from a centralized location by remote sensors or calibrated jacking system. The maximum lift for all jacking points shall be sufficient to decompress the bearings and stop 3 mm above the final jacking elevation, unless otherwise specified in the Contract Documents.

7.05.05 Temporary Supports

The bridge superstructure shall not be supported on hydraulic jacks for a period longer than permitted on the jacking drawings and in no case longer than 12 hours.

When the required lift for all jacking points has been achieved and the bearings have been released, temporary supports (such as blocking and shimming) shall be placed to support the bridge. The jacks shall then be lowered in one synchronized operation while maintaining the maximum allowable difference between any two jacking points of 1.0 mm.

The jacking loads shall be transferred to the temporary supports and then the jacks released prior to the commencement of bearing removal and bearing seat reconstruction or bearing replacement work.

Unless otherwise specified in the Contract Drawings, temporary supports shall be located at the jacking points.

The superstructure shall not be left on temporary supports for more than 15 Days or as specified in the Contract Documents.

7.05.05.01 Post-Jacking Survey

Immediately after the structure has been placed on temporary supports and prior to the bearing seats being reconstructed (if applicable), the underside of the superstructure that will be in contact with the new bearings shall be surveyed. The survey shall include the four corners in contact with the bearings and at least one point in the middle of the bearing area. Data from the survey shall be forwarded to the Contract Administrator to determine if adjustments to the design are required.

7.05.06 Lowering of the Superstructure

Where jacking of the superstructure is accompanied by rehabilitation of bearing seats, the superstructure may be jacked again for the removal of the temporary supports only after the concrete in the bearing seats has reached 75% of its design strength. The jacks shall then be lowered in one synchronized operation, while maintaining the maximum allowable difference between any two jacking points of 1.0 mm, and the superstructure shall be placed onto the bearings.

7.05.06.01 Bearing Contact

The bearings shall have uniform and full contact at top and bottom. The requirements for bearing full contact as specified in OPSS 922 shall be met. The jacking system shall remain in place until full contact of bearings is achieved.

7.05.07 Reinstatement of Structure and Components

The bridge deck and girders shall be reinstated to the original elevations unless new elevations are specified in the Contract Documents or as otherwise directed by the Contract Administrator.

A final continuous and smooth riding surface not exceeding 3 mm in difference across all joints, approaches and adjacent spans where bearings are replaced shall be provided. The pre-jacking elevations, proposed new elevations, new bearing thickness, elastic compression of new bearings from the manufacturer, and any other new components installed shall be assessed as part of the Work in meeting this requirement.

The Contractor shall notify the Contract Administrator when any existing conditions or components will affect the ability to meet the above requirement.

Anchor holes shall be filled with non-shrink grout finished flush with the surrounding concrete with matching color; no metal components of the jacking system shall be embedded permanently in concrete with less than 40 mm of cover.

All expansion joint and handrail components removed or loosened to facilitate jacking shall be reinstated.

7.06 Inspection after Completion of the Jacking Operation

A Certificate of Conformance shall be submitted to the Contract Administrator upon completion of each jacking operation.

7.07 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

8.0 QUALITY ASSURANCE - Not Used

9.0 MEASUREMENT FOR PAYMENT - Not Used

10.0 BASIS OF PAYMENT

10.01 Jacking of Superstructure - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment and Materials to do the work.

SSP 104 REPAIRS OF SOFFIT CHAIR LOCATIONS

MTO Non-Standard Special Provision January 2019

Scope

This special provision provides requirements for the repair of the exposed soffit chair locations at the abutments.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

References

N/A

Definitions

N/A

Submission

N/A

Construction

In the construction of the original structure steel chairs were utilized to support the reinforcing steel in the deck.

In the deck soffit, particularly in the vicinity of the expansion joints at the abutments, these chairs have corroded and have caused staining and localized spalls.

For a distance of 2.0 m from the ends of the deck at the abutments, the corroding rebar chairs and exposed transverse reinforcement at the deck end soffit shall be repaired by firstly saw-cutting to 12mm deep for an area 25mm all around the exposed steel; then concrete within the sawcut area should be removed by an electric chipping hammer or grinder to 15mm deep and the steel component could be ground down or cut to provide a minimum of 15mm cover.
A proprietary patching product shall be used to patch the individual areas.
After all the patch repairs have been completed and the moisture content of the concrete surface is air dried to less than 5% moisture, a concrete sealer containing MCI shall be applied for the last 2m of the deck ends.

Quality Control

N/A

Quality Assurance

N/A

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

SSP 105 SURFACE APPLIED CORROSION INHIBITOR

MTO Non-Standard Special Provision January 2019

1.0 SCOPE

This specification covers the requirements for the application of Surface Applied Corrosion Inhibitor.

The following locations require the application of a Migrating Corrosion Inhibitor (MCI) sealer:

a) The entire top and inside surface of the barrier wall to remain in place.
b) The entire surface of the column
c) The entire front face and abutment bearing seat of both abutments.
d) The entire soffit of the deck for a distance of 2.0 m from the ends at the abutments

2.0 REFERENCES

This specification refers to the following standards, specifications or publications:

Ontario Provincial Standards Specifications, General:

OPSS 180 Management of Excess Material

Ontario Provincial Standards Specifications, Construction:

OPSS 929 Abrasive Blast Cleaning - Concrete Construction

3.0 DEFINITIONS

Corrosion Inhibitor: A proprietary product applied to concrete surfaces in liquid form that would permeate the concrete and inhibit corrosion of the steel reinforcement. The material shall be a dual function sealer and migrating corrosion inhibitor that comprises of a silane sealer and an organic corrosion inhibitor that can penetrate up to 75mm of concrete.

4.0 SUBMISSION AND DESIGN REQUIREMENTS

4.01 Submissions

The Contractor shall submit written notification to the Contract Administrator of the scheduled date of the application three (3) Days prior to the application of the corrosion inhibitor.

At least 14 days prior to the use of the corrosion inhibitor on the contract, the Contractor shall provide the Contract Administrator the material safety data sheets and any other information for the safe handling and storage of the product.

5.0 MATERIALS

5.01 Corrosion Inhibitor

The surface applied corrosion inhibitor shall be “Masterseal CP” supplied by: BASF Canada Inc. 100 Milverton Drive Mississauga, Ontario L5R 4H1, Canada

Other equivalent product(s) shall be subjected to approval by the Ministry.

6.0 EQUIPMENT

6.01 Abrasive lasting

The abrasive blasting equipment shall be according to OPSS 929.

6.02 Spraying

The corrosion inhibitor shall be applied using low pressure spray equipment meeting the requirements of the material supplier. The Contractor shall observe all safety and health precautions in the application of the inhibitor coating in accordance with the manufacturer’s recommendations and prescriptions, as well as to relevant safety regulations pertaining to the use of similar types of products.

7.0 CONSTRUCTION

7.01 General

Concrete surfaces to be treated with the corrosion inhibitor are as specified in the Contract Drawings. The Contractor shall field verify all dimensions. The Contractor shall coordinate application of the corrosion inhibitor with all other construction operations.

7.02 Operational Constraints

The corrosion inhibitor shall not be applied to the deck surface or treatment areas until all the following requirements have been satisfied:

a) Deck has been scarified.

b) All local delaminations and spalled concrete has been removed (partial depth removal areas).

c) Surfaces to receive corrosion inhibitor have been properly abrasive blast cleaned, cleared and prepared in accordance with the recommendations of the supplier;

d) 2 coats of corrosion inhibitor shall be applied on the entire surface in accordance with the Manufacturer's instruction manual.

e) For decks, 2 coats shall be applied to the entire surface except at the partial depth removal areas, in accordance to the Manufacturer's instruction manual. Care shall be taken to not allow the corrosion inhibitor run into the partial depth removal areas with coverings that is approved by the Contract Administrator;

f) No rain or water has been on the surface and the concrete has been in a dry state for a minimum of three (3) consecutive days prior to application of the corrosion inhibitor;

g) No rain or freezing is in the forecast for a minimum 24 hours after the expected date of placement.

h) Allow the corrosion inhibitor to dry in accordance to the Manufacturer's guidelines, with 72 hours minimum

7.03 Surface Preparation

All concrete surfaces to receive the surface applied corrosion inhibitor shall be abrasive blast cleaned according to OPSS 929; followed by air-blasting with a jet of oil-free/ water-free compressed air to remove all fine dust and debris immediately prior to the application of the corrosion inhibitor.

7.04 Application

All materials shall be delivered to site in original sealed containers, clearly marked with the manufacturer's labels, product identification, batch number and date of manufacture. Delivery, storage, handling, applicable temperature range, and environmental restrictions on use shall be in accordance with manufacturer's recommendations.

The ambient and substrate temperature shall be above 5-degree C.

A minimum of two coats is required. The second coat shall be applied as soon as the first coat has been absorbed into the substrate, but no less than 2 hours between coats. The two coats together shall achieve a minimum total application of 400 ml per square metre. The contractor shall keep record of the total quantity of material used for each areal to prove that the minimum required application rate has been achieved.

7.05 Environmental Protection of Overspray and Spilling

The Contractor shall provide environmental protection to prevent overspray and spilling of all materials on all adjacent surfaces including live traffic during surface preparation and application of the corrosion inhibitor. Excess material on the protection and work area shall be cleaned up regularly to prevent migration of the material into natural environment.

7.06 Remedial Work

Work not meeting the acceptance requirements shall be re-cleaned, repaired, replaced or re-applied. Proposals for correcting the deficiency shall be submitted to the Contract Administrator for review and acceptance prior to commencement of the remedial work.

7.07 Management of Excess Material

Management of excess material shall be according to OPSS 180.

8.0 QUALITY ASSURANCE

8.01 Corrosion Inhibitor

The application of the surface applied corrosion inhibitor shall be done in the presence of the Contract Administrator.

8.02 Acceptance and Rejection

The Contract Administrator shall determine the acceptability of the corrosion inhibitor treatment. The placement of the corrosion inhibitor is to be applied in the presence of the Contract Administrator.

All visually defective material or work shall be rejected by the Contract Administrator. Such defective material and work shall not be incorporated into the finished work.

Work not meeting the requirements of this specification will be subject to rejection.

9.0 MEASUREMENT FOR PAYMENT

Measurement for payment is by square meters (m^2) of the area to which the Corrosion Inhibitor is applied. The total area will be calculated to the nearest $0.1m^2$.

10.0 BASIS FOR PAYMENT

10.01 Surface Applied Corrosion Inhibitor - Item

Payment at the Contract Price for the above tender item shall be full compensation for all labour, Equipment and Material to do the work.

SSP 106 H-PILES (1) – HP 310 x 110

MTO Non-Standard Special Provision January 2019

Scope

This special provision describes installation, vibration and settlement monitoring requirements for the installation of the piles.

References

N/A

Definitions

N/A

Submission

N/A

Construction

Pile driving operations should be closely monitored at all times, and a continuous pile driving record for each pile should be kept.

The Contractor is warned that cobbles and boulders may be encountered which may pose difficulties during pile driving.

It is expected that the piles will be driven to the specified capacities at specified elevations.

In the event that a pile does not reach the specified load capacity at the above elevation it should be driven further until the specified capacity is confirmed.

Settlement Monitoring Plan during Deep Foundations Installations

The Contractor shall monitor settlements at one point on each abutment and pier foundation immediately adjacent to the widening during deep foundation installations.

The settlement monitoring shall consist of survey monitoring with minimum measurement precision of 1 mm. Settlement monitoring shall be carried out on a daily basis, from 2 days prior to the commencement of deep foundation operations to establish a baseline, to the completion of the deep foundation installation operations. The Contractor shall prepare a report at the completion of each day during the specified period documenting the cumulative settlement from baseline. If the total amount of settlement change exceeds 10 mm, deep foundation installation operations shall be stopped immediately and the issue shall be immediately referred to the designer.

Vibration Monitoring Plan during Deep Foundations Installations

Monitoring of vibrations on the existing structure foundations shall be carried out during pile driving. The Contractor shall monitor vibration settlements at one point on each existing abutment and pier foundation immediately adjacent to the twinning during these operations.

The contractor shall take measurements for 2 days prior to commencement of deep foundations installation operations to establish a baseline for the initial driven pile within a pile group. The pile location, pile driving set criteria and installation/driving log shall be documented to relate to associated deep foundation installations. Vibrations shall not exceed 50 mm/sec at locations where concrete has not reached 28 day strength or 100 mm/sec at the existing bridge monitoring points.

If the results are acceptable, the Contractor may continue with the remaining piles within the specific foundation element under test. If the readings are not within the limits stated above, the Contractor shall alter the deep foundation installation procedures until the vibrations of the existing structure are within the limits.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Quality Control

N/A

Quality Assurance

N/A

SSP 107 TRAFFIC SIGNALS

TS1 - Traffic Signal Construction

As part of this contract the Region will be required to bring in their own forces to complete all or a portion of the traffic signal construction not included in the schedule of quantities. The contractor is therefore required to give adequate notice (minimum 5 working days) to the Region, and co-ordinate the scheduling of this work following the completion of all preparatory work within the intersection. The contractor shall at no cost ensure adequate separation of his work area and the traffic signal work area to satisfy the Ministry of Labour requirements and will not claim for mobilization or any lost time costs resulting from traffic signal construction. Regional forces shall have a maximum of 10 working days per intersection to construct the traffic signal installation. During this phase of the project traffic control at the intersection shall be undertaken by Regional Niagara but shall be organized in such a manner as to supplement the contractor's traffic management plan.

All construction is to be in accordance with Niagara Region Traffic Signal Standards (NRTSS) manual. This manual can be viewed and downloaded from the Niagara Region website at:

http://niagararegion.ca/government/works/Traffic-Signals-Manual.aspx

Traffic control is the responsibility of the contractor including the coordination and cost of a point duty officer (if required). The Niagara Peninsula Standard Contract Document, Special Provisions A8; Construction Signs, Traffic Control, and Traffic Management Plan will apply. If there is no item for traffic control in the Schedule of Quantities it will be deemed to be included in other traffic signal items.

Temporary signal works may be required to reduce conflicts between existing traffic signal plant and the proposed road construction. The contractor will organize and construct the temporary signal work and coordinate the cable connections by Regional forces as per contract documents. All temporary signal work will be subject to the related specifications in this document.

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

The contractor shall contact the Region's Manager Traffic Operations following the traffic signal plant layout. Property and utility locations must also be identified. The exact locations for all traffic signal plant including but not limited to ducts, pole bases, junction boxes, controller base and loops will be verified in the field by the Regional Inspector prior to installation. The Region's Manager Traffic Operations or designate may change final location of signal plant. A traffic signal inspector from the Region must be on site at all times (or where determined by the Region's Manager Traffic Operations as necessary) when traffic signal work is being undertaken.

The Niagara Peninsula Standard Contract Document provides Special Provisions for construction items not addressed in this document.

Regional Niagara will supply the following materials:

- Junction boxes, Concrete Polymer.
- Anchor bolt cages: as required per NRS 2001
- Traffic Signal Cable: all sizes
- Interconnect communication cable (Wire or Fibre) including:
    - 12 Fiber Outdoor Single mode
    - 100 FT Gator patch Panel
    - Corning Splice Kit
    - 14 solid locate cable
- Sectional Steel Poles Direct Buried
- Sectional Steel Poles Base Mounted
- Signal Mast Arms and Signal Hangers
- Double Arm Brackets
- Special Arrow Type Signal Heads
- Highway Type Signal Heads
- Standard Type Signal Heads
- Pedestrian Type Signal Heads
- Traffic Signal Controller/Cabinet c/w skirt and anchor bolts
- Video Vehicle Detectors
- Radar Detection Cameras
- Audible Pedestrian Pushbuttons
- Emergency Vehicle Pre-Emption Equipment (if applicable)
- Power Supply Control Cabinet Assemblies
- Loop extension Extra Low Voltage Cable
- Roadway Lighting Luminaires and elliptical arms

The Contractor is to supply the following materials:

- 100mm and 50mm rigid PVC Sceptre-type conduit including sweeps, bends, couplings, end bells and cement for traffic signals and interconnect ducts

- 50mm rigid PVC Sceptre-type conduit including sweeps, bends, couplings, end bells and cement for streetlight ducts if applicable
- ground rods and/or ground plates
- 6.35mm (1/4") minimum diameter woven polypropylene rope fish in all the conduit work
- rebar, as specified in NRS 2002
- concrete, as specified in NRS 2002
- Concrete Footings and Pads
- Vehicle Detection Loops

All materials provided by the Contractor shall be approved by Regional Niagara before the Contractor is permitted to use on the work site.

All other electrical or signal materials required for this project, but not listed above, shall be supplied by Regional Niagara upon five (5) working-days notice by the Contractor.

Splice kits are required when the fibre cable is interrupted. Fibre cable should be interrupted as little as possible. A patch panel is required to interface with the signal cabinet.

- Fiber cable shall be continuous in between signal plants unless otherwise directed by the Region.
- Tracer cable shall be installed in between signal plants and terminated in the junction box closest to the signal plant. Tracer cable cannot enter any signal plant.
- 16m of extra cable in junction box for every cable involved in a splice.
- Junction boxes used as pull points shall have 2-5m extra meters of cable.

The contractor must provide an itemized list by email of all materials identifying the location to be used two working days prior to pick up. If the contractor cannot pick up the material at the scheduled time he must contact the Region and reschedule a pick up date. Materials provided by Regional Niagara are to be obtained by the Contractor from:

Stores Contact:

Transportation Materials Technician Lead
3547 Thorold Townline Road
Niagara Falls, ON L2E 6S4

The store hours are 8:00 a.m. to 2:00 p.m., Monday to Friday.

Unless the Contractor has a secured storage area on the construction site, he shall be able to obtain only enough materials for one day's advance work at a time.

The contractor will be back charged for excess wasted material supplied by the region but not used on project.

TS2 - Traffic Signal Construction Layout

The provisions of OPS General Conditions of Contract GC7.02 apply except as amended or extended herein.

The contract administrator will provide the contractor a construction drawing in AutoCAD format. Layout using coordinates from the drawing will be used to locate all traffic signal plant. Where road works or grade changes are included in the project the roadway construction drawings should be used to determine the finished grade at traffic signal plant locations.

The contractor shall layout all pole, junction box, conduit, loops and controller locations prior to construction for review and approval by the Region's Manager Traffic Operations. The contractor is responsible to have all utilities, watermain, storm and sanitary sewers and property lines located and marked in the field.

Where there is no separate item for layout in the contract, layout will be included in the contract price for each item.

TS3 - Concrete Footings and Pads

The provisions of OPSS 616 and the Niagara Region's Traffic Signal Standards (NRTSS) apply except as amended or extended herein.

The location and type of pole base shall be confirmed by the Region's Manager Traffic Operations prior to construction. Bases shall be constructed in sonotubes with the top of concrete 50mm above finished grade on all sides. Poles constructed on slopes will require alteration to the adjacent grades to ensure 50mm clearance. The underground location of the conduit connecting to the pole base will be marked with a 50mm cut cross. Concrete for constructing the footing shall be 30Mpa of 28 days, except that a retarder supplement is added to prevent temporary set for a period of four hours.

Concrete pole bases must be constructed and installed as shown in NRS 2002.

Anchorage assembly studs shall be installed to provide maximum adjustment for pole. Studs or bolts shall have the exposed threads, above the ferrule, coated with Silver Neverseize. Anchorage assemblies used for concrete pole bases must be constructed and installed as shown in NRS 2001.

Wet burlap shall be applied to the top (unformed) surface of the footing immediately after

completion of the finishing operation, without damaging or marring the surface of the concrete and maintained wet for the minimum curing period. The contractor shall compact all backfill around footings and trenches.

Contractor shall note that caution should be exercised when excavating in the proximity of underground utilities. Hand digging and/or use of hydrovac equipment should be undertaken when warranted. Excavation by hydrovac method must be approved by contract administrator.

Where bedrock is reached before full depth of pole base is attained the region may allow the procedure called “Anchor Base to bedrock”. This procedure requires 2” holes to be drilled to a depth of four feet for all vertical rebar specified on the detail drawing. The two inch (2”) drill holes will be filled with “Flow-Rock” Epoxy adhesive to anchor the rebar into the bedrock.

Existing concrete pole bases may be adjusted 1” to 5” above grade before complete replacement is required.

TS4 - Conduit

The provisions of OPSS 603 shall apply excepted as amended or extended herein. Conduit material to be used under this item is 100mm and 50mm rigid PVC sceptre-type or high density polyethylene (HDPE) conduit or equal and the appropriate fittings. All conduit connections are to be made by the glue method unless specified on drawings.

The conduit is to be installed between 0.75m and 1.0m below finished grade. Conduit in new road base is to be installed in a trench just below the roadway subgrade elevation to prevent damage during granular compaction. Conduit in existing roads should be placed as close as possible to subgrade elevation. All roadway crossings shall be directionally bored. Open cut crossings only permitted with Niagara Region approval.

Backfill in the road shall be granular A and compacted to 100% standard Proctor density unless otherwise indicated. All asphalt pavements shall be reinstated by matching the existing depth, or a minimum of 180 mm in total, (120 mm of base course and 60 mm top course), in 60 mm lifts of HL8 HS and milled to a minimum 0.6 m beyond the saw cut limit and reinstated with 60 mm of HL3 HS surface course. The vertical edges and milled surfaces must be tack coated with a suitable asphalt emulsion prior to the replacement of the final surface layer of asphalt.

All conduits in junction boxes should extend up 100mm from the bottom of junction box. All conduits shall include End Bells on all open ends. Conduit intended for future use or as being spare shall be provided with a 6mm polypropylene fish line rope.

Marking tape shall be used to identify the location of all conduits. The location marking tape shall be placed horizontally along the centre of the conduit at a depth half the distance between

the conduit and finished grade.

Conduit specified in contract documents as installed by directional bore method will be high density polyethylene (HDPE).

Measurement for payment will be by the meter of horizontal length plus one and a half meters (1.5m) for each riser section in the junction boxes and two and a half meters (2.5m) at signal poles and controller cabinet for the sweep riser sections.

TS5 - Cable

The provisions of OPSS 604, OPSS 620 and the NRTSS apply except as amended or extended herein.

The Contractor shall utilize a Certificate of Qualification 309A Electrician to install/ draw cable in conduit as described in the Ontario Regulation 275/11; Scope Of Practice – Trades In The Construction Sector.

Traffic signal cable, supplied by the Region, must be used. The Region uses 25-conductor signal cable designed specifically for Niagara's use. Signal cable runs must be continuous between poles. Signal cable splices must only be made at pole handholes. No signal cable splices are permitted below ground. Sufficient length (1.5m) of free cable must be left in pole handholes or junction boxes to allow a proper connection to be made with cable coming from signal and/or pedestrian heads.

The contractor must identify all cable in accordance with Appendix D of the Traffic Signal Standards manual.

The contractor shall inspect the cables prior to installation. The contractor will pull the appropriate cables required to construct the traffic signal plant according to the traffic signal drawing. Any changes made to the signal plant at the time of layout approval that require cable location modification to different conduit will be updated by the contractor at no additional cost.

Cable connecting to the controller will be protected by the cabinet base installed by the contractor as part of the cable item.

TS6 - Junction Boxes

The provisions of OPSS 602 (Junction Box referred to as Handhole) and NRS 2020 apply except as extended or amended herein. The installation work also includes junction boxes, large and small (if necessary) of concrete polymer material, couplings, sweep bends, and wiring as shown in the wiring drawings and construction drawings. Junction boxes must be placed on

bricks at each corner with 150mm of clear stone as shown in NRS 2020. Alterations or cuts into the sides of the junction box are not permitted.

Existing junction boxes may be adjusted by contractor to match new sidewalk and curb elevations.

The location of junction boxes must be confirmed by the Region's inspector prior to placement.

TS7 - Sectional Steel Poles

The provisions of OPSS 615 apply except as extended or amended herein.

The following outlines the specifications that must be satisfied when installing traffic signal poles at a Regional traffic signal installation.

Traffic signal poles, supplied by the Region, must be used. The height and location of each traffic signal pole must be as outlined in the contract drawings unless otherwise directed by the Region's traffic signal inspector. Where traffic signal poles are perforated for cables or cut for any reason, they must be treated with a zinc black rich compound and fitted with rubber grommets. Traffic signal poles must be installed as per the manufacturer's specifications. Pole sections must be fastened to each section using 3 zinc coated ¼" x 1¼" self-tapping screws. Traffic signal poles should be installed in such a manner that the hand holes are facing away from the direction of traffic unless otherwise noted or directed in the field. Pole plates (mast arm brackets) should be installed at the location where pole sections overlap unless otherwise directed in the field.

TS8 - Signal Mast Arms

The provisions of OPSS 620 apply except as extended or amended herein. The following outlines the specification that must be satisfied when installing traffic signal arms for the Region.

Traffic signal arms, supplied by the Region, must be used. The length of each traffic signal arm required to place the traffic signal heads in the drawing location will be measured by the Region's traffic signal inspector. Traffic signal arms must be installed as per the manufacturer's specifications. Pole plate brackets must be fastened to traffic signal poles using two zinc coated self-tapping screws.

TS9 - Vehicle Detection Loops

This item will include all labour, material (wire, sealing compound and flexible duct for under curb) and equipment to construct the vehicle detection loops as per OPSS 620, NRS 2520, NRS 252 and NRTSS. Loops shall be located 0.6 meters from the edge of lane being serviced

and will be a maximum of 2.4 meters wide. The location of the loop must be confirmed by the Region's inspector. Inductive loop feeds crossing barrier curb must be installed in flexible 19mm conduit below the curb as shown in NRS 2520. Where inductive loops are used, loop feeders must be tagged and terminated at the controller cabinet. Loop leads must include 2.0 meters of slack coil at the base of the controller cabinet and at the junction box feeding the pavement loop cable.

Loops will be duplex or simplex as specified in the contract documents and shall be constructed in upper most lift of base asphalt prior to the placement of the top surface.

TS10 - Intersection Lighting Luminaries

The provisions of OPSS 617, NRS 2130 apply except as amended or extended herein. Intersection illumination will be part of the traffic signal system and connected at the traffic signals power pole. Luminaires will be placed as per the contract drawings and confirmed by the Region's traffic signal inspector. This item will include the installation of the luminaire bracket and arm.

TS11 - Ground Wire and Ground Rods

Grounding wire and grounding rods shall be constructed as per OPSS 609 except as amended or extended herein.

The Contractor shall inspect the grounding cables, bonding jumpers, ground electrodes and connection components prior to and during installation to ensure that they meet the requirements of the contract. All poles will be grounded to a ground rod in the closest available junction box with connection hardware supplied by the region. Two (2) ground rods shall be installed at the power supply pole a minimum of 3m apart.

TS12 - Interconnect Duct

The provisions of OPS 603 and the Niagara Regional Standards (NRS) and Niagara Region Traffic Signal Standards apply except as amended or extended herein.

Interconnect duct to be 50mm PVC Sceptre-type conduit constructed 0.75m to 1.0m below finished grade. Junction boxes (Concrete Polymer 300mm x 300mm) to be spaced no more than 300m apart and whenever a road crossing is present or as directed by the Region. Dedicated conduit for interconnect shall be connected from one signal plant to another signal plant to allow for the placement of future fibre optic cable.

All ducts shall be provided with interconnect cable (supplied by Region) as specified in the Schedule of Quantities. Ducts for future use must be provided with 6mm polypropylene fishline

rope.

Marking tape shall be installed along the centreline of the trench half the distance between the conduit and finished grade for duct protection.

Reinstatement of open cut tranches or daylight pits for trenchless installations shall be to existing condition.

TS13 - Removal of Traffic Signal Equipment

The provisions of OPSS 610 apply except as extended or amended herein.

All luminaires, signal heads, internally illuminated signs, flashers, poles, arms, junction boxes, cable and cabinets identified for removal shall be salvage and transported to the Region's Public Works Service Centre. Poles shall be stripped of all hardware prior to being returned. The contractor must contact the Region and make arrangements for delivery of salvaged materials.

Stores Contact:
Transportation Materials Technician Lead
3547 Thorold Townline Road
Niagara Falls, ON L2E 6S4
The store hours are from 8:00 a.m. to 2:00 p.m., Monday to Friday

All other excess materials, such as, Portland cement, concrete (including pole bases), natural wood, masonry, fabricated metal and plastic products, shall be managed as non-hazardous solid industrial or commercial waste, as specified in OPSS 180.

SCHEDULE OF DRAWINGS

STANDARD DRAWINGS

(Refer to Niagara Peninsula Standard Contract Documents)

Contract No. 2019-T-157
(RN 19-57)

Reconstruction of Regional Road 38 (Martindale Road)
from Fourth Avenue
to Barton Street
In the City of St. Catharines

Schedule of Drawings

1. Contract Drawings

Cover Page	
Block Legend Sheet	1
Alignments	AL01
Advance Warning Signs	ANS01
Staging	ST01 – ST03
Removals	RM01-RM06
Plan and Profiles	PP01-PP11
Pavement Markings and Signs	PS01-PS06
Spline Elevations	SP01
Typical Sections	TS01
Typical Details	TD01
Electrical	E01-E12
Structural (Rehabilitation)	R1-R14
Structural (New Structure)	S1-S20
Traffic Signals	TS01-TS02

2. OPSD (Not included in Contract Documents)

200.101	205.010	206.010	206.050	216.010
216.020	216.021	219.180	220.010	300.010
301.010	300.020	310.010	310.020	310.030
600.010	600.030	600.040	600.080	600.110
605.010	605.030	608.010	610.010	701.010
701.011	701.021	705.010	705.020	708.010
708.030	802.010	802.030	803.030	803.031
809.010	911.103	911.140	912.130	922.532
980.101	3000.100	3000.150	3090.101	3101.150
3102.100	3329.100	3360.100	3360.200	3370.100
3370.101	3390.100	3419.100	3950.100	

MTOD (Not included in Contract Documents)

911.610	924.130	3941.210
908.210	987.310	

4. Municipal Standard Drawings (If Applicable)

SUPPLEMENTARY GENERAL CONDITIONS OF CONTRACT

(Refer to Niagara Peninsula Standard Contract Documents)

OPS GENERAL CONDITIONS OF CONTRACT

(Refer to Niagara Peninsula Standard Contract Documents)

APPENDICES

Appendix A

Geotechnical Investigation Report
Genivar Inc., May 2012

Appendix B

Geotechnical Investigation and Pavement Design Report, Temporary Detour on Highway 406
AMEC, March 2015

Appendix C

Revised Pavement Design for Highway 406
Detour Memo
Wood, February 2019

Appendix D

Martindale Road Test Pit Investigation
Wood, February 2019

Appendix E

Roadway Design Cross Section