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REVISION INFORMATION SHEET

ONTARIO PROVINCIAL STANDARDS FOR ROADS AND PUBLIC WORKS

VOLUME 5 PROVINCIAL-ORIENTED MTO GENERAL CONDITIONS OF CONTRACT AND GENERAL AND CONSTRUCTION SPECIFICATIONS

MANUAL REVISION #12

NOVEMBER 2016

UPDATING ONTARIO PROVINCIAL STANDARDS FOR YOUR USE

Each roads and public works owner (Owner) is responsible for determining implementation dates and directions for use of Ontario Provincial Standards; therefore, manual holders are cautioned about immediately discarding superseded and cancelled standards.

A NOTE TO DESIGNERS OF MUNICIPAL CONTRACTS REGARDING APPENDICES

There are a number of OPS specifications published with appendices containing supplemental requirements that modify the specification. These specifications contain information written for use in provincial contracts. The appendices contain supplemental requirements that modify the provincial requirements so the specifications can be used in municipal contracts. The specifications are easily identified, as the table of contents for each specification lists the appendix containing the supplemental requirements (e.g., Supplemental Requirements for Using OPSS XXX in Municipal Contracts).

Designers of municipal contracts should review each specification to determine if the supplemental requirements should be invoked in their contracts. To ensure completeness of municipal Contract Documents, designers should invoke the appendices by referencing them in the Contract Documents.

ACCESSING AND OBTAINING ONTARIO PROVINCIAL STANDARDS

The Ontario Provincial Standards for Roads and Public Works (OPS) manuals and the latest published updates for each of the eight OPS manuals are available as follows:

- Available electronically on the OPS/MTO website. Online access to the current, updated, and archived standards; indexes; OPS User Notes; and publication Revision Information Sheets are available free of charge at the site.
(<http://www.raqs.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage>)
- Hard-copy format available from Publications Ontario by telephone at 1-800-668-9938 or online. Updates and OPS manuals are available for a cost-recovery fee.
(www.publications.serviceontario.ca)

- The eight OPS manuals of standards are available on one CD in PDF format. The OPS drawings published in Volumes 3 and 4 are available in AutoCAD format on a separate CD. These CDs are available from Publications Ontario or by telephone at 1-800-668-9938 or online for a cost-recovery fee. The updates are not available on CDs as an update package.
(www.publications.serviceontario.ca)

At the Publications Ontario web page, you can type "Ontario Provincial Standards," "OPS," "OPSS," or "OPSD" in the search box, and all related products for the Ontario Provincial Standards will be listed, click on the item you wish to purchase, add the item to your cart, then follow the instructions to complete your order. If trying to order an OPS product online from Publications Ontario and it is shown as Out of Stock, you can backorder the product by telephone at 1-800-668-9938.

In order to receive the Municipal Engineers Association (MEA) purchase price, MEA members should visit the MEA website (www.municipalengineers.on.ca/) for the MEA Publications Ontario order form for hard-copy manuals and CDs.

MTO employees should contact Simon Leung, Account Representative at Publications Ontario, by email (simon.leung@ontario.ca) to set up an account in order to receive the MTO purchase price for technical publications, including the Ontario Provincial Standards.

Links to Publications Ontario and the Ontario Provincial Standards on the MTO Library website are available on the OPS website (www.ops.on.ca). Also on this site under News and Activities are notices for updates and changes in OPS.

Questions should be directed by email to Ontario.Prov.Standards@ontario.ca.

YOU SHOULD REGISTER YOUR OPS MANUALS AND CDs

Users of OPS do not receive notices of OPS updates as they had in the past. Methods of notification from Publications Ontario for the future are being investigated, and you will be informed of them as they become available. In the interim, an email will be sent to OPS users who have registered their OPS manuals and CDs with OPS.

Owners of OPS manuals, who have not yet done so, are requested to register their OPS hard-copy manuals and CDs with OPS by email at Ontario.Prov.Standards@ontario.ca. The registration form and submission instructions are available on the OPS website (www.ops.on.ca), Miscellaneous Info, OPS Forms.

WAITING TO HEAR FROM YOU

If you have a suggestion to revise a standard or you have a standard that works in your ministry, municipality, or area, send it to the Head, OPS Administration, for review and possible inclusion into the Ontario Provincial Standards.

THIS MANUAL IS REVISED AS FOLLOWS:

Index Pages Volume 5

Remove the entire index and replace with the revised index.

Standard Specifications Volume 5

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSS.PROV	Dated	OPSS.PROV	Dated	
100	April 2010	100	Nov 2016	"MTO GENERAL CONDITIONS OF CONTRACT" See Summary of Revisions.
		180	Nov 2016	"GENERAL SPECIFICATION FOR THE MANAGEMENT OF EXCESS MATERIALS" See Summary of Revisions.
		304	Nov 2016	"CONSTRUCTION SPECIFICATION FOR SINGLE AND DOUBLE SURFACE TREATMENT" See Summary of Revisions.
		305	Nov 2016	"CONSTRUCTION SPECIFICATION FOR GRANULAR SEALING" See Summary of Revisions.
313	April 2007	313	Nov 2016	"CONSTRUCTION SPECIFICATION FOR HOT MIX ASPHALT – END RESULT" See Summary of Revisions.
		332	Nov 2016	"CONSTRUCTION SPECIFICATION FOR HOT IN-PLACE RECYCLING AND HOT IN-PLACE RECYCLING WITH INTEGRAL OVERLAY" See Summary of Revisions.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSS.PROV	Dated	OPSS.PROV	Dated	
		402	Nov 2016	“CONSTRUCTION SPECIFICATION FOR EXCAVATING, BACKFILING AND COMPACTING FOR MAINTENANCE HOLES, CATCH BASINS, DITCH INLETS AND VALVE CHAMBERS” The PROV implemented in November 2016 replaces OPSS 402 COMMON, November 2013 with no content changes.
		403	Nov 2016	“CONSTRUCTION SPECIFICATION FOR ROCK EXCAVATION FOR PIPELINES, UTILITIES AND ASSOCIATED STRUCTURES IN OPEN CUT” The PROV implemented in November 2016 replaces OPSS 403 COMMON, November 2010 with no content changes.
		441	Nov 2016	“CONSTRUCTION SPECIFICATION FOR WATERMAIN INSTALLATION IN OPEN CUT” The PROV implemented in November 2016 replaces OPSS 441 COMMON, November 2014 with no content changes.
		517	Nov 2016	“CONSTRUCTION SPECIFICATION FOR DEWATERING” The PROV implemented in November 2016 replaces OPSS 517 COMMON, November 2010. See Summary of Revisions.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSS.PROV	Dated	OPSS.PROV	Dated	
		518	Nov 2016	“CONSTRUCTION SPECIFICATION FOR CONTROL OF WATER FROM DEWATERING OPERATIONS” The PROV implemented in November 2016 replaces OPSS 518 COMMON, November 2011 with no content changes.
		610	Nov 2016	“CONSTRUCTION SPECIFICATION FOR REMOVAL OF ELECTRICAL EQUIPMENT AND MATERIALS” See Summary of Revisions.
		630	Nov 2016	“CONSTRUCTION SPECIFICATION FOR REMOVAL OF ELECTRICAL EQUIPMENT AND MATERIALS” See Summary of Revisions.
		706	Nov 2016	“CONSTRUCTION SPECIFICATION FOR TEMPORARY TRAFFIC CONTROL DEVICES” OPSS 706 has been revised extensively. It is recommended that users read the entire specification, as there are major differences between this version of the specification and previous versions.
		708	Nov 2016	“CONSTRUCTION SPECIFICATION FOR PORTABLE TEMPORARY TRAFFIC SIGNALS” This is a NEW specification. Conversion of MTO standard special provision into specification.
		909	Nov 2016	“CONSTRUCTION SPECIFICATION FOR PRESTRESSED CONCRETE - PRECAST GIRDERS” See Summary of Revisions.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSS.PROV	Dated	OPSS.PROV	Dated	
920	Nov 2008	920	Nov 2016	“CONSTRUCTION SPECIFICATION FOR DECK JOINT ASSEMBLIES, PREFORMED SEALS, JOINT FILLERS, JOINT SEALS, JOINT SEALING COMPOUNDS, AND WATERSTOPS – STRUCTURES” See Summary of Revisions.
		922	Nov 2016	“CONSTRUCTION SPECIFICATION FOR INSTALLAION OF BEARINGS” See Summary of Revisions.

SUMMARY OF REVISIONS TO OPSS.PROV 100

MTO GENERAL CONDITIONS OF CONTRACT

- Subsection GC 1.02 updated
- Paragraph .01 of subsection GC 1.04 revised to clarify the version of OPSS 127 that applies
- Subsection GC 1.07 revised with the amendment or addition of definitions for Claims, Contract Drawings or Contract Plans, Extra Work, Notice of Protest, Referee, Referee Roster Administrator, Regional Operations Office
- Paragraph .01 of subsection GC 3.07 revised with the addition of bullet h) for Species at Risk
- Paragraph .04, bullet b), of subsection GC 3.07 wording amended
- Paragraph .06 related to Species at Risk added to subsection GC 3.07
- Subsection GC 3.14 revised in its entirety
- Paragraph .01 of subsection GC 4.13 revised to extend to Subcontractors
- Paragraph .05 related to multi-support point work platform system added to clause GC 7.01.04
- Paragraphs .03 and .04 related to use of unlicensed vehicles and construction equipment and pile driving equipment on bridges added to subsection GC 7.05
- Subsection GC 7.20 related to stockpiling of material on bridges added
- Paragraph .05 of subsection GC 8.06 revised in its entirety
- Table 8.02.04.02-1 revised
- Other minor corrections throughout

SUMMARY OF REVISIONS TO OPSS.PROV 180

GENERAL SPECIFICATION FOR THE MANAGEMENT OF EXCESS MATERIAL

- Current clause 180.04.01.04, retitled and revised.
- Subsection 180.07.05, revised.
- Subsection 180.07.07, revised.
- OPSF forms 180-1, 180-2, 180-3 and 180-5 converted to PH-CC forms, deleted and references updated accordingly.
- OPSF form 180-4 deleted.

SUMMARY OF REVISIONS TO OPSS.PROV 304

CONSTRUCTION SPECIFICATION FOR SINGLE AND DOUBLE SURFACE TREATMENT

- Clause 304.07.02.01, Binder, rewritten.
- Subsection 304.07.03, Determination of Binder and Aggregate Application Rates, rewritten.
- Section 304.08, Quality Assurance, added.
- Subsection 304.10.01, rewritten.
- Subsection 304.10.02, Adjustment Points for Emulsified Asphalt Binders, added.
- Table 3, added.

SUMMARY OF REVISIONS TO OPSS.PROV 305

CONSTRUCTION SPECIFICATION FOR GRANULAR SEALING

- OPSS 305 has been revised extensively. It is recommended that users read the entire specification, as there are major differences between this version of the specification and previous versions.

SUMMARY OF REVISIONS TO OPSS.PROV 313

CONSTRUCTION SPECIFICATION FOR HOT MIX ASPHALT - END RESULT

- OPSS.PROV 313 has been revised extensively. It is recommended that users read the entire specification, as there are major differences between this version of the specification and the previous version.

SUMMARY OF REVISIONS TO OPSS.PROV 332

CONSTRUCTION SPECIFICATION FOR HOT IN-PLACE RECYCLING AND HOT IN-PLACE RECYCLING WITH INTEGRAL OVERLAY

- Although the OPSS.PROV is based on OPSS 332, a significant number of revisions have been made to the technical content. It is recommended that users read the entire specification to become familiar with the differences.

SUMMARY OF REVISIONS TO OPSS.PROV 517

CONSTRUCTION SPECIFICATION FOR DEWATERING

- Major update
- Specification retitled, entirely rewritten, and items added

SUMMARY OF REVISIONS TO OPSS.PROV 610

REMOVAL OF ELECTRICAL EQUIPMENT AND MATERIALS

- Clause 610.04.01.01, f); Certificate of Approval revised to Environment Compliance Approval.
- Subsection 610.07.03 Removal, new 2nd paragraph added.
- Appendix 610, information deleted.

SUMMARY OF REVISIONS TO OPSS.PROV 630

INSTALLATION OF SECTIONAL STEEL HIGH MAST LIGHTING POLES

- Section 630.02 References, CSA S6 updated.
- Appendix 630, information deleted.

SUMMARY OF REVISIONS TO OPSS.PROV 909

CONSTRUCTION SPECIFICATION FOR PRESTRESSED CONCRETE – PRECAST GIRDERS

- OPSS 909 has been revised extensively. It is recommended that users read the entire specification, as there are major differences between this version of the specification and previous versions.

SUMMARY OF REVISIONS TO OPSS.PROV 920

CONSTRUCTION SPECIFICATION FOR DECK JOINT ASSEMBLIES, PREFORMED SEALS, JOINT FILLERS, JOINT SEALS, JOINT SEALING COMPOUNDS, AND WATERSTOPS – STRUCTURES

- Section 920.02, References, OPSS 1004, removed
Ontario Ministry of Transportation Publications LS-407, LS-433 added.
ASTM International standards updated.
- Section 920.04, Design and Submission Requirements, rewritten.
- Section 920.05, Materials, rewritten.
- Section 920.07, Construction, rewritten.
- Section 920.08 Quality Assurance, rewritten.

SUMMARY OF REVISIONS TO OPSS.PROV 922

CONSTRUCTION SPECIFICATION FOR INSTALLATION OF BEARINGS

- Section 922.02, References,
 - o CSA Standard A23.1-04/A23.2-4 removed and A3004-C2 added
 - o ASTM International C 928 updated
- Section 922.04, Design and Submission Requirements, clauses 922.04.01.01.01 General and 922.04.01.02, Jacking, rewritten.
- Subsection 922.05.02, Grout, rewritten.
- Subsections 922.07.01, General, 922.07.04, Installation of Anchors, rewritten.
- Subsection 922.07.08, Jacking renumbered 922.07.09 and replaced with 922.07.08, Permission to Proceed.
- Subsection 922.07.09 Quality Control, deleted and replaced with subsections 922.07.10, Positive Attachment of Elastomeric Bearing Strips, 922.07.11 Sampling for Quality Assurance Testing.
- Subsection 922.07.12, Certificate of Conformance, added.
- Subsection 922.07.13, Management of Excess Materials, added.
- Section 922.08, Quality Assurance, rewritten.
- Section 922.10, Basis of Payment, rewritten.
- Tables 1 and 2 added.

MANUAL REVISION RECORD

Provincial-Oriented

Volume 5 – MTO General Conditions of Contract and General & Construction Specifications

This record should remain in the manual at all times. Revisions are numbered sequentially. This sheet should be filled in after each revision has been placed into the manual. It will quickly indicate to users whether the contents of the manual are up-to-date.

REVISION NUMBER	REVISION DATE	ENTERED BY	REVISION NUMBER	DATE	ENTERED BY
1	APRIL 2008	Included in new manuals	27		
2	NOV 2008	Included in new manuals	28		
3	APR 2010	Included in new manuals	29		
4	NOV 2010	Included in new manuals	30		
5	APR 2012	Included in new manuals	31		
6	NOV 2012	Included in new manuals	32		
7	NOV 2013	Included in new manuals	33		
8	NOV 2014	Included in new manuals	34		
9	APRIL 2015	Included in new manuals	35		
10	NOV 2015	Included in new manuals	36		
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DATE	SPEC. NO. OPSS.PROV	TITLE
MTO GENERAL CONDITIONS OF CONTRACT		
NOV 2016	100	MTO General Conditions of Contract
DIVISION 1 - GENERAL SPECIFICATIONS		
NOV 2008	106	Notice to Users of OPSS 106 (Electrical Work)
NOV 2014	120	The Use of Explosives
NOV 2016	180	General Specification for The Management of Excess Materials
NOV 2015	182	Environmental Protection for Construction in and Around Waterbodies and on Waterbody Banks
NOV 2012	185	Temporary Flow Control for Construction in Waterbodies
DIVISION 2 - GENERAL GRADING		
NOV 2013	202	Rock Removal by Manual Scaling, Machine Scaling, Trim Blasting, or Controlled Blasting
NOV 2014	203	Rock Stabilization
NOV 2014	206	Grading
NOV 2014	209	Embankments Over Swamps and Compressible Soils
NOV 2013	212	Earth Borrow
NOV 2014	220	Wick Drain Installation
DIVISION 3 - PAVEMENT (FLEXIBLE AND RIGID)		
NOV 2016	304	Single and Double Surface treatment
NOV 2016	305	Granular Sealing
APR 2012	308	Tack Coating and Joint Painting
NOV 2016	313	Hot Mix Asphalt - End Result
NOV 2015	314	Untreated Subbase, Base, Surface, Shoulder, Selected Subgrade, and Stockpiling
APR 2016	320	Open Graded Drainage Layer



DATE	SPEC. NO. OPSS.PROV	TITLE
NOV 2014	330	In-Place Full Depth Reclamation of Bituminous Pavement and Underlying Granular
NOV 2015	331	Full Depth Reclamation with Expanded Asphalt Stabilization
NOV 2016	332	Hot In-Place recycling and Hot In-Place recycling With Integral Overlay
NOV 2015	333	Cold In-Place Recycling
NOV 2015	335	Cold In-Place Recycling with Expanded Asphalt
NOV 2015	342	Grinding of Centreline and Shoulder Rumble Strips in Asphalt
NOV 2014	355	Installation of Interlocking Concrete Pavers
NOV 2014	363	Repairing Rigid Pavement with Precast Concrete Slabs
NOV 2014	365	Cross-Stitching Longitudinal Cracks in Concrete Pavement and Concrete Base
DIVISION 4 - DRAINAGE, WATERMAINS, AND UTILITY		
NOV 2015	401	Trenching, Backfilling, and Compacting
NOV 2016	402	Excavating, Backfilling and Compacting For Maintenance Holes, Catch Basins, Ditch Inlets and Valve Chambers
NOV 2016	403	Rock Excavation For Pipelines, Utilities and Associated Structures in Open Cut
NOV 2015	410	Pipe Sewer Installation in Open Cut
NOV 2015	421	Pipe Culvert Installation in Open Cut
NOV 2016	441	Watermain Installation In Open Cut
DIVISION 5 - MISCELLANEOUS		
NOV 2014	501	Compacting
NOV 2014	510	Removal
NOV 2014	512	Installation of Gabions
NOV 2016	517	Dewatering
NOV 2016	518	Control of Water From Dewatering Operations
NOV 2014	539	Temporary Protection Systems



**ONTARIO
PROVINCIAL
STANDARD
SPECIFICATION**

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**PROVINCIAL-ORIENTED
MTO GENERAL CONDITIONS OF CONTRACT AND
GENERAL & CONSTRUCTION SPECIFICATIONS**

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DIVISION 6 - ELECTRICAL		
NOV 2016	610	Removal of Electrical Equipment and Materials
NOV 2016	630	Installation of Sectional Steel High Mast lighting Poles
DIVISION 7 - TRAFFIC SAFETY		
NOV 2016	706	Temporary Traffic Control Devices
NOV 2016	708	Portable Temporary Traffic Signals
NOV 2015	721	Steel Beam Guide Rail and Cable Guide Rail
NOV 2015	723	Energy Attenuators
APR 2016	732	Guide Rail End Treatment - Steel Beam Energy Attenuating Terminal Systems
NOV 2014	771	Standard Highway Fence
DIVISION 8 - ENVIRONMENTAL AND LANDSCAPE		
NOV 2014	804	Seed and Cover
DIVISION 9 - STRUCTURAL		
APR 2016	903	Deep Foundations
NOV 2014	905	Steel Reinforcement for Concrete
NOV 2014	908	Metal Traffic Barriers and Metal Railings for Structures
NOV 2016	909	Pre-stressed Concrete – Precast Girders
APR 2008	910	Stressing Systems for Post-Tensioning
NOV 2014	911	Coating Structural Steel Systems
NOV 2014	914	Waterproofing Bridge Decks with Applied Asphalt Membrane
NOV 2014	915	Sign Support Structures
NOV 2016	920	Deck Joint Assemblies, Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds, and Waterstops – Structures
NOV 2016	922	Installation of Bearings
APR 2012	928	Structure Rehabilitation - Concrete Removal



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**PROVINCIAL-ORIENTED
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GENERAL & CONSTRUCTION SPECIFICATIONS**

DATE	SPEC. NO. OPSS.PROV	TITLE
NOV 2014	930	Structure Rehabilitation - Concrete Patches, Refacing, and Overlays
NOV 2014	935	Impressed Current Cathodic Protection System for Bridge Structures



MTO GENERAL CONDITIONS OF CONTRACT

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SECTION GC 1.0 - INTERPRETATION

GC 1.01 Captions

- .01 The captions appearing in these MTO General Conditions of Contract have been inserted as a matter of convenience and for ease of reference only and in no way define, limit, or enlarge the scope or meaning of these General Conditions of Contract or any provision hereof.
- .02 In the event of a conflict of a reference to the number and caption of a section, subsection, clause, or paragraph, reference shall be made to the caption.

GC 1.02 Abbreviations

- .01 The abbreviations listed on the left below are commonly found in the Contract Documents and represent the organizations and phrases listed on the right:

AASHTO	-	American Association of State Highway Transportation Officials
ANSI	-	American National Standards Institute
ASTM	-	ASTM International - formerly American Society for Testing and Materials
AWG	-	American Wire Gauge
AWWA	-	American Water Works Association
CGSB	-	Canadian General Standards Board
CSA	-	CSA Group - formerly Canadian Standards Association
CWB	-	Canadian Welding Bureau
CVOR	-	Commercial Vehicle Operator's Registration
DSM	-	Designated Sources for Materials
GC	-	MTO General Conditions of Contract
MOE	-	Ministry of the Environment and Climate Change (Ontario)
MTO	-	Ontario Ministry of Transportation
MTC	-	Ministry of Transportation and Communications, now MTO
MUTCD	-	Manual of Uniform Traffic Control Devices, published by MTO
OPS	-	Ontario Provincial Standards
OPSS	-	Ontario Provincial Standard Specification
OPSD	-	Ontario Provincial Standard Drawing
OTM	-	Ontario Traffic Manual
PDF	-	Portable Document Format
PEO	-	Professional Engineers Ontario
SAE	-	SAE International – formerly Society of Automotive Engineers
SSPC	-	Structural Steel Painting Council
TRA	-	The Road Authority
UL	-	Underwriters Laboratories
ULC	-	Underwriters Laboratories Canada

GC 1.03 Gender and Singular References

- .01 References to the masculine or singular throughout the Contract Documents shall be considered to include the feminine and the plural and vice versa as the context requires.

GC 1.04 Ontario Provincial Standards

- .01 Regardless of the publishing date on OPSSs and OPSDs contained in the OPS manuals and on a MTO website, the Standards applicable to this Contract are listed in the schedule of Provisions, Plans, Standard Drawings, Specifications, and MTO General Conditions of Contract, with the exception the version of OPSS 127 that is current at the time the work is carried out shall apply.

- .02 When an OPSS contains an appendix, the appendix is deleted in its entirety and is not invoked unless specified elsewhere in the Contract Documents. When an appendix is invoked, the information contained in the appendix shall form part of the specification.

GC 1.05 Ontario Traffic Manual

- .01 All references in the Contract Documents to the MUTCD, including all Parts and Divisions thereof, or MTO Traffic Control Manual for Roadway Work Operations, or Traffic Control Manual for Roadway Operations Field Edition are hereby deleted and replaced by the following books of the Ontario Traffic Manual:

Book 1	-	Introduction to the Ontario Traffic Manual;
Book 1A	-	Illustrated Sign and Signal Display Index;
Book 1B	-	Sign Design Principles;
Book 1C	-	Positive Guidance Toolkit;
Book 5	-	Regulatory Signs;
Book 6	-	Warning Signs;
Book 7	-	Temporary Conditions (and Temporary Conditions Field Edition);
Book 11	-	Pavement, Hazard and Delineation Markings;
Book 12	-	Traffic Signals.

- .02 Any reference in the Contract Documents to OTM shall be deemed to be the Ontario Traffic Manual Books 1, 1A, 1B, 1C, 5, 6, 7, 11, and 12.
- .03 The Contractor shall comply with the applicable requirements of the above OTM books.

GC 1.06 Conflict of Interest

- .01 The Contractor, any of the Subcontractors and any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall not engage in any activity or provide any services to the Minister where such activity or the provision of such services, creates a conflict of interest (actually or potentially in the sole opinion of the Minister) with the provision of services pursuant to this Contract. The Contractor acknowledges and agrees that it shall be a conflict of interest for it to use confidential information of the Crown relevant to the services where the Minister has not specifically authorized such use.
- .02 The Contractor shall disclose to the Minister, without delay, any actual or potential situation that may be reasonably interpreted as either a conflict of interest or a potential conflict of interest.
- .03 A breach of this section by the Contractor shall entitle the Minister to terminate the Contract, in addition to any other remedies that the Minister has in this Contract, in law or in equity.

GC 1.07 Definitions

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

Abnormal Weather means an extreme climatic condition characterized by wind speed, air temperature, precipitation, or snowfall depth, that is less than or greater than 1½ standard deviations from the mean determined from the weather records of the 25 years immediately preceding the tender opening date.

Access Road means a private road built or existing road used by the Contractor to gain access to the Work or to a source of material.

Actual Measurement means the field measurement of that quantity within the approved limits of the Work.

Addendum means an addition to or a change in the Contract Documents issued prior to tender closing.

Additional Work means work not provided for in the Contract and not considered by the Contract Administrator to be essential to the satisfactory completion of the Contract within its intended scope.

Aggregate means gravel, sand, clay, earth, shale, stone, limestone, dolostone, sandstone, marble, granite, or rock other than metallic ores, slag, and clinkers.

Agreement means the signed document between the Minister or delegated representative and the Contractor for the performance of the Work included in the Contract Documents.

Base means a layer of Material of specified type and thickness placed immediately below the Pavement, driving surface, finished grade, curb with gutter, or sidewalk.

Business Day means any Day which is not:

- a) A Saturday or a Sunday or
- b) A Day observed as a holiday under the laws of the Province of Ontario or the federal laws of Canada applicable to the Province of Ontario.

Change in the Work means the deletion, extension, increase, decrease, or alteration of lines, grades, dimensions, quantities, methods, drawings, changes in the character of the work to be done, or Materials of the Work or part thereof, within the intended scope of the Contract.

Change Order means a written order to the Contractor covering contingencies, extra work, increase or decrease in Contract quantities, and additions or alterations to the plans or specifications, within the scope of the Contract and establishing the basis of payment. Also means, a written authorization covering Additional Work.

Change Proposal means a proposal by the Contractor for a modification to the Contract Documents that is expected to result in design improvement benefits or a reduction in costs or both, or Contract Time.

Claim means any dispute for a modification in the payment from the original tender bid price arising from:

- a) Request for Clarification (RFC) submitted according to clause GC 3.14.02, Request for Clarification;
- b) Applications submitted according to subsection GC 3.06, Extension of Contract Time or Interim Completion Dates;
- c) Change Order price negotiations undertaken according to subsection GC 3.10, Changes in the Work and Additional Work.

Commercial Motor Vehicle means as defined under Section 16 of the *Highway Traffic Act*, R.S.O. 1990, c. H.8, as amended (*Highway Traffic Act*).

Commercial Source means a place where Aggregate or a product containing Aggregate is made available for sale.

Construction Signs means all traffic control devices and signs, including vehicles, trailers, and the like that are provided to support signs, and equipment to supply sign lighting, but excludes Contract identification signs and Highway number markers, all as may be described in the OTM.

Constructor means, for the purposes of, and within the meaning of the *Occupational Health and Safety Act*, R.S.O. 1990, c. O.1, as amended, the Contractor who executes this Contract.

Contract means the undertaking by the Owner and the Contractor to perform their respective duties, responsibilities, and obligations as prescribed in the Contract Documents.

Contract Administrator means the person, partnership, or corporation designated by the Owner to be the Owner's representative for the purposes of the Contract.

Contract Bulletin means a publication of MTO on the MTO's website www.raqs.merx.com.

Contract Completion means the Work has passed all inspection and testing requirements, the Contractor has rectified all deficient Work, and the Contractor has fulfilled all obligations under the Contract, except warranty obligations.

Contract Completion Certificate means the certificate issued by the Contract Administrator at Contract Completion.

Contract Documents means the Agreement, Tender, MTO General Conditions of Contract, Standard Specifications and Drawings, Special Provisions, Contract Drawings, Addenda incorporated into any aforementioned document, documents referenced in the aforementioned documents, and subsequent amendments to any of these documents made pursuant to the provisions of the Agreement.

Contract Drawings or **Contract Plans** mean drawings or plans provided by the Owner for the Work and without limiting the generality thereof may include soil profiles, foundation investigation reports, reinforcing steel schedules, aggregate sources lists, quantity sheets, and cross-sections.

Contractor means the person, partnership, or corporation undertaking the Work as identified in the Agreement.

Contractor's Intellectual Property means Intellectual Property owned by the Contractor prior to its performance under this Contract or created by the Contractor during this Contract independently of the performance of Contractor obligations under this Contract.

Contract Time means the time stipulated in the Contract Documents for completion of the Work, including any extension of Contract Time made pursuant to the Contract Documents.

Controlling Operation means any component of the Work that, if delayed, will delay the completion of the Work.

Cut-off Date means the date up to which a progress payment shall be made for work performed.

CVOR Abstract means a level 1 Commercial Vehicle Operator's Registration (CVOR) abstract obtained from MTO.

CVOR Certificate means a Commercial Vehicle Operator's Registration certificate issued under the *Highway Traffic Act*.

CVOR Holder means a person or company to whom a CVOR Certificate was issued that has not been cancelled nor currently under suspension.

Daily Work Records means daily records for any part of the Work detailing the work in question, names, and categories of workers and hours worked or on standby; types and quantities of Equipment and number of hours in use and/or on standby; and description and quantities of Material used.

Day means a calendar day.

Earth Grade means the earth surface, whether in cut or fill, as prepared for the Base or Subbase.

Engineer means a professional engineer licensed by the Professional Engineers Ontario to practice in the Province of Ontario.

Environmental Incident means an event such as a spill, discharge, emission, release, or escape of a material, pollutant, contaminant, deleterious substance, or dangerous good as defined in the legislation referenced in paragraph GC 7.13.02.01.

Equipment means all machinery and equipment used for preparing, fabricating, conveying, or erecting the Work and normally referred to as construction machinery and equipment.

Estimate means a calculation of the quantity or cost of the Work or part of it, depending on the context.

Extra Work means Change in the Work.

Grade means the required elevation of work.

Grade Line means a reference line representing the Grade in profile or longitudinal section established for the control of work.

Hand Tools means tools that are commonly called tools or implements of the trade and include small power tools. Individually, a tool shall be considered as a Hand Tool where the maximum cost is \$400.

Haul Road means any public road excluding the road under Contract that forms part of a Material haul route.

Highway means a common and public highway any part of which is intended for or used by the general public for the passage of vehicles and includes the area between the lateral property lines thereof.

Inclement Weather means weather conditions or conditions that result immediately there from that prevents the Contractor from proceeding with the Controlling Operation.

Inspector means any person, partnership, or corporation appointed by the Contract Administrator to participate in the inspection of the Work and the Material to be used in the Work.

Intellectual Property means any intellectual, industrial, or other proprietary right of any type in any form protected under the laws of Canada, any foreign country, or any political subdivision of any country, including, without limitation, any intellectual, industrial, or proprietary rights protected by legislation, by common law, or at equity.

Labour and Material Payment Bond means the type of security furnished to the Owner to guarantee payment of prescribed debts of the Contractor covered by the bond.

Lump Sum Item means a tender item indicating a portion of the Work for which payment shall be made at a single tendered price. Payment is not based on a measured quantity, although a quantity may be given in the Contract Documents.

Major Item means any tender item that has a value, calculated on the basis of its actual or estimated tender quantity, whichever is the greater, multiplied by its tender unit price, which is equal to or greater than the lesser of:

- a) \$200,000, or
- b) 5% of the total tender value calculated on the basis of the total of all the estimated tender quantities and the tender unit prices.

Material means material, machinery, equipment, and fixtures forming part of the Work.

Newly Created Intellectual Property means any Intellectual Property created by the Contractor in the course of performance of the Contractor's obligations under this Contract.

Notice of Protest means a written notice delivered by either party to the other party within 30 Business Days of the date of the decision of the Referee that the party disagrees with the Referee's decision and desires to have the decision reviewed according to paragraph GC 3.14.13.07.03 and no later than 2 years after the date of Contract Completion.

Owner means the party to the Agreement for whom the Work is being performed, as identified in the Agreement, and includes, with the same meaning and import, "Authority."

Pavement means a wearing course or courses placed on the Roadway and consisting of asphaltic concrete, hydraulic cement concrete, or other bituminous surfaces.

Performance Bond means the type of security furnished to the Owner to guarantee completion of the Work according to this Contract and to the extent provided in the bond.

Person means an individual, corporation, partnership, joint venture, association, trust, pension fund, union, governmental agency, board, tribunal, ministry, commission, or department and the heirs, beneficiaries, executors, legal representatives, or administrators of a person to whom the context can apply according to law.

Plan Quantity means that quantity as computed from within the boundary lines of the Work as shown in the Contract Documents.

Profile Grade means the required elevation of the surface of the Base.

Quantity Sheet means a list of the locations, estimated design quantities, and other details of Work to be completed for tender items.

Quarried Rock means material removed from an open excavation made in a solid mass of rock that was integral with the parent mass prior to removal.

Quarry means a place where Aggregate has been or is being removed from an open excavation made in a solid mass of igneous, sedimentary, or metamorphic rock or any combination of these that was integral with the parent mass prior to removal.

Rates of Interest means the interest rates determined by the Treasurer of Ontario and that are issued by and available from the Owner.

Record Drawings mean marked-up Contract Drawings prepared by the Contractor that show all differences, design changes, and deviations from the original Contract Drawings.

Records mean any books, payrolls, accounts, or other information that relate to the Work or any Change in the Work or Claims arising there from.

Referee means an independent third party consisting of 1 or 3 members who shall have the duty, responsibility and authority to conduct an independent review of the facts associated with a Claim and to then issue a written provisionally binding decision based solely on the facts of the Claim and in strict adherence with the Contract Documents.

Referee Roster Administrator is an independent and neutral 3rd party responsible to maintain and administer a Referee roster and who has the responsibility of administering the selection of the Referee on a per Claim basis on the Contract according to clause GC 3.14.13.03, Referee Selection. The name

of the Referee Roster Administrator shall be provided to the Contractor by the Owner after Contract award.

Regional Operations Office means the Operations Office in the MTO Region administering the Contract.

Release from Warranty Certificate means the certificate prepared by the Owner releasing the Contractor from all warranty obligations at the end of the last expiring warranty period.

Road Allowance means the lands acquired at any time for use as a Highway.

Roadbed means that part of the Work which is designed to support the Roadway.

Roadway means that part of the Highway designed or intended for use by vehicular traffic and includes the shoulders.

Rock Grade means the rock surface, whether in cut or fill, that has been prepared for the Base or Subbase.

Shoulder means that portion of the Roadway between the edge of the travelled lane and the top inside edge of the ditch or fill slope.

Special Provision means special direction within the Contract Documents containing requirements particular to the Work.

Standard means, when used alone, the generic term for Standard Specifications and Standard Drawings.

Standard Specification or **Standard Drawing** means a standard practice required and stipulated by the Owner for performance of the Work.

Subbase means a layer of material of specified type and thickness between the Subgrade and the Base.

Subcontractor means a person, firm, or corporation undertaking the execution of a part of the Work by virtue of a contract with the Contractor.

Subgrade means the Earth Grade or Rock Grade.

Substructure means all of that part of a structure, including backwalls, wingwalls, and wing protection railings, below:

- a) The bearings of single and continuous span bridges.
- b) Skewbacks of arches and tops of footings of rigid frame bridges.

Superintendent means the Contractor's authorized representative in responsible charge of the Work.

Superstructure means all that part of a structure, excluding backwalls, wingwalls, and wing protection railings, above:

- a) The bearing seat of single and continuous span bridges.
- b) Skewbacks of arches and tops of footings of rigid frame bridges.

Surety means the person, partnership, or corporation, other than the Contractor, executing a bond provided by the Contractor.

Time and Material means costs calculated according to subsection GC 8.03, Payment on a Time and Material Basis.

Utility means a facility maintained by a municipality, public utility authority, or regulated authority and includes sanitary sewer, storm sewer, water, electric, gas, steam, data, telephone, and cable television services.

Work means the total construction and related services required by the Contract Documents.

Working Area means all the land and all the easements owned or acquired by the Owner for the construction of the Work.

Working Day means any Day:

- a) Except Saturdays, Sundays and statutory holidays.
- b) Except a Day as determined on which the Contractor is prevented by weather or conditions resulting immediately thereafter, from proceeding with a Controlling Operation. For the purposes of this definition, this shall be a Day during which the Contractor cannot proceed with at least 60% of the normal labour and equipment force effectively engaged on the Controlling Operation for at least 5 hours.
- c) Except a Day on which the Contractor is prevented from proceeding with the Controlling Operation by reason of:
 - i. Any breach of Contract or prevention by the Owner, by any other Contractor of the Owner, or by any employee of any one of them.
 - ii. Non-delivery of Owner supplied materials.
 - iii. Any cause beyond the reasonable control of the Contractor that can be substantiated by the Contractor.

Working Drawings or Working Plans means any drawings or plans prepared by the Contractor for the execution of the Work and may, without limiting the generality thereof, include falsework and formwork plans, roadway protection plans, shop drawings, shop plans, or erection diagrams.

GC 1.08 Substantial Performance

.01 The Work is substantially performed:

- a) When the Work or a substantial part thereof has passed inspection and testing and is ready for use or is being used for the intended purposes; and
- b) When the Work to be performed under the Contract is capable of completion or, where there is a known defect, correction, at a cost of not more than:
 - i. 3% of the first \$500,000 of the Contract price,
 - ii. 2% of the next \$500,000 of the Contract price, and
 - iii. 1% of the balance of the Contract price

.02 For the purpose of this Contract where the Work or a substantial part thereof is ready for use or is being used for the purposes intended and the remainder of the Work cannot be completed expeditiously for reasons beyond the control of the Contractor or, where the Owner and the Contractor agree not to complete the Work expeditiously, the price of the services or Materials remaining to be supplied and required to complete the Work shall be deducted from the Contract price in determining substantial performance.

GC 1.09 Interpretation of Certain Words

- .01 The words "acceptable," "approval," "authorized," "considered necessary," "directed," "required," "satisfactory," or words of like import shall mean approval of, directed, required, considered necessary, or authorized by and acceptable or satisfactory to the Contract Administrator unless the context clearly indicates otherwise.
- .02 The words "Ministry of Transportation," "ministry," and "Owner" and the abbreviations "MTO" and "MTC" shall mean the Ontario Ministry of Transportation.

GC 1.10 Liens

- .01 A lien is preserved when the claimant has given the Owner a copy of the claim for lien together with the affidavit of verification within the time frame detailed in Section 34 of the *Construction Lien Act*, R.S.O. 1990, c. C.30, as amended (*Construction Lien Act*).
- .02 A preserved lien is perfected when the claimant commences an action in the courts to enforce the lien prior to the end of the period specified in Section 36 of the *Construction Lien Act*.

SECTION GC 2.0 - CONTRACT DOCUMENTS

GC 2.01 Reliance on Contract Documents

- .01 The Owner warrants that the information furnished in the Contract Documents can be relied upon with the following limitations or exceptions:
 - a) The location of all mainline underground Utilities that affects the Work shall be shown to a tolerance of 1.0 m horizontal and 0.3 m vertical
- .02 The Owner does not warrant interpretations of data or opinions expressed in any subsurface report available for the perusal of the Contractor and excluded from the Contract Documents
- .03 The Owner does not warrant any other information specifically excluded from this warranty.

GC 2.02 Order of Precedence

- .01 In the event of any inconsistency or conflict in the contents of the following documents, such documents shall take precedence and govern in the following order:
 - a) Agreement
 - b) Addenda
 - c) Special Provisions
 - d) Contract Drawings
 - e) Standard Specifications
 - f) Standard Drawings
 - g) Tender
 - h) MTO General Conditions of Contract
 - i) Working Drawings

Later dates shall govern within each of the above categories of documents.

- .02 In the event of any conflict among or inconsistency in the information shown on Contract Drawings, the following rules shall apply:
 - a) Dimensions shown in figures on a drawing shall govern where they differ from dimensions scaled from the same drawing.
 - b) Drawings of larger scale shall govern over those of smaller scale.
 - c) Detailed drawings shall govern over general drawings.
 - d) Drawings of a later date shall govern over those of an earlier date in the same series.
- .03 In the event of any conflict in the contents of Standards the following order of precedence shall govern:

- a) Ontario Provincial Standard Specifications and Drawings
 - b) Other Standards referenced by OPSSs and OPSDs (e.g., CSA, CGSB, ASTM, and ANSI)
- .04 The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all.

SECTION GC 3.0 - ADMINISTRATION OF THE CONTRACT

GC 3.01 Contract Administrator's Authority

- .01 The Contract Administrator shall be the Owner's representative during construction and until the issuance of the Release from Warranty Certificate. All instructions to the Contractor including instructions from the Owner shall be issued by the Contract Administrator. The Contract Administrator shall have the authority to act on behalf of the Owner only to the extent provided in the Contract Documents.
- .02 All Claims, disputes, and other matters in question relating to the performance and the quality of the Work or the interpretation of the Contract Documents shall be referred to the Contract Administrator in writing by the Contractor. The Contract Administrator shall give a decision in writing within a reasonable time.
- .03 The Contract Administrator may inspect the Work for its conformity with the Contract Drawings and Standard Specifications and all Drawings, and to record the necessary data to establish payment quantities under the schedule of tender quantities and unit prices or to make an assessment of the value of the work completed in the case of a lump sum price Contract.
- .04 The Contract Administrator shall approve the amounts owing to the Contractor under this Contract and shall issue certificates for payment in such amounts as provided for in section GC 8.0, Measurement and Payment.
- .05 The Contract Administrator shall, with reasonable promptness, review and take appropriate action upon the Contractor's submissions such as Working Drawings, product data, and samples according to the Contract Documents. Unless specified otherwise, the Contract Administrator shall respond to submissions requiring approval according to the Contract as soon as possible but not longer than 5 Business Days excluding any requests for extensions of Contract Time.
- .06 The Contract Administrator shall investigate all allegations of a change in the character of the Work made by the Contractor and issue appropriate instructions.
- .07 The Contract Administrator shall prepare and issue Change Orders.
- .08 The Contract Administrator shall be, in the first instance, the interpreter of the Contract Documents and the judge of the performance there under by both parties to the Contract. Interpretations and decisions of the Contract Administrator shall be consistent with the intent of the Contract Documents.
- .09 The Contract Administrator shall have the authority to reject work or Material which does not conform to the Contract Documents.
- .10 Defective work, whether the result of poor workmanship, use of defective Material, or damage through carelessness or other act or omission of the Contractor and whether incorporated in the Work or not, that has been rejected by the Contract Administrator as failing to conform to the Contract Documents shall be removed promptly from the Work by the Contractor and replaced or re-executed promptly according to the Contract Documents at no additional cost to the Owner.
- .11 Any part of the Work destroyed or damaged by such removals, replacements, or re-executions shall promptly be made good at no additional cost to the Owner.
- .12 If, in the opinion of the Contract Administrator, it is not expedient to correct defective work or work not performed according to the Contract Documents, the Owner may deduct from monies otherwise due to the Contractor the difference in value between the work as performed and that specified in

the Contract Documents, the amount of which shall be determined in the first instance by the Contract Administrator.

- .13 Notwithstanding any inspections made by the Contract Administrator or the issuance of any certificates or the making of any payment by the Owner, the failure of the Contract Administrator to reject any defective work or Material shall not constitute acceptance of defective work or Material.
- .14 The Contract Administrator shall have the authority to temporarily suspend the Work for such reasonable time as may be necessary to facilitate the checking of any portion of the Contractor's construction layout or the inspection of any portion of the Work. There shall not be any extra compensation for this suspension of work.

GC 3.02 Working Drawings

- .01 The Contractor shall arrange for the preparation of clearly identified and dated Working Drawings as specified in the Contract Documents.
- .02 The Contractor shall submit Working Drawings to the Contract Administrator with reasonable promptness and in orderly sequence so as to not cause delay in the Work. If either the Contractor or the Contract Administrator so requests, they shall jointly prepare a schedule fixing the dates for submission and return of Working Drawings. At the time of submission, the Contractor shall notify the Contract Administrator in writing of any deviations from the Contract requirements that exist in the Working Drawings.
- .03 The Contractor shall make any changes in Working Drawings that the Contract Administrator may require consistent with the Contract Documents and resubmit, unless otherwise directed by the Contract Administrator. When resubmitting, the Contractor shall notify the Contract Administrator in writing of any revisions other than those requested by the Contract Administrator.
- .04 The Contractor shall keep one set of the Working Drawings at the site at all times.

GC 3.03 Right of the Contract Administrator to Modify Methods and Equipment

- .01 The Contractor shall, when instructed in writing, make alterations in the method, Equipment, or work force at any time the Contract Administrator considers the Contractor's actions to be unsafe or damaging to either the Work or existing facilities or the environment, at no additional cost to the Owner. The Contractor shall alter the sequence of operations on the Contract, when requested in writing, so as to avoid interference with other work.
- .02 Notwithstanding the foregoing, the Contractor shall ensure that all necessary safety precautions and protection are maintained throughout the Work.

GC 3.04 Emergency Situations

- .01 The Contract Administrator has the right to determine the existence of an emergency situation and, when such an emergency situation is deemed to exist, the Contract Administrator may instruct the Contractor to take action to remedy the situation. If the Contractor does not take timely action or, if the Contractor is not available, the Contract Administrator may direct others to remedy the situation.
- .02 If the emergency situation was the fault of the Contractor, the remedial work shall be completed at no additional cost to the Owner. If the emergency situation was not the fault of the Contractor, the Owner shall pay for the remedial work.

GC 3.05 Working Area

- .01 The Contractor's sheds, site offices, toilets, other temporary structures, and storage areas for Material and Equipment shall be grouped in a compact manner and maintained in a neat and orderly condition at all times.
- .02 The Contractor shall confine his construction operations to the Working Area so as not to interfere with public use. Should the Contractor require more space than that shown on the Contract Drawings, the Contractor shall obtain such space at no additional cost to the Owner.
- .03 The Contractor shall not enter upon or occupy any private property for any purpose, unless the Contractor has received prior written permission from the property owner.

GC 3.06 Extension of Contract Time or Interim Completion Dates

- .01 An application for an extension of Contract Time or interim completion dates shall be made in writing by the Contractor on the Owner standard form PH-CC-775, Extension of Time Request and Approval Form, to the Contract Administrator, as soon as the need for such extension becomes evident. The application for an extension of Contract Time shall enumerate the reasons and impact on the critical path schedule, and state the length of extension required.
- .02 Circumstances suitable for consideration include the following:
 - a) Delays: See subsection GC 3.07, Delays.
 - b) Changes in the Work: See clause GC 3.10.01, Changes in the Work.
 - c) Additional Work: See clause GC 3.10.02, Additional Work.
- .03 The Contract Time shall be extended for such additional time as approved by the Contract Administrator.
- .04 The terms and conditions of the Contract shall continue for such extension of Contract Time.

GC 3.07 Delays

- .01 If the Contractor is delayed in the performance of the Work by:
 - a) War, blockades, or civil commotions; or
 - b) Errors in the Contract Documents; or
 - c) An act or omission of the Owner, Contract Administrator, other contractors, or anyone employed or engaged by them directly or indirectly, contrary to the provisions of the Contract Documents; or
 - d) A stop work order issued by a court or public authority, provided that such order was not issued as the result of an act or omission of the Contractor or anyone employed or engaged by the Contractor directly or indirectly; or
 - e) The Contract Administrator giving notice under subsection GC 7.11, Suspension of Work; or
 - f) Abnormal Weather, provided that in the case of an application for an extension of Contract Time, due to the Abnormal Weather, the Contractor shall, with the Contractor's application, submit evidence from Environment Canada, together with detailed calculations in support of such application; or

- g) Archaeological finds, or
- h) The presence of species at risk as defined in the *Species at Risk Act* (S.C. 2002, c. 29) and/or the *Endangered Species Act*, S.O. 2007, c. 29 not otherwise identified in the Contract Documents,

then, the Contractor shall be granted an extension of Contract Time according to subsection GC 3.06, Extension of Contract Time or Interim Completion Dates, and shall be reimbursed by the Owner for reasonable costs incurred by the Contractor as the result of such delay.

- .02 To determine if the weather encountered during the term of the Contract constitutes Abnormal Weather, the weather records used for the calculation of the 25-year mean and standard deviation shall be from the Environment Canada weather station nearest to the location of the Work. The weather conditions measured in time periods of 3 consecutive Days within a 30-Day period, a calendar month, or 3 consecutive calendar months shall be used to determine the values for the calculations. No other time periods shall be considered.
 - a) For precipitation and snowfall, the values for each year shall be the total amount over the time period.
 - b) For wind and temperature, the values for each year shall be either the average highest or lowest value in the time period.
 - c) The same month or 3 month time period shall be used for each of the 25 years.
 - d) For a consecutive 3-Day period within a 30-Day period, the 30-Day period shall begin 15 Days prior to the start of the weather event that is suspected to be abnormal. Only the highest or lowest 3-Day value within the same 30-Day period shall be used for each of the preceding 25 years.

- .03 If the Contractor is granted an extension of Contract Time, compensation for unabsorbed head office overhead shall be as follows:

$$HOOH = (Te (OCv \times 0.05)/T) - 0.05(FCv-OCv)$$

Where:

HOOH: means head office overhead payment

Te: means approved extension of Contract Time in Days less the Days between December 1 and May 15 inclusive (for Working Day Contracts elapsed Days for approved Working Days)

OCv: means Original Contract tender value in dollars

T: means original Contract Time less the Days between December 1 and May 15 inclusive (Days for completion date contracts or elapsed Days for Working Day Contracts)

FCv: means final Contract value in dollars excluding: incentive/disincentive payments, material bonus/penalty payments, asphalt cement index payments and fuel price adjustments

The head office overhead payment shall not be negative.

For the purposes of establishing the start date to calculate Contract durations, the date shown on the Owner standard form PH-CC-700, Permission to Start Work, shall be considered as the start date. No other payment shall be made for head office overhead.

Payment for unabsorbed head office overhead shall be made after the Contract Completion Certificate has been issued.

- .04 If the Work is delayed by labour disputes, strikes, or lock-outs, including lock-outs decreed or recommended to its members by a recognized contractor's association, of which the Contractor is a member or to which the Contractor is otherwise bound, which are beyond the Contractor's control, then:
- a) Where an industry-wide strike delays the Work, the Contractor shall be granted an extension of Contract Time but not financial compensation (i.e., the strike is considered to be an excusable and non-compensable delay). The Contractor shall make application and shall document the extent to which Controlling Operations were delayed by the strike.
 - b) Incentives and disincentives shall apply to the revised interim and final completion dates.
- .05 If the Contractor's operations expose any items which may indicate an archaeological find, such as building remains, hardware, accumulations of bones, pottery, or arrowheads:
- a) The Contractor shall immediately notify the Contract Administrator and suspend operations within the area identified by the Contract Administrator.
 - b) Work shall remain suspended within that area until otherwise directed by the Contract Administrator in writing, according to subsection GC 7.11, Suspension of Work.
 - c) Any delay in the completion date of the Contract that is caused by such a cessation of construction operations shall be considered to be beyond the Contractor's control according to paragraph GC 3.07.01.
 - d) Any increases in the cost of the work to be done that are caused by such a cessation of construction operations shall be considered as a Change in the Work according to paragraph GC 3.10.01.01.
 - e) Any work directed or authorized in connection with an archaeological find shall be considered as Changes in the Work according to clause GC 3.10.01, Changes in the Work.
- .06 If the Contractor encounters species at risk as defined in paragraph GC 3.07.01 within the Working Area not otherwise identified in the Contract Documents, and that are likely to be impacted by the Contractor's operations:
- a) The Contractor shall immediately notify the Contract Administrator and suspend operations within the area identified by the Contract Administrator.
 - b) Work shall remain suspended within that area until otherwise directed by the Contract Administrator in writing, according to subsection GC 7.11, Suspension of Work.
 - c) Any delay in the completion date of the Contract that is caused by such a cessation of construction operations shall be considered to be beyond the Contractor's control according to paragraph GC 3.07.01.
 - d) Any increases in the cost of the work to be done that are caused by such a cessation of construction operations shall be considered as a Change in the Work according to paragraph GC 3.10.01.01.

- e) Any work directed or authorized in connection with the unexpected presence of species at risk shall be considered as Changes in the Work according to clause GC 3.10.01, Changes in the Work.

GC 3.08 Assignment of Contract

- .01 The Contractor shall not assign the Contract, either in whole or in part, without the written consent of the Owner.

GC 3.09 Subcontracting by the Contractor

- .01 The Contractor may subcontract any portion of the Work, but the total of all sublets shall not exceed 60% of the total tender value without the written consent of the Contract Administrator, subject to these MTO General Conditions of Contract and any limitations established by the Owner.
- .02 The Contractor shall notify the Contract Administrator, in writing on the Owner standard form PH-CC-742, Consent to Sublet, of the intention to subcontract where the subcontract comprises greater than 50% of the tender item value. Such notification shall identify the part of the Work, and the Subcontractor with whom it is intended.
- .03 The Contractor shall preserve and protect the rights of the parties under the Contract with respect to the work to be performed under subcontract and shall:
 - a) Enter into agreements with the intended Subcontractors to require them to perform their work according to the Contract Documents; and
 - b) Be as fully responsible to the Owner for acts and omissions of the Contractor's Subcontractors and of persons directly or indirectly employed by them as for acts and omissions of persons directly employed by the Contractor.
- .04 Subcontracting shall not be construed to relieve the Contractor from any obligation under the Contract or to impose any liability upon the Owner. Nothing contained in the Contract Documents shall create a contractual relationship between a Subcontractor and the Owner.
- .05 The Contractor shall not subcontract any part of the Work to a Subcontractor that has submitted the lowest tender for the Contract, and has subsequently failed to enter into a Contract with the Owner. The Owner shall not be responsible or liable for any costs or damages of the Contractor arising from the need of the Contractor to substitute a Subcontractor.

GC 3.10 Changes in the Work and Additional Work

GC 3.10.01 Changes in the Work

- .01 The Owner or the Contract Administrator, where so authorized, may, by order in writing, make Changes in the Work without invalidating the Contract. The Contractor shall not be required to proceed with a Change in the Work until in receipt of a Change Order. Upon the receipt of such written order the Contractor shall proceed with the work and shall provide the Owner with a detailed cost estimate of the work described in the Change Order. The estimate shall identify the costs of salaries and wages, payroll burden, Equipment, Materials, and payments to Subcontractors. Alternatively, and with the agreement of the Contract Administrator, the Contractor may provide a cost estimate based on actual or revised Contract prices. The Contractor shall also estimate the impact on any incentives or disincentives.
- .02 The Contractor may apply for an extension of Contract Time according to the terms of subsection GC 3.06, Extension of Contract Time or Interim Completion Dates.

- .03 If the Changes in the Work relate solely to quantities, payment for the work shall be made according to the conditions specified in clause GC 8.01.02, Variations in Tender Quantities. If the Changes in the Work do not solely relate to quantities, then either the Owner or the Contractor may negotiate upwards or downwards the adjustment of the Contract price in respect of the Changes in the Work according to subsection GC 3.14, Clarification and Claims, or payment may be made according to the conditions contained in subsection GC 8.03, Payment on a Time and Material Basis.
- .04 The undisputed value of work performed as a result of a Change Order is eligible to be included in the Progress Payment Certificate. The Owner shall compensate the Contractor for the direct costs of labour, Materials, Equipment, and subcontracts. The interim payment shall be based on a mutually agreed lump sum, pro-rated for the percentage of work completed. In the case of failure to reach agreement, the interim payment shall be calculated according to subsection GC 8.03, Payment on a Time and Material Basis.

GC 3.10.02 Additional Work

- .01 The Owner or Contract Administrator, where so authorized, may request the Contractor to perform Additional Work without invalidating the Contract. If the Contractor agrees to perform Additional Work, the Contractor shall proceed with such work upon receipt of a Change Order establishing the basis of payment, the price, and the adjustment of Contract Time.

GC 3.10.03 Price Agreement Form

- .01 If the Contractor and Contract Administrator agree on the basis of payment and price when appropriate, a price agreement on the Owner standard form PH-CC-856, Price Agreement for Change in the Work, Extra Work or Additional Work, shall be signed by both parties.

GC 3.10.04 Work Directive

- .01 If there is a dispute between the Owner and the Contractor whether a Change Order is required, and the Contractor does not proceed with the Work, the Owner may issue an Owner standard form PH-CC-857, Work Directive. Upon receipt of a Work Directive the Contractor shall proceed with the Work. The Contractor may pursue resolution of the dispute according to subsection GC 3.14, Clarification and Claims.

GC 3.11 Change Proposals after Contract Award

GC 3.11.01 Definitions

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

Alternative Type of Material means a substitute for a specified type of Material to be incorporated into a product and would involve a change that does not adversely affect the performance of the product.

Design Change means an alteration to a specified physical feature of a product or to the construction staging requirements that does not adversely affect the performance of the facility, and may include the use of an Alternative Type of Material that changes the physical dimensions of a product.

Method Change means an alteration to the specified means or process used to produce a product.

GC 3.11.02 Sharing of Cost Savings

- .01 The Contractor may propose cost-reducing Change Proposals after Contract award and gain a financial reward by receiving 50% of the savings resulting from a Change Proposal. If a Change

Proposal is acceptable to the Owner, as determined by an Owner Change Proposal review team, the Contractor shall:

- a) Be reimbursed 100% for the agreed upon design/redesign cost as agreed upon at acceptance by the Owner in principle of a Change Proposal, and
- b) Receive payment of 50% of the net construction cost savings, as detailed in clause GC 3.11.05, Accepted Change Proposal Payment, resulting after preliminary design development at the Contractor's cost.

Items a) and b) are in addition to payment for the tendered cost for construction of a Change Proposal.

- .02 Standard submission forms and guidelines for their completion are available from the Contract Administrator.

GC 3.11.03 Conditions of Change Proposals

GC 3.11.03.01 Processing, General

- .01 Change Proposals under this provision shall be considered after award and when all applicable conditions are met. Change Proposals need not necessarily be completely equivalent to or meet specified requirements, except as otherwise specified in subsection GC 3.11, Change Proposals after Contract Award. Change Proposals shall be submitted on the applicable Owner standard forms and shall duplicate all the original text provided in the original standard forms.
- .02 Acceptance or rejection of the Change Proposal shall be at the sole discretion of the Owner. The Owner shall advise the Contractor of the reasons for rejection of a Change Proposal according to clause GC 3.11.03.09, Time Periods for Review.
- .03 Each proposed Change that affects a different set of Contract items shall be documented as a separate Change Proposal.
- .04 Ongoing costs and future life costs shall be evaluated, as detailed and explained on the Owner standard forms, and shall be noted considering, as a minimum, a perpetual/infinite life cycle using present worth value analysis, using a constant dollars concept, and a discount rate of 6%.
- .05 Change Proposals that take advantage of any errors or omissions in the plans for the as-designed project, or discrepancies between the as-designed project and the Special Provisions covering alternate designs, shall not be accepted. In the event that any error, omission, or discrepancy is discovered, the Contractor shall immediately notify the Contract Administrator. Failure to notify the Owner shall constitute a waiver of all claims for misunderstandings, ambiguities, or other situations resulting from the error, omission, or discrepancy.
- .06 The Contractor shall be responsible for all costs arising in connection with errors in the quantities related to the Change Proposal.
- .07 The Owner shall not be liable to the Contractor for failure to accept or act upon any Change Proposal nor for any delays attributable to any such Change Proposal.
- .08 No extension of Contract Time shall be permitted unless detailed in a Change Proposal and accepted by the Owner.
- .09 The Contractor shall be responsible for obtaining all regulatory approvals resulting from any Change Proposal.

- .10 The Owner shall be the sole judge of whether any Change Proposal is consistent with owner design policies and basic design criteria for the project.
- .11 The Contractor shall have no Claim against the Owner for any costs or delays due to the Owner's review or rejection of a Change Proposal, including but not limited to review for approval of designs, development costs, anticipated profits, or increased material or labour costs resulting from delays in the review of such Change Proposals.
- .12 If a Change Proposal is acceptable to the Owner, the Contractor shall construct the Change Proposal, and shall do the construction for the price bid for the Change Proposal identified by MTO as acceptable.
- .13 If the Change Proposal is acceptable in whole or in part, such acceptance shall be clarified by the Owner by means of a Change Order that shall specifically state that it is executed pursuant to subsection GC 3.11, Change Proposals after Contract Award.
- .14 Subcontractors may not submit a Change Proposal, except through the Contractor.
- .15 If the Owner accepts a design change, the Owner shall not give permission to proceed with such a Change Proposal until an agreement has been reached on the estimated value of the cost savings and on the Change Proposal design or redesign costs, or until there is a written agreement on a dispute resolution procedure to resolve any disagreement over the values. If a Change Proposal is rejected, no compensation shall be made for any costs associated with the Change Proposal, other than those accepted as part of a Change Proposal and/or other costs found to be acceptable to the Owner.
- .16 If the Owner already has under consideration certain revisions to the Contract or has approved certain changes in Standard Specifications or Drawings for general use that are subsequently incorporated into a Change Proposal, the Owner shall reject the Change Proposal and shall proceed with such revisions, if the Owner so desires and without any obligation to the Contractor. At the Owner's discretion, such changes may be made under subsection GC 3.10, Changes in the Work and Additional Work.

GC 3.11.03.02 Incomplete Change Proposals

- .01 The Owner reserves the right to reject any Change Proposal if the Change Proposal does not contain all required information or is not presented clearly. Without prejudice to this right, the Owner may request clarification when the intent of a Change Proposal is unclear. If supporting data is insufficient or unclear, this shall also be grounds for rejection of a Change Proposal.

GC 3.11.03.03 Proposals for Design Changes

- .01 When the Contract Documents do not contain a provision for a design change for a tender item, the Contractor's bid for the tender item shall be based on the specified/tendered design exclusive of any Change Proposal. Alternative designs presented under this provision may be proposed only after award. The Owner shall review the design Change Proposal and if the Change Proposal is acceptable to the Owner, the Contractor shall be responsible for the cost of all impacts on other construction item costs that are not included in the Change Proposal and for the schedule resulting from the Change Proposal.

GC 3.11.03.04 Design Changes

- .01 The situations described below are covered in OPSSs, and shall be used by the Owner to determine how a Change Proposal shall be handled:

- a) When the Contract contains provisions for acceptable alternative designs (e.g., pipe sewers, cast-in-place vs. precast manholes, and culverts), the Contractor may proceed with any one of them with no need to negotiate cost savings after award based on this provision.
- b) When the Contractor is specifically permitted in the Contract Documents to design an alternative to the design specified in the Contract (e.g., track protection, work sequence, or staging requirements), the Contractor shall perform the design, and the associated cost shall be deemed to be included in the related Contract prices. The design shall be subject to Owner review and, if the alternative design is not acceptable, it shall be changed to meet the Owner's requirements at no additional cost to the Owner or revert to the original design as directed by the Owner.
- c) When the Contractor is responsible for the design of temporary work and no design has been provided in the Contract Documents, or the design provided by the Owner is not sufficiently detailed to permit construction (e.g., formwork and falsework, dewatering, trench shoring, and roadway protection), it shall be understood that the costs for such work were included in the Contractor's original tendered bid, and the Contractor shall assume all the risk associated with bidding and constructing the design.

GC 3.11.03.05 Proposals for Method Changes

- .01 When the Contract Documents do not contain a provision for a method change for the tender item, or when the Contractor proposes an alternative method to the specified method, the Owner shall, under this provision, receive, review, and accept or reject an alternate method only after award of the Contract. The Contractor shall assume all of the risk in bidding the tender item with an alternate method and in using the alternate method. If the alternative method is acceptable to the Owner, or is acceptable with modifications, the Contractor shall be paid according to the payment conditions of subsection GC 3.11, Change Proposals after Contract Award. If a Change Proposal is rejected, no additional compensation shall be made.
- .02 The Contractor shall not start work with a proposed method change until the Owner has given written permission.
- .03 When the Contractor proposes to change the construction staging scheme identified in the Contract Documents, and where these changes are deemed by the Contract Administrator to be a significant departure from the Contract Documents, the Contractor shall submit 4 copies of a traffic management plan that:
 - a) Includes, as appropriate, the following documents:
 - i. Plan, profile, and cross-section drawings indicating the proposed changes to the horizontal and vertical alignment and any changes to the drainage; electrical; environmental; Pavement; structural; over-winter; work zone safety; and public safety, including pedestrian access, schemes for all affected construction and traffic stages.
 - ii. Revised signing and Pavement marking schemes.
 - iii. Revised detour, lane, or ramp closure schemes.
 - iv. A revised critical path schedule for the duration of the project.
 - b) Maintains the minimum standards as used in the Contract Documents for:
 - i. Highway geometrics.
 - ii. Pavement structures (i.e., type, depth and granular depths).
 - iii. Illumination and traffic signals needs.
 - iv. Seasonal shutdown conditions.

- v. Environmental Protection (i.e., design measures, construction constraints and requirements and commitments in environmental documentation which may not be referred to in the Contract Documents).
- c) Clearly identifies geometric design criteria used for:
- i. Design speed.
 - ii. Vertical grades.
 - iii. Stopping sight distance.
 - iv. Vertical curves.
 - v. Horizontal curves.
 - vi. Superelevation.
 - vii. Lane widths.
 - viii. Shoulder widths.
 - ix. Grades for side slopes.
 - x. Hazard offsets.
 - xi. Barrier warrants.
 - xii. Pavement crossfalls.
 - xiii. Shoulder crossfalls.
- d) Identifies any changes to the construction staging or traffic operations affecting municipal roadways to the Contract Administrator who shall notify the affected municipality. A minimum of 10 Business Days shall be provided to the municipality for their response.
- e) Complies with the pavement marking and signing standards of the OTMs.
- f) Complies with permitted time periods for lane and ramp restrictions and closures as specified in the Contract Documents.
- g) Complies with environmental constraints and requirements as specified in the Contract Documents.
- h) Meets current MTO Standards.

GC 3.11.03.06 Proposals for Alternative Types of Materials or Material Sources

- .01 The Contractor's Change Proposal for alternative types of Materials or Material sources shall include evidence that the Material or Material source meets the Owner's requirements in place at the time the Change Proposal is submitted.

GC 3.11.03.07 Proposal for a Combination of Design, Method, and Material Changes

- .01 When the Contract Documents do not contain a provision for a design change for a tender item, other than that permitted by a Change Proposal, and the proposed design change requires a different method from that specified in the Contract Documents, the Change Proposal including the proposed method shall be considered a design change, and all the requirements of clause GC 3.11.03.03, Proposals for Design Changes, shall apply.

GC 3.11.03.08 Ownership and Copyright

GC 3.11.03.08.01 Intellectual Property

GC 3.11.03.08.01.01 Ownership of Intellectual Property

- .01 The Owner shall be the sole proprietor of any Newly Created Intellectual Property. The Contractor irrevocably assigns to and in favour of the Owner, and the Owner accepts every right, title, and

interest in and to all Newly Created Intellectual Property in the Change Proposal, immediately following the creation thereof, for all time and irrevocably waives in favour of the Owner all rights of integrity and other moral rights to all Newly Created Intellectual Property in the Change Proposal, immediately following the creation thereof, for all time. To the extent that the Change Proposal includes, in whole or in part, the Contractor's Intellectual Property, the Contractor grants to the Owner a licence to use that Contractor's Intellectual Property in the manner contemplated in clause GC 3.11.03.08.01, Intellectual Property, of these MTO General Conditions of Contract, the total consideration for which shall be a portion of the payment of the lump sum tender item price to the Contractor by the Owner.

GC 3.11.03.08.01.02 Presumption Governing Ownership

- .01 The presumption governing the Contract shall be that the Owner shall be the sole proprietor of any Intellectual Property in any form contained in the Change Proposal. If the Contractor's Intellectual Property forms any part of the Change Proposal, the Contractor shall notify the Owner in the Change Proposal. In the absence of any such notice, the presumption shall remain that the Owner is the sole proprietor of any Intellectual Property contained in the Change Proposal.

GC 3.11.03.08.01.03 Contractor's Grant of Licence

- .01 For those parts of the Change Proposal that are the Contractor's Intellectual Property, the Contractor grants to the Owner for the sole purposes of resolving or remedying any breach of the Contract Documents or this warranty by the Contractor or for the Owner to undertake maintenance, rehabilitation, reconstruction, or construction work, a perpetual, world-wide, non-exclusive, irrevocable, transferable, royalty-free, fully-paid-up right and licence to:
- a) Use, modify, reproduce, and distribute, in any form, the identified Intellectual Property; and
 - b) Authorize other Persons, including agents, contractors, or Subcontractors, to do any of the former on behalf of the Owner.
- .02 The Owner acknowledges and agrees that the Contractor's Intellectual Property is the property of the Contractor and is highly valuable, confidential, and material to the interests, business, and affairs of the Contractor and that disclosure thereof would be detrimental to the interests, business, and affairs of the Contractor. The Owner agrees to maintain the confidentiality of the Contractor's Intellectual Property and that, subject to a court order or except as specifically permitted by the terms of these provisions, the Owner shall not disclose the Contractor's Intellectual Property to any person for any reason whatsoever other than to those persons who actually need to have knowledge of the Contractor's Intellectual Property for the sole purposes of resolving or remedying any breach of the Contract Documents or this warranty or for the Owner to undertake maintenance, rehabilitation, reconstruction, or construction work. The confidentiality obligation of the Owner shall not apply to those elements of the Contractor's Intellectual Property that are currently or hereafter become generally available to the public, provided such public availability has not occurred as a result of the disclosure by the Owner in contravention of this provision.

GC 3.11.03.08.01.04 No Restrictive Materials in Change Proposal

- .01 The Contractor shall not incorporate into any Change Proposal anything that would restrict the right of the Owner to modify, further develop, or otherwise use the Change Proposal in any way that the Owner deems necessary, or that would prevent the Owner from entering into any contract with any contractor other than the Contractor for the modification, further development, or other use of the Change Proposal.

GC 3.11.03.08.01.05 Assurances Regarding Moral Rights

- .01 At the request of the Owner, at any time or from time to time, the Contractor shall execute and agree to cause its directors, officers, employees, agents, partners, affiliates, volunteers, or Subcontractors to execute an irrevocable written waiver of any moral rights or other rights of integrity in the applicable Change Proposal in favour of the Owner. Such waiver to be in the form provided by the Owner, and which waiver may be invoked without restriction by any person authorized by the Owner to use the Change Proposal.
- .02 The Contractor shall deliver such written waivers to the Owner within 10 Business Days of the receipt of the request from the Owner.

GC 3.11.03.08.01.06 Further Assurances Regarding Copyright

- .01 At the request of the Owner, at any time or from time to time, the Contractor shall execute and agree to cause its directors, officers, employees, agents, partners, affiliates, volunteers, or Subcontractors to execute a written assignment of copyright in the applicable Change Proposal to the Owner in the form provided by the Owner. The Contractor shall deliver such written assignments to the Owner within 10 Business Days of the receipt of the request from the Owner. The Contractor shall assist the Owner in preparing any Canadian copyright registration that the Owner considers appropriate. The Contractor shall obtain or execute any other document reasonably required by the Owner to protect the Intellectual Property of the Owner.

GC 3.11.03.08.01.07 Owner May Prescribe Further Compliance

- .01 The Owner reserves the right to prescribe the specific manner in which the Contractor shall perform its obligations relating to the Intellectual Property.

GC 3.11.03.08.01.08 Survival

- .01 The obligations contained in clause GC 3.11.03, Conditions of Change Proposals, shall survive the termination or expiry of the Contract.

GC 3.11.03.08.02 Owner Rights

- .01 In submitting a Change Proposal under this provision, the Contractor agrees to the following:
 - a) All plans, drawings, design reports, procedures, and programs prepared, conceived of, or produced or caused to be prepared, conceived of, or produced and delivered by or on behalf of the Contractor as part of an acceptable Change Proposal (the "Proposal") shall be the sole property of the Owner, except as otherwise provided below. The Contractor covenants that the Owner shall be the sole owner of the Proposal, and that none of such Proposal shall infringe the copyright, patent, or other right of any other Person.

For the purposes of the Copyright Act (Canada), the Contractor acknowledges that all Proposal shall be deemed to have been prepared under the direction and control of the Owner, and the copyright, except as otherwise provided below, shall belong to the Owner. The Contractor waives any moral rights it may have under the Copyright Act (Canada), concerning the Proposal.

All patents, copyrights, and other industrial and Intellectual Property rights, including trade secrets, arising in relation to the Proposal, if any, are hereby assigned to the Owner for its use, excepting any third party proprietary products, any licensed procedures, and any products licensed to a third party. Change Proposals shall clearly identify any third party proprietary

products and licensed products and procedures to be used as a part of a Change Proposal. The Contractor shall take all reasonable steps, including the steps the Contractor takes to protect information, data, or other tangible and intangible property the Contractor owns and regards as proprietary or confidential, to ensure that such proprietary rights of the Owner are not violated.

The Contractor shall obtain all required assignments and releases of interest, acknowledgments, or waivers that the Owner considers necessary or advisable to transfer title and publication rights in and to the Proposal to the Owner, unless accepted otherwise.

- b) The Owner hereby grants the Contractor a non-exclusive, royalty-free licence to use the Proposal for any and all purposes.
- c) Without limitation, the Owner acknowledges that the Contractor shall have the right to use for the Contractor's own purposes outside of this Contract, any novel ideas and concepts developed by the Contractor.
- d) The Contractor shall not be liable in any manner whatsoever for the claims arising as a result of the use by the Owner of the Proposal in connection with projects other than this Contract. Further, the Contractor cannot warrant the fitness of or be responsible or liable for any Proposal that are only partially completed due to early termination or suspension of this Contract by the Owner, or if same have been altered, revised, modified, or amended without the written consent and knowledge of the Contractor or if such Proposal have been provided to the Owner on computer devices with removable storage and used on improper or incompatible computer processing equipment.
- e) The rights and privileges of the Owner, and the licence in favour of the Contractor provided for in these MTO General Conditions of Contract shall survive and shall not merge on the termination or other expiry of this Contract.

GC 3.11.03.09 Time Periods for Review

- .01 Any Change Proposal shall include/document the anticipated change in the construction schedule and shall account for and clearly indicate the desired and reasonable time period for review of same by the Owner. When there is no time period specified with the Change Proposal for review of designs, methods, or Working Drawings in the Contract Documents that are applicable to the Change Proposal, the Owner shall, unless it accepts the times suggested in the Change Proposal, review the Change Proposal expeditiously. The actual duration shall depend on the complexity of the Change Proposal; however, within 5 Business Days of receipt of the Change Proposal, the Owner shall notify the Contractor in writing:
 - a) If the Change Proposal requires clarification or further supporting information, and
 - b) Of the expected time period for review.
- .02 The Contractor shall be notified in writing of the acceptance or rejection of the Change Proposal not more than 20 Business Days after a fully documented and supported Change Proposal is received. If the Change Proposal is rejected, the reasons for the rejection shall be stated.
- .03 If the Owner fails to respond to the Change Proposals within the desired review time suggested in the Change Proposal or within the time stated in the notification in paragraph GC 3.11.03.09.01, b), the Contractor shall consider the Change Proposal rejected, and shall have no claim against the Owner as a result thereof.

GC 3.11.03.10 Risk Sharing/Warranty

- .01 As part of a Change Proposal, the Contractor shall outline and thoroughly explain warranties and other measures offered to reduce the Owner's risks, thus encouraging adoption of a Change Proposal. Shared risks and all risks that the Contractor is not prepared to accept shall also be outlined.

GC 3.11.04 Submission of Change Proposals

- .01 The Contract Administrator shall be notified of the Contractor's intention to submit a Change Proposal at least 5 Business Days before a Change Proposal is submitted.
- .02 Change Proposals shall be identified as Change Proposals submitted under subsection GC 3.11, Change Proposals after Contract Award, and shall include a completed standard cover sheet, the Owner standard forms, and the following:
- a) A description of the proposed Change Proposal, and the related design or redesign costs;
 - b) A detailed list of the Contract requirements that change, if the Change Proposal is adopted;
 - c) The tender items affected by the proposed changes, including any quantity variation, and any new items, applicable Standards, Special Provisions, and quantities;
 - d) A detailed estimate of the Contractor's cost of performing the work under the existing Contract, and under the proposed Change Proposals;
 - e) A description of the comparative advantages and disadvantages of the Change Proposals;
 - f) A revised construction schedule and an application for extension of Contract Time, if applicable; and
 - g) Completed Owner's Standard Change Proposal Forms and procedures shall be used, and shall document and support, for acceptance/review purposes, any Change Proposals.
- .03 Any aspect of a Change Proposal that involves or may involve (e.g., preliminary Change Proposal designs prepared for approval in principle) doing work or an act that is within the practice of professional engineering shall be designed by an Engineer and shall bear the seal and signature of the Engineer. Whatever the Contract specifies regarding stamp occurrences for such design work, the same requirement shall apply to designs or redesigns for a Change Proposal.

GC 3.11.05 Accepted Change Proposal Payment

- .01 If a Change Proposal is acceptable to the Owner, the changes and payment related to the savings thereto shall be authorized by means of a Change Order to the Contract. Compensation to the Contractor shall be made as follows:
- a) The Contractor's costs for development work (i.e., any preliminary work up to Owner acceptance in principle of a Change Proposal related to the Change Proposals) shall not be eligible for reimbursement.
 - b) The items for a Change Proposal shall become guaranteed maximum price items. Change proposal savings sharing shall be calculated as outlined in paragraph GC 3.11.05.01, c), and be shared equally between the Contractor and Owner; the Change Proposal design or redesign cost as agreed with MTO as acceptance in principle of the Change Proposal shall be fully reimbursed to the Contractor.

- c) Change Proposal net construction cost savings Change Sharing payment shall be based on the following: the original directly related tendered construction price minus the price proposed (bid) to construct the Change Proposal and minus the cost of the Change Proposal design or redesign accepted by the Owner as a Change Proposal approval in principle. In addition to the shared savings payment total and the tendered price payment for the construction of redesigned Change Proposal work, the Contractor shall be reimbursed 100% for the price of the new Change Proposal design or redesign as agreed upon as acceptance of a Change Proposal in principle.
- d) Unless otherwise specified in writing by the Contractor and agreed upon with the Owner, the Contractor's share of the change sharing savings shall be paid according to the following schedule: 50% of the Contractor's share of the agreed change sharing savings shall be paid as a part of the Owners progress payment following the Owner's acceptance of a Change Proposal in principle; the remaining Change Proposal costs shall be paid according to the percentage of Change Proposal work completed over the duration of the work of the Change Proposal. The Contractor shall indicate, as a part of the Change Proposal, what items shall be used for each Change Proposal, shall get agreement with the Owner regarding such items, and shall outline, in the Change Proposal, any payment schedule that differs from clause GC 3.11.05, Accepted Change Proposal Payment.
- e) The Contractor may submit any Change Proposals for an approved Subcontractor provided that reimbursement shall be made by the Owner to the Contractor; the terms of the pass through to the Subcontractor shall have been satisfactorily negotiated between the Contractor and the Subcontractor, and be accepted by both before the Change Proposal is submitted to the Owner.

GC 3.12 Notices

- .01 The Contractor and the Owner shall provide each other with the mailing addresses, telephone numbers, facsimile terminal numbers, and email addresses for the Contract Administrator and the Superintendent at the commencement of the Work.
- .02 Any notice permitted or required to be given to the Owner or the Contractor shall be given according to the notice provision of the Agreement.
- .03 In the event of an emergency situation or other urgent matter the Contract Administrator or the Superintendent may give a verbal notice, provided that such notice is confirmed in writing.
- .04 Any document permitted or required to be given to the Contract Administrator or the Contractor in respect of the Work shall be deemed to have been given to and received by the addressee on the date of delivery, if delivered by hand or by electronic transmission, and on the third Business Day after the date of mailing, if sent by mail.

GC 3.13 Use and Occupancy of the Work Prior to Substantial Performance

- .01 Where it is not contemplated elsewhere in the Contract Documents, the Owner may use or occupy the Work or any part thereof prior to Substantial Performance, provided that at least 30 Days written notice has been given to the Contractor.
- .02 The use or occupancy of the Work or any part thereof by the Owner prior to Substantial Performance shall not constitute an acceptance of the Work or parts so occupied. In addition, the use or occupancy of the Work shall not relieve the Contractor or the Contractor's Surety from any liability that has arisen, or may arise, from the performance of the Work according to the Contract Documents. The Owner shall be responsible for any damage that occurs because of the Owner's use or occupancy. Such use or occupancy of any part of the Work by the Owner does not waive

the Owner's right to charge the Contractor liquidated damages according to the terms of the Contract.

GC 3.14 Clarification and Claims

GC 3.14.01 Claim Resolution Approach

- .01 The parties agree to make reasonable good faith efforts to resolve any Claim arising out of the Contract by following the procedures set out in the Contract before resorting to the commencement of a legal proceeding. In this regard, the parties recognize the mutual desire of each of them to resolve the Claim in a timely manner and to exchange such appropriate information relied upon by them for the purpose of engaging in confidential settlement negotiations in order to facilitate resolution of the Claim.
- .02 All Claims shall be addressed according to the Claim Review Process set out in clause GC 3.14.07. Each level of the process shall be completed before the next level or another form of resolution is initiated.
- .03 Unresolved Claim submissions that are submitted to the next level of the Claims Review Process shall be comprised of only the original Notice of Claim submission according to paragraph GC 3.14.05.02 and other information according to paragraphs GC 3.14.05.03 and GC 3.14.05.04, which together was considered by the Owner prior to issuing its decision at the previous Claims Review Process level.
- .04 If both parties mutually agree before the expiry of any time period specified for resolving a Claim, then the parties may extend such time to make a decision.
- .05 Any offer of settlement becomes null and void, and shall not be considered an undisputed value, when either party requests that the claim review proceed to the next level of the Claim Review Process, the Referee Process, or to other forms of Alternative Dispute Resolution.
- .06 Both parties shall conduct, without prejudice, negotiations as part of the Claim review, and they agree not to disclose in any subsequent legal proceeding, any statements made, and documents or information obtained during the course of the Claim review and at any of three levels of the Claim Review Process and/or the Referee Process that is not otherwise required to be disclosed by law.
- .07 Notwithstanding that the Claim is not resolved, the Contractor shall proceed with the Work to completion with due diligence and in an expeditious manner and such action shall not prejudice the Contractor in respect of any Claim it may have. The Contractor is not relieved from complying with any direction, order, Change Order, or Work Directive that is the subject of the Claim.

GC 3.14.02 Request for Clarification

- .01 The Contractor shall immediately submit a RFC, in writing, on the Owner standard form PH-CC-750, Request for Clarification, when the Contractor becomes aware of or ought to be aware of any of the following:
 - a) A situation that is different than represented in the Contract Documents.
 - b) A Change Order where the Contractor disagrees with the basis of payment.
 - c) A situation where the Contractor believes the Contract Documents to be ambiguous.
 - d) Disagreement with Owner audit results.

The RFC shall include a clear description of the situation with specific references to the Contract Documents. Notwithstanding the Contractor's RFC, the Contractor shall proceed with the work as directed by the Contract Administrator.

- .02 Prior to the expiry of 30 Business Days from the date of receipt of the RFC, the Contract Administrator shall provide a written response to the Contractor explaining the rationale and basis of the Contract Administrator's position to the RFC which shall be deemed to be the initial site response.

GC 3.14.03 Extension of Contract Time or Interim Completion Date Requests

- .01 Prior to the expiry of 30 Business Days from the date of receipt of the Extension of Time Request, the Contract Administrator shall provide a written response to the Contractor explaining the rationale and basis of the Contract Administrator's position to the Extension of Time Request which shall be deemed to be the initial site response.

GC 3.14.04 Change Order Price Negotiations

- .01 Prior to the expiry of 30 Business Days from the date of receipt of Change Order, the Contract Administrator shall provide a written response to the Contractor stating the Contract Administrator's final price for the Change Order and an explanation of the rationale and basis of the Contract Administrator's position which shall be deemed to be the initial site response.
- .02 Immediately after the Change Order has been provided to the Contractor, Daily Work Records shall be prepared by the Contractor.

GC 3.14.05 Notice of Claim

- .01 In the event that a matter remains unresolved and the Contractor wishes to pursue a Claim through the Claim Review Process, within 15 Business Days of receipt of the Contract Administrator's initial site response regarding an RFC, an Extension of Time Request, or a Change Order price negotiation, the Contractor shall provide a written notice of its intent to submit a Claim to the Contract Administrator, which notice shall be referred to as the "Initial Notice". The "Initial Notice" shall reference the original RFC number, the original Change Order number, or the original Extension of Time Request number and contain a brief description of the circumstances of the reasons for the Claim.
- .02 The Contractor shall then within 15 Business Days from the date of the "Initial Notice" provide a detailed written paper Claim submission package to the Contract Administrator and that Claim submission package shall be referred to as the Notice of Claim. The Contractor shall ensure that the Notice of Claim contains, as a minimum, sufficient information under the headings described below to permit a detailed review by the Contract Administrator:
 - a) Contract number and description;
 - b) Claim title;
 - c) Name of Contractor;
 - d) Request for Clarification number and Notice of Claim date;
 - e) Date on which the circumstances arose that gave rise to the Claim;
 - f) Detailed description of the nature of the Claim with dates, location, Materials, and Equipment involved and any other items relevant to the Claim;

- g) Relevant provisions of the Contract which support the Claim and the reasons these provisions are relevant, including work affected by the Claim, areas of work incurring additional costs and the change from the tendered Contract;
- h) Name of each official, representative, or employee of the Owner involved in or knowledgeable about the Claim;
- i) Name of each official, representative, or employee of the Contractor or Subcontractor, supplier, or other persons involved in or knowledgeable about the Claim;
- j) Schedule changes as a result of the Claim shall be identified and shall include the supporting critical path updates that have been previously submitted as part of the Notice of Claim. If the Contractor sought an extension of Contract Time, the Contractor shall provide the particulars of the extension and the reasons.
- k) Summary of proven actual or estimated additional costs, including direct labour, Material, and Equipment costs and Subcontractor costs.
- l) Summary of proven indirect costs or estimated indirect costs, including standby, site overhead, and impact costs;
- m) Copies of all supporting documentation and records of the Contractor applicable to the Claim, including the following:
 - i. Instruction Notices
 - ii. Change Orders
 - iii. Daily Work Records as set out in clause GC 8.03.02, Daily Work Records
 - iv. Email correspondence between the Contract Administrator/Owner and the Contractor
 - v. Production rates
 - vi. Minutes of meetings
- n) Any other information deemed necessary or appropriate by the Contractor.

.03 The Contractor shall not be permitted to change the Notice of Claim after it has been submitted to the Contract Administrator.

Subsequent to the Contractor filing the Notice of Claim, the Contractor shall be permitted to submit to the Contract Administrator the following:

- a) Additional information that supports the Claim;
- b) Information requested by the Owner during the Field, Regional or Provincial Levels of the Claim Review Process.
- c) Updated, actual or additional cost information of items contained in the original Notice of Claim as those costs become available during the Claim Review Process and the Referee Process.

The above information shall be clearly labelled with the original Notice of Claim title and number, and tracked by an indexed transmittal completed by the Contractor.

.04 When the Contractor completes the work associated with the Claim and the Claim remains unresolved, then the Contractor shall provide details of the actual costing of the items detailed in the original Notice of Claim in writing to the Contract Administrator and also to the appropriate respective Claim Review Process level or to the Referee within 30 Business Days after completion of the affected work.

- .05 The Contractor is solely responsible for ensuring that it has provided all the information required in the RFC, according to clause GC 3.14.02, Request for Clarification, and the Notice of Claim, according to clause GC 3.14.05, Notice of Claim.
- .06 The Contractor's failure to provide any notices as required shall result in the waiver of any Claim and the loss of compensation to the Contractor in respect of such Claim. However, if the Contractor provides the Owner with an explanation for the delay in providing these notices, which the Owner, in its sole discretion, can accept or reject for any reason, then, if the explanation is accepted, the Owner shall review the Claim according to the procedures set out herein. This provision shall not be interpreted so as to compel the Owner to review every Claim of the Contractor or any other person that does not comply with the requirements of the Contract, but rather is intended to allow the Owner the ability to consider those Claims that have failed to comply with the procedures and where the Owner, at its sole discretion, desires to consider such a Claim.

GC 3.14.06 Daily Work Records

- .01 After the RFC, Change Order, or Extension of Time Request is provided, the Contractor shall immediately:
 - a) Begin to keep Daily Work Records relating to the RFC, Change Order, or Extension of Time Request as the work is performed, according to clause GC 8.03.02, Daily Work Records.
 - b) Limit such Daily Work Records to the work directly impacted by the RFC, Change Order, or Extension of Time Request.
 - c) Keep separate Daily Work Records for each individual RFC, Change Order, or Extension of Time Request.
- .02 The keeping of Daily Work Records by the Contractor and any process to review or comment on those records shall not be construed to be the Owner's acceptance of the Claim for additional payment to which the Daily Work Records relate.

GC 3.14.07 Claim Review Process

- .01 Unless the Claim is resolved, the Claim review shall proceed through the Claim Review Process as follows:
 - a) Field Level; between the Contractor and the Contract Administrator;
 - b) Regional Level; between the Contractor and the Regional Manager, Operations Office where the Contract work is being performed;
 - c) Provincial Level; between the Contractor and the Manager, Claims Office within the Contract Management and Operation Branch.

GC 3.14.08 Claim Review Process – Field Level

- .01 Where the Contractor desires to pursue the Claim to the Field Level, upon receipt of the Notice of Claim from the Contractor, the Contract Administrator shall make reasonable efforts to try to negotiate resolution of the Claim at the earliest opportunity.
- .02 Prior to the expiry of 30 Business Days from the receipt of the Contractor's Notice of Claim the Contract Administrator shall provide the Contractor with a written Field Level decision on the Claim. If the Claim is denied in whole or in part at the Field Level, the Contract Administrator shall provide the Contractor with a written explanation of the rationale and basis of the Field Level decision.

- .03 The Contractor shall then be permitted up to 15 Business Days from the receipt of the Contract Administrator's response to accept or reject the Field Level decision regarding the Contractor's Notice of Claim.
- .04 If the Contractor rejects the decision of the Contract Administrator, then the Contractor can elect to have the Claim submitted to the Regional Level or request that the Claim proceed to the Referee Process.
- .05 If the Contractor elects to elevate their Claim to the Regional Level then within 15 Business Days of receipt of the written Field Level decision on the Claim, the Contractor shall submit to the Regional Manager, Operations Office the originally submitted Notice of Claim according to paragraph GC 3.14.05.02 and additional information that was submitted according to paragraphs GC 3.14.05.03 and GC 3.14.05.04 and all upon which the Field Level decision was made.
- .06 The Contractor shall send a duplicate copy of the Claim submission sent to the Regional Level according to paragraph GC 3.14.08.05 to the Contract Administrator (Field Level) on the same day that it is sent to the Regional Level.
- .07 If the Contractor elects to have their Claim submitted to the Referee Process then the Contractor shall so instruct the Contract Administrator in writing within 15 Business Days of the receipt date of the written decision from the Field Level.
- .08 If the Contractor elects to submit the Claim to the Referee Process then within 15 Business Days of receipt of the written Field Level decision on the Claim the Contractor shall submit to the Referee Roster Administrator the originally submitted Notice of Claim according to paragraph GC 3.14.05.02 and any additional information that was submitted to the Field Level according to paragraphs GC 3.14.05.03 and GC 3.14.05.04.
- .09 The Contractor shall send a duplicate copy of the Claim sent to the Referee Roster Administrator according to paragraph GC 3.14.08.08 to the Contract Administrator (Field Level) on the same day that the Claim is sent to the Referee Roster Administrator.
- .10 All Referee processes and timing of all Referee submissions shall be made according to the Owner standard form PH-CC-751, Referee Services Agreement, or Owner standard form PH-CC-752, Referee Services Panel Agreement, and any mutually agreed upon amendments thereto.

GC 3.14.09 Claims Review Process – Regional Level

- .01 The Regional Manager, Operations Office shall have 15 Business Days from the receipt of the Contractor's Notice of Claim to either begin the review of the Claim or refer the Claim to the Referee Process.
- .02 If the Regional Manager, Operations Office elects to review the Claim then prior to the expiry of 60 Business Days from the receipt of the Contractor's Notice of Claim at the Regional Level, the Regional Manager shall provide the Contractor with a written decision, either;
 - a) Accepting the position of the Contractor on the Claim;
 - b) Making an offer to settle the Claim; or,
 - c) Rejecting the position of the Contractor according to the Claim. If applicable, provide additional reasons for rejecting the Claim if not previously provided to the Contractor.
- .03 The Contractor shall be permitted up to 15 Business Days from the receipt of the Regional Level written decision to accept or reject the Region's decision on the Contractor's Claim.

- .04 If the Contractor rejects the decision of the Regional Level, then the Contractor may elect to have the Claim elevated to the Provincial Level or submitted to the Referee Process.
- .05 If the Contractor elects to have the Claim elevated to the Provincial Level then within 15 Business Days of receipt of the Regional Manager, Operations Office written decision on the Claim, the Contractor shall submit to the Manager, Claims Office the originally submitted Notice of Claim according to paragraph GC 3.14.05.02; and additional information that was submitted to the Regional Level as set out in paragraphs GC 3.14.05.03 and GC 3.14.05.04.
- .06 The Contractor shall send an exact duplicate copy of the Claim sent to the Provincial Level to the Regional Level according to paragraph GC 3.14.09.05 on the same day that it is sent to the Provincial Level.
- .07 If the Contractor elects to have the Claim submitted to the Referee Process, then the Contractor shall instruct the Regional Manager, Operations Office accordingly in writing within 15 Business Days of the receipt date of the written decision from the Regional Level.
- .08 If the Contractor elects to have the Claim submitted to the Referee Process then within 15 Business Days of receipt of the Regional Manager, Operations Office written decision on the Claim, the Contractor shall submit to the Referee Roster Administrator the originally submitted Notice of Claim according to paragraph GC 3.14.05.02; and, additional information that was submitted to the Regional Level according to paragraphs GC 3.14.05.03 and GC 3.14.05.04. The Referee submission may include additional supporting information according to the Owner standard form PH-CC-751, Referee Services Agreement, or Owner standard form PH-CC-752, Referee Services Panel Agreement. The Owner may provide a written submission to the Referee in response to the Contractor's submission.
- .09 The Contractor shall send an exact duplicate copy of the Referee Submission sent to the Referee Roster Administrator according to paragraph GC 3.14.09.08 to the Regional Level on the same day that the Claim is sent to the Referee Roster Administrator.
- .10 If the Regional Manager, Operations Office elects to have the Claim submitted to the Referee Process, then the Region shall instruct the Contractor accordingly in writing within 15 Business Days of the receipt date of the Claim at the Regional Level.
- .11 If the Regional Manager, Operations Office elects to submit the Claim to the Referee Process, then the Region shall send to the Contractor an exact duplicate copy of the Referee Submission sent to the Referee Roster Administrator on the same day that the Claim is sent to the Referee Roster Administrator. The Contractor may provide a written submission to the Referee in response to the ministry's submission.
- .12 All Referee processes and timing of all Referee submissions shall be according to the Owner standard form PH-CC-751, Referee Services Agreement, or Owner standard form PH-CC-752, Referee Services Panel Agreement, and any mutually agreed upon amendments thereto.

GC 3.14.10 Claims Review Process – Provincial Level

- .01 The Manager, Claims Office shall have 15 Business Days from the receipt of the Contractor's Notice of Claim to either begin the review of Notice of Claim or to request the Referee Process.
- .02 If the Manager, Claims Office elects to review the Claim then prior to the expiry of 60 Business Days from the receipt of the Contractor's Notice of Claim at the Provincial Level, the Manager, Claims Office shall provide the Contractor with a written decision, either;
 - a) Accepting the position of the Contractor on the Claim;

- b) Making an offer to settle the Claim; or,
 - c) Rejecting the position of the Contractor as set out in the Claim. If applicable, provide additional reasons for rejecting the Claim if not previously provided to the Contractor.
- .03 The Contractor shall be permitted up to 15 Business Days from the receipt of the Provincial Level written decision to accept or reject the Provincial Level decision regarding the Contractor's Claim.
 - .04 If the Contractor rejects the decision of the Provincial Level, then the Contractor can request the Referee Process. Notification of the desire to request the Referee Process must be received by the Manager, Claims Office in writing within 15 Business Days of the receipt by the Contractor of the Provincial Level written decision.
 - .05 If the Contractor elects to have the Claim submitted to the Referee Process, then the Contractor shall submit to the Referee Roster Administrator the originally submitted Notice of Claim according to paragraph GC 3.14.05.02; and, additional information that was submitted according to paragraphs GC 3.14.05.03 and GC 3.14.05.04, and all upon which the Provincial Level decision was made. The Referee submission may include additional supporting information according to the Owner standard form PH-CC-751, Referee Services Agreement, or Owner standard form PH-CC-752, Referee Services Panel Agreement. The ministry may provide a written submission to the Referee in response to the Contractor's submission.
 - .06 The Contractor shall send an exact duplicate copy of the Referee Submission sent to the Referee Roster Administrator according to paragraph GC 3.14.10.05 to the Manager, Claims Office on the same day that the Claim is submitted to the Referee.
 - .07 If the Manager, Claims Office elects to have the Claim submitted to the Referee Process, then the Manager, Claims Office shall instruct the Contractor accordingly in writing within 15 Business Days of the receipt date of the Contractor's Claim at the Provincial Level.
 - .08 If the Manager, Claims Office elects to submit the Claim to the Referee Process, then the Manager, Claims Office shall send to the Contractor an exact duplicate copy of the Referee Submission sent to the Referee Roster Administrator on the same day that the Claim is sent to the Referee Roster Administrator. The Contractor may provide a written submission to the Referee in response to the ministry's submission.
 - .09 All Referee processes and timing of all Referee submissions shall be according to the Owner standard form PH-CC-751, Referee Services Agreement, or Owner standard form PH-CC-752, Referee Services Panel Agreement, and any mutually agreed upon amendments thereto.

GC 3.14.11 Owner Rights

- .01 The Contractor's failure to provide the written notification for the next Level of the Claim Review Process, according to clause GC 3.14.07, Claim Review Process, and clauses GC 3.14.08, Claim Review Process – Regional Level, GC 3.14.09, Claim Review Process – Regional Level, 3.14.10, Claim Review Process – Provincial Level, and GC 3.14.13, Referee Process, shall preclude the Contractor from later seeking such further review of the Claim and shall constitute an abandonment of the Claim and the loss of any compensation to the Contractor not previously agreed upon by the Owner in respect of such Claim. However, if the Contractor provides the Owner with an explanation for the failure to provide the written notification for the next level of Claim review including the Referee Process, which the Owner, in its sole discretion, can accept or reject for any reason, then, if the explanation is accepted, the Owner shall review the Claim or agree to proceed to the Referee Process according to the procedures set out herein.

This provision shall not be interpreted so as to compel the Owner to review every Claim of the Contractor or any other person that does not comply with the requirements of the Contract including

the Referee Process, but rather is intended to allow the Owner the ability to consider those Claims that have failed to comply with the procedures and where the Owner, at its sole discretion, desires to consider such a Claim either internally or through the Referee Process.

- .02 If the Owner requests additional information from the Contractor to justify the Claim, then the calculation of time set out in paragraphs GC 3.14.08.02, GC 3.14.09.02 and GC 3.14.10.02, to render a decision shall cease from the date of the request, until the Contractor has provided the information or a statement that it does not intend to provide the information. This waiting period is limited to 20 Business Days. If no further information is received within that time frame, the Owner shall issue the written decision regarding the Notice of Claim based on the information provided with the Contractor accepting the risk of the Owner making an adverse decision by reason of the lack of the requested information.
- .03 If the Owner fails to resolve or make a decision on the Claim within the times detailed within paragraphs GC 3.14.08.02, GC 3.14.09.02 and GC 3.14.10.02, then the Contractor, if the Contractor so chooses, may elevate the Claim to the next Level of the Claim Review Process or request the use of the Referee Process. In all such situations, the Contractor shall provide the RFC, according to clause GC 3.14.02, Request for Clarification, and the Notice of Claim, according to clause GC 3.14.05, Notice of Claim, or required notification of the desire to proceed to the next Level according to clause GC 3.14.07, Claim Review Process, or to proceed to the Referee Process, depending on status of the Claim review.
- .04 Justification of the Claim and completing the Notice of Claim to the satisfaction of the Owner is the full responsibility of the Contractor, failing which, the Owner shall rely upon the information provided by the Contractor to review the Claim at the risk of the Owner making an adverse decision by reason of the lack of supporting information.

GC 3.14.12 Contractor Rights

- .01 Where a decision is not received from the Field, Regional or Provincial Office Levels of the Claim Review Process within the specified time period as may be extended by mutual agreement, the Claim shall be assumed to be denied, whereupon the Contractor may request to have their Claim submitted to the next Level of the Claim Review Process or to request the Referee Process.

GC 3.14.13 Referee Process

GC 3.14.13.01 Commencement

- .01 The Referee Process can be initiated by the Contractor after the conclusion of any level of the Claims Review Process, according to clauses GC 3.14.08, Claim Review Process – Field Level, GC 3.14.09, Claim Review Process – Regional Level, or GC 3.14.10, Claim Review Process – Provincial Level.
- .02 The Referee Process can be initiated by the Owner once the Notice of Claim is received at Regional or Provincial Levels of the Claim Review Process from the Contractor according to paragraphs GC 3.14.09.07 or GC 3.14.10.07.
- .03 If at any level in the Claim Review Process, the Contractor or the Owner initiates the Referee Process; then they shall have departed from the Claim Review Process and shall not be permitted to return to it, because the Claim Review Process shall be deemed to have been concluded. For greater clarity, the Claim Review Process shall not be used after the Notice of Claim has been submitted to the Referee Roster Administrator.

GC 3.14.13.02 Number of Referees

- .01 For amounts of less than \$750,000, the Claim shall be decided by one Referee.

- .02 For amounts equal to or greater than \$750,000, the Claim shall be decided by a three member Referee panel.
- .03 If the parties mutually agree, a Notice of Claim equal to or greater than \$750,000 may be decided by a single Referee.

GC 3.14.13.03 Referee Selection

- .01 According to the Owner standard form PH-CC-752, Referee Services Panel Agreement, for the selection of a Referee located on www.raqs.merx.com, incorporated by reference herein, both parties agree to cooperate with the Referee Roster Administrator, who shall facilitate the selection of a one-person Referee or a three-person Referee Panel for each Claim.
- .02 The parties understand and agree that the Referee shall be neutral, act impartially, and not have any conflict of interest to the Claim before or during their service as a Referee, unless such interest is fully disclosed in writing to the parties and both parties agree that the individual may serve as a Referee.

GC 3.14.13.04 Referee Services Agreement

- .01 If the Claim is to be decided by a one-person referee, both parties shall agree to the terms and conditions of the Owner standard form PH-CC-751, Referee Services Agreement, subject to any mutually agreed upon amendments thereto. The Contract Administrator shall fill out the Referee Services Agreement and provide it to the Contractor for signing.
- .02 If the Claim is to be decided by a three-person referee panel, both parties shall agree to the terms and conditions of the Owner standard form PH-CC-752, Referee Services Panel Agreement, subject to any mutually agreed upon amendments thereto with the selected Referee, which establishes the scope of authority of the Referee panel to conduct an independent neutral review of the Claim and which defines how the Referee Process shall operate. The Contract Administrator shall fill out the Referee Services Panel Agreement and provide it to the Contractor for signing.

GC 3.14.13.05 Referee Meetings

- .01 The parties agree that the Referee shall request and schedule a meeting that both parties shall attend in person.
- .02 It is understood and agreed by the parties that the purpose of the meeting is for the Referee to obtain clarification as deemed necessary by the Referee from either party to decide on the Claim.
- .03 The Referee meeting shall not be conducted as a formal presentation/hearing, but as a meeting for the Referee to seek clarification and ask questions of either party.
- .04 The parties understand and agree that the Referee shall have the authority to request and receive additional relevant information as may be necessary for the Referee to make a decision.
- .05 Both parties agree that legal counsels for either party may attend the Referee meeting but are not permitted to address the Referee.
- .06 The overall format of the Referee meeting shall be established solely by the Referee.

GC 3.14.13.06 Submissions to Referee

- .01 The Referee shall conduct the review according to the terms of the Owner standard form PH-CC-751, Referee Services Agreement, or Owner standard form PH-CC-752, Referee Services Panel Agreement, and any mutually agreed upon amendments thereto.
- .02 Both parties shall provide relevant information according to the Owner standard form PH-CC-751, Referee Services Agreement, or Owner standard form PH-CC-752, Referee Services Panel Agreement, and/or as requested by the Referee to allow a decision of the Claim to be made by the Referee but subject to the right of any party to deny the request for such information.
- .03 Subject to the terms and conditions described in the Contract Documents or the Owner standard form PH-CC-751, Referee Services Agreement, or Owner standard form PH-CC-752, Referee Services Panel Agreement, and any mutually agreed upon amendments thereto, both parties shall co-operate with the Referee's reasonable requirements as best as possible to complete the Referee Process as soon as possible and by no longer than 90 Business Days.

GC 3.14.13.07 Referee Decision

- .01 The Referee's decision shall be provisionally binding on both parties subject to the right of either party to protest the decision as set out herein and the Owner standard form PH-CC-751, Referee Services Agreement, or Owner standard form PH-CC-752, Referee Services Panel Agreement, and any mutually agreed upon amendments thereto.
- .02 Both parties shall agree to abide by the Referee decision according to the procedures set out in the Owner standard form PH-CC-751, Referee Services Agreement, or Owner standard form PH-CC-752, Referee Services Panel Agreement, and any mutually agreed upon amendments thereto and to comply with the decision of the Referee without delay from the date of the Referee decision. It is understood and agreed that such compliance is without prejudice to a party to protest the decision as described herein or in the Referee Services Agreement.
- .03 Referee decisions may be reviewed by either party by filing a Notice of Protest within 30 Business Days of the date of the Referee decision. Such reviews shall be dealt with according to clause GC 3.14.14, Further Avenues of Dispute Resolution, which shall not commence until the date of Contract Completion and no later than 2 years after the date of Contract Completion.
- .04 Decisions of the Referee shall be final and binding on both parties in the absence of the issuance of a Notice of Protest by either party within 30 Business Days following the date of the Referee decision. Notwithstanding submission of a Notice of Protest, both parties shall abide by the decision of the Referee ruling and carry out the decision without delay.

GC 3.14.13.08 Referee Fees and Costs

- .01 Each party is required to pay their own expenses and costs associated with the Referee process.
- .02 Each party shall also be required to pay an equal share of the Referee fees and expenses and an equal share of the Referee Roster Administrator's expenses and costs associated with selecting the Referee.
- .03 For purposes of payment of the Referee, the Contractor shall pay the total Referee fees to the Referee when due and then the Owner shall reimburse Contractor for one- half of those fees through payments under the Contract.
- .04 For purposes of payment of the Referee Roster Administrator, the Owner shall pay the total Referee Roster Administration fees to the Referee Roster Administrator when due and then Owner

shall charge the Contractor one half of those fees through a deduction against payments on the Contract.

GC 3.14.14 Further Avenues of Dispute Resolution

- .01 If the parties fail in their efforts to resolve the Claim, and neither party elected to refer the Claim to the Referee Process prior to or after completion of the Provincial Level, then Referee Process shall be used by the parties prior to resorting to further alternative dispute resolution methods. In this case the Contractor shall provide written notice to the Manager, Claims Office, Provincial Highways Management, of the Contractor's request to use the Referee Process within 15 Business Days of the decision of the Owner's Provincial Level of claim review.
- .02 If the parties fail in their efforts to resolve the Claim then the parties agree that prior to resorting to litigation they may explore further alternative dispute resolution methods that are acceptable to the Owner. The Contractor shall provide written notice to the Manager, Claims Office, Provincial Highways Management, of the desire to explore further alternative dispute resolution methods within 30 Business Days of the Contract Completion date if the Referee decision was protested according to paragraph GC 3.14.13.07.03. The parties agree to explore all avenues of alternative dispute resolution and shall attempt to negotiate the method and the terms for the alternative dispute resolution in an effort to settle the Claim before resorting to litigation. If the parties are unable to agree upon an alternative dispute resolution method and its terms within 60 Business Days of the request to explore alternative dispute resolution, then either party may resort to litigation.

SECTION GC 4.0 - OWNER'S RIGHTS AND RESPONSIBILITIES

GC 4.01 Working Area

- .01 The Owner shall acquire all property rights which are deemed necessary by the Owner for the construction of the Work, including temporary working easements, and shall indicate the full extent of the Working Area on the Contract Drawings.

GC 4.02 Management of Excess Materials

- .01 The Owner shall identify in the Contract Documents the materials to be moved within or removed from the Working Area, and any characteristics of those materials which shall necessitate special materials management and disposition.
- .02 The Owner shall be responsible for any additional costs of removal, management, and disposition of any material not identified in the Contract Documents, or where conditions exist that could not have been reasonably foreseen at the time of tendering.

GC 4.03 Construction Affecting Railway Property

- .01 When construction affects railway property, the Owner shall pay the costs of all flagging and other traffic control measures required and provided by the railway company within the Working Area.

GC 4.04 Default by the Contractor

- .01 The Contractor shall be in default of the Contract if:
 - a) The Contractor fails to commence the Work or execute the Work properly or otherwise fails to comply with the requirements of the Contract to a substantial degree; or
 - b) If the Contractor is adjudged bankrupt or makes a general assignment for the benefit of creditors because of insolvency or if a receiver is appointed because of insolvency.

GC 4.05 Notification of Default

- .01 The Owner shall give written notice of a default to the Contractor as soon as the Owner becomes aware of the alleged default, but failure to give such notice in a timely way shall not constitute acceptance of the default. The notice shall include instructions to correct the default within 5 Business Days.

GC 4.06 Contractor's Right to Correct a Default

- .01 The Contractor shall have the right within the 5 full Business Days following the receipt of a notice of default to correct the default and provide the Owner with satisfactory proof that appropriate corrective measures have been taken.
- .02 If the correction of the default cannot be completed within the 5 full Business Days following receipt of the notice, the Contractor shall not be in default if the Contractor:
 - a) Commences the correction of the default within the 5 full Business Days following receipt of the notice;
 - b) Provides the Owner with an acceptable schedule for the progress of such correction; and
 - c) Completes the correction according to such schedule.

GC 4.07 Owner's Right to Correct Default

- .01 If the Contractor fails to correct the default within the time specified in subsection GC 4.06, Contractor's Right to Correct a Default, or subsequently agreed upon, the Owner, without prejudice to any other right or remedy the Owner may have, may correct such default and deduct the cost thereof, as certified by the Contract Administrator, from any payment then or thereafter due to the Contractor.

GC 4.08 Termination of Contractor's Right to Continue the Work

- .01 Where the Contractor fails to correct a default within the time specified in subsection GC 4.06, Contractor's Right to Correct a Default, or subsequently agreed upon, the Owner, without prejudice to any other right or remedy the Owner may have, may terminate the Contractor's right to continue the Work in whole or in part by giving written notice to the Contractor.
- .02 If the Owner terminates the Contractor's right to continue with the Work in whole or in part, the Owner shall be entitled to:
- a) Take possession of the Working Area or that portion of the Working Area devoted to that part of the Work terminated;
 - b) Use the Contractor's Material within the Working Area which is intended to be incorporated into the Work, the whole subject to the right of third parties;
 - c) Withhold further payments to the Contractor with respect to the Work or the portion of the Work withdrawn from the Contractor until the Work or portion thereof withdrawn is completed;
 - d) Charge the Contractor the additional cost over the Contract price of completing the Work or portion thereof withdrawn from the Contractor, as certified by the Contract Administrator, and any additional compensation paid to the Contract Administrator for such additional service arising from the correction of the default;
 - e) Charge the Contractor a reasonable allowance, as determined by the Contract Administrator, to cover correction to the Work performed by the Contractor that may be required under subsection GC 7.18, General Warranty; and
 - f) Charge the Contractor for any damages the Owner may have sustained as a result of the default.

GC 4.09 Final Payment to Contractor

- .01 If the Owner's cost to correct and complete the Work in whole or in part is less than the amount withheld from the Contractor under subsection GC 4.08, Termination of Contractor's Right to Continue the Work, the Owner shall pay the balance to the Contractor as soon as the final accounting for the Contract is complete.

GC 4.10 Termination of the Contract

- .01 Where the Contractor is in default of the Contract, the Owner may, without prejudice to any other right or remedy the Owner may have, terminate the Contract by giving written notice of termination to the Contractor, the Surety, and any trustee or receiver acting on behalf of the Contractor's estate or creditors.
- .02 If the Owner elects to terminate the Contract, the Owner shall provide the Contractor and the trustee or receiver with a complete accounting to the date of termination.

GC 4.11 Continuation of Contractor's Obligations

- .01 The Contractor's obligation under the Contract as to quality, correction, and warranty of the Work performed prior to the time of termination of the Contract or termination of the Contractor's right to continue with the Work in whole or in part shall continue to be in force after such termination.

GC 4.12 Use of Performance Bond

- .01 If the Contractor is in default of the Contract and the Contractor has provided a Performance Bond, the provisions of section GC 4.0, Owner's Rights and Responsibilities, shall be exercised according to the conditions of the Performance Bond.

GC 4.13 Owner Audit

- .01 The Owner may inspect, review, and audit all Records associated with the Contract, including the Contractor's and Subcontractor's Records relating to the Work and Changes in the Work and Claims, at any time up to 24 months after releasing payment of the final holdback. The Contractor shall complete and submit to the Contract Administrator, the Owner standard form PH-CC-762, Subcontractor's Consent to Audit, for each Subcontractor employed by the Contractor.
- .02 The Contractor shall supply certified copies of any part of the Contractor's Records whenever requested by the Owner.
- .03 Where the inspection, review, and audit reveals discrepancies in payment, the Contractor shall be advised immediately. The Contractor shall have the opportunity to dispute these discrepancies by immediately submitting a Request for Clarification.
- .04 Upon agreement with the results, any monies payable to the Contractor shall be payable within 30 Days. Interest back to the time the amount became payable shall not be paid.
- .05 Upon agreement with the audit results, any monies due to the Owner shall be payable within 30 Days together with interest due from the time the amount was over paid. Where such amounts are not paid within 30 Days, the Owner shall setoff such monies owing the Contractor from other contracts.

SECTION GC 5.0 - MATERIAL

GC 5.01 Supply of Material

- .01 All Material necessary for the proper completion of the Work, except that listed as being supplied by the Owner, shall be supplied by the Contractor. The Contract prices for the appropriate tender items shall be deemed to include full compensation for the supply and delivery of such Material.

GC 5.02 Quality of Material

- .01 All Material provided by the Contractor shall be new, unless otherwise specified in the Contract Documents.
- .02 Material shall be supplied from sources identified in the MTO DSM available on TRA website <http://www.roadauthority.com> that is current at the time of supply of the product. If there are revisions to the DSM, these shall be posted on TRA website on the first Business Day of the months of February, April, June, August, October, and December. Material for which there is no category in the DSM shall be supplied according to the Contract Documents. Material which is not specified shall be of a quality best suited to the purpose required and the use of such Material shall be subject to the approval of the Contract Administrator.

Sources in the DSM have demonstrated their ability to produce material according to specified material specifications. However, the MTO does not warrant that these sources shall produce acceptable or sufficient Material for any contract. The Contractor shall make such independent investigation and examination as the Contractor deems necessary, to satisfy the Contractor as to the quality and quantity of the Material available from these sources, and to ensure that all Material supplied by them satisfies the requirements of the Contract Documents.

- .03 When specified in the Contract Documents or requested by the Contract Administrator, the Contractor shall make available for inspection or testing a sample of any Material to be provided by the Contractor.
- .04 The Contractor shall obtain for the Contract Administrator the right to enter upon the premises of the Material manufacturer or supplier to carry out such inspection, sampling, and testing as specified in the Contract Documents or as requested by the Contract Administrator.
- .05 The Contractor shall complete and submit, on Owner standard form PH-A-106, List of Materials from Designated Sources, to the Contract Administrator indicating where the Contractor intends to obtain the designated source materials for the Contract. The Contractor shall notify the Contract Administrator of the sources of supply of all Material sufficiently in advance of the Material shipping dates to enable the Contract Administrator to perform the required inspection, sampling, and testing.
- .06 The Owner shall not be responsible for any delays to the Contractor's operations where the Contractor fails to give sufficient advance notice to the Contract Administrator to enable the Contract Administrator to carry out the required inspection, sampling, and testing before the scheduled shipping dates.
- .07 Where the Standards require the Contractor to supply a Material designated by a trade or other name, the tender shall be based only upon supply of the Material so designated, which shall be regarded as the standard of quality required by the Standard.
- .08 Prior to the commencement of Work, the Contractor shall provide to the Contract Administrator a list of those products controlled under the Workplace Hazardous Material Information System (WHMIS) that the Contractor expects to use on the Contract. Related Material Safety Data Sheets shall accompany the submission. All containers used in the application of products controlled

under WHMIS shall be labelled. The Contractor shall notify the Contract Administrator of changes to the list in writing and provide relevant Material Safety Data Sheets.

- .09 When a Material or Material source is deleted from the DSM list of pre-qualified Materials or Material sources after the tender opening date, the Owner shall be responsible for the extra costs of Material supply only, unless the Material production or Material source is controlled by the Contractor or Subcontractor. If the type of Material or Material source is pre-qualified after the date of tender opening, permission to use the Materials or Material sources shall not be given until an agreement has been reached on the estimated value of the cost savings to the Owner.

GC 5.03 Rejected Material

- .01 Rejected Material shall be removed from the Working Area expeditiously after the notification to that effect from the Contract Administrator. Where the Contractor fails to comply with such notice, the Contract Administrator may cause the rejected Material to be removed from the site and disposed of in what the Contract Administrator considers to be the most appropriate manner, and the Contractor shall pay the costs of disposal and the appropriate overhead charges.

GC 5.04 Owner Supplied Material

GC 5.04.01 Ordering of Excess Material

- .01 Where Material is supplied by the Owner and where this Material is ordered by the Contractor in excess of the amount specified to complete the Work, such excess Material shall become the property of the Contractor on completion of the Work and shall be charged to the Contractor at cost plus 10% for administration.

GC 5.04.02 Care of Material

- .01 The Contractor shall, in advance of receipt of shipments of Material supplied by the Owner, provide adequate and proper storage facilities acceptable to the Contract Administrator; and, on the receipt of such Material, promptly place it in storage except where it is to be incorporated forthwith into the Work.
- .02 The Contractor shall be responsible for acceptance of Material supplied by the Owner, at the specified delivery point and for its safe handling and storage. If such Material is damaged while under the control of the Contractor, it shall be replaced or repaired by the Contractor at no expense to the Owner, and to the satisfaction of the Contract Administrator. If such Material is rejected by the Contract Administrator for reasons which are not the fault of the Contractor, it shall remain in the care and at the risk of the Contractor until its disposition has been determined by the Contract Administrator.
- .03 Where Material supplied by the Owner arrives at the delivery point in a damaged condition or where there are discrepancies between the quantities received and the quantities shown on the bills of lading, the Contractor shall immediately report such damage or discrepancies to the Contract Administrator who shall arrange for an immediate inspection of the shipment and provide the Contractor with a written release from responsibility for such damage or deficiencies. Where damage or deficiencies are not so reported, it shall be assumed that the shipment arrived in good order and any damage or deficiencies reported thereafter shall be made good by the Contractor at no extra cost to the Owner.
- .04 The full amount of Material supplied by the Owner in each shipment shall be accounted for by the Contractor and such Material shall be at the risk of the Contractor after taking delivery. Such Material shall not be used by the Contractor for purposes other than the Work under the Contract.

- .05 Empty reels, crates, containers, and other types of packaging from Material supplied by the Owner shall become the property of the Contractor when they are no longer required for their original purpose and shall be disposed of by the Contractor, unless otherwise specified in the Contract Documents.
- .06 The Contractor shall provide the Contract Administrator, immediately upon receipt of each shipment, copies of bills of lading, or such other documentation the Contract Administrator may require to substantiate and reconcile the quantities of Material received.
- .07 Where Material supplied by the Owner is ordered and stockpiled prior to the award of the Contract, the Contractor shall, at no extra cost to the Owner, immediately upon commencement of operations, check the Material, report any damage or deficiencies to the Contract Administrator, and take charge of the Material at the stockpile site. Where damage or deficiencies are not so recorded by the Contractor, it shall be assumed that the stockpile was in good order when the Contractor took charge of it and any damage or deficiencies reported thereafter shall be made good by the Contractor at no extra cost to the Owner.

SECTION GC 6.0 - INSURANCE, PROTECTION, AND DAMAGE

GC 6.01 Protection of Work, Persons, and Property

- .01 The Contractor, the Contractor's agents, and all workers employed by or under the control of the Contractor, including Subcontractors, shall protect the Work, persons, and property from damage or injury, and shall be responsible for all losses and damage which may arise as the result of the Contractor's operations under the Contract unless indicated to the contrary below.
- .02 The Contractor is responsible for the full cost of any necessary temporary provisions and the restoration of all damage, where the Contractor damages the Work or property in the performance of the Contract. If the Contractor is not responsible for the damage that occurs to the Work or property the Contractor shall restore such damage, and such work shall be administered according to these MTO General Conditions of Contract.
- .03 The Contractor shall immediately inform the Contract Administrator of all damage and injuries which occur during the term of the Contract.
- .04 The Contractor shall not be responsible for loss and damage that occurs as a result of:
 - a) War;
 - b) Blockades and civil commotion;
 - c) Errors in the Contract Documents;
 - d) Acts or omissions of the Owner, the Contract Administrator, the Owner's agents, officers, and employees, or others not under the control of the Contractor but are within the Working Area with the Owner's permission.
- .05 The Contractor and the Contractor's Surety or Sureties shall not be released from any term or provision of any responsibility, obligation, or liability under the Contract or waive or impair any of the rights of the Owner, except by a release duly executed by the Owner.

GC 6.02 Indemnification

- .01 The Contractor shall indemnify and hold harmless the Owner and the Contract Administrator, the Owner's agents, officers, and employees from and against all claims, demands, losses, expenses, costs, damages, actions, suits or proceedings by third parties, hereinafter called "claims", directly or indirectly arising or alleged to arise out of the performance of or the failure to perform the Work, provided such claims are:
 - a) Attributable to bodily injury, sickness, disease, or death or to damage to or destruction of tangible property;
 - b) Caused by negligent acts or omissions of the Contractor or anyone for whose acts the Contractor may be liable; and
 - c) Made in writing within a period of 6 years from the date of Substantial Performance of the Work as set out in Owner standard form PH-CC-799, Certificate of Substantial Performance, for the Work or, where so specified in the Contract from the date of the Contract Completion Certificate.
- .02 The Contractor shall indemnify and hold harmless the Owner from all and every claim for damages, royalties, or fees for the infringement of any patented invention or copyright occasioned by the

Contractor in connection with work performed or Material furnished by the Contractor under the Contract.

- .03 The Owner expressly waives the right to indemnity for claims other than those stated in paragraphs GC 6.02.01 and GC 6.02.02.
- .04 The Owner shall indemnify and hold harmless the Contractor, his agents, officers, and employees from and against all claims, demands, losses, expenses, costs, damages, actions, suits, or proceedings arising out of the Contractor's performance of the Contract that are attributable to a lack of or defect in title or an alleged lack of or defect in title to the Working Area.
- .05 The Contractor expressly waives the right to indemnity for claims other than those stated in paragraph GC 6.03.04.

GC 6.03 Contractor's Insurance

GC 6.03.01 General

- .01 Without restricting the generality of subsection GC 6.02, Indemnification, the Contractor shall provide, maintain, and pay for the insurance listed in these MTO General Conditions of Contract and specifically described under clause GC 6.03.02, Commercial General Liability Insurance, and clause GC 6.03.03, Automobile Liability Insurance, and such other insurance as may be specified in the Contract Documents.

GC 6.03.02 Commercial General Liability Insurance

- .01 Commercial general liability insurance on an occurrence basis for third party bodily injury, personal injury, and property damage shall have an inclusive limit of not less than \$5,000,000 per occurrence with \$2,000,000 products and completed operations aggregate. The policy is to include the following:
 - a) The Owner and the Contract Administrator as additional insured's with respect to liability arising in the course of performance of the Contractor's obligations under or otherwise in connection with the Contract Documents.
 - b) Contractual liability coverage.
 - c) Cross-liability clause.
 - d) Employer's liability coverage.
 - e) 30 Day written notice of cancellation, termination, or material change.
 - f) Non-owned automobile coverage, including standard contractual liability endorsement, with blanket coverage for hired automobiles.
- .02 The Contractor shall provide the Owner with proof of insurance required by these MTO General Conditions of Contract in the form of valid certificates of insurance acceptable to the Owner that references the Contract and confirms the required coverage, on or before the commencement of this Contract, and any renewal replacements on or before the expiry of any such insurance.
- .03 The Contractor shall submit annually on the anniversary of the execution of the Agreement to the Owner the proof of the continuation of the insurance as described in these MTO General Conditions of Contract or elsewhere in the Contract Documents in the form of valid certificates of insurance acceptable to the Owner that references the Contract and confirms the required coverage.

- .04 If the Contractor decides not to employ Subcontractors for operations requiring the use of explosives for blasting, pile driving or caisson work, or removal or weakening of support of property building or land, the certificate of insurance shall include the appropriate endorsements.
- .05 "Claims Made" insurance policies shall not be permitted.

GC 6.03.03 Automobile Liability Insurance

- .01 Automobile insurance in respect of licensed vehicles as per statutory requirements in Ontario shall have limits of not less than \$5,000,000 inclusive per occurrence for bodily injury, death, and damage to property, including accident benefits in the standard owner's form automobile policy providing third party liability and accident benefits insurance and covering licensed vehicles owned or operated by the Contractor and endorsed to provide the Owner with not less than 30 Days written notice in advance of any cancellation, change, or amendment restricting coverage.

GC 6.03.04 Payment for Loss or Damage

- .01 The Contractor shall be entitled to receive from the Owner, in addition to the amount due under the Contract, the amount at which the Owner's interest in restoration of the Work has been appraised, such amount to be paid as the restoration of the Work proceeds and according to the requirements of section GC 8.0, Measurement and Payment. In addition the Contractor shall be entitled to receive from the payments made by the insurer the amount of the Contractor's interest in the restoration of the Work.
- .02 The Contractor shall be responsible for deductible amounts under the policies except where such amounts may be excluded from the Contractor's responsibility by the terms of this Contract.
- .03 In the event of loss or damage to the Work arising from the action of others, the Owner shall pay the Contractor the cost of restoring the Work as the restoration of the Work proceeds and according to the requirements of section GC 8.0, Measurement and Payment.

GC 6.03.05 Insurance Requirements and Duration

- .01 Unless specified otherwise, the insurance shall be maintained continuously from the commencement of the Work until 10 Days following the date of Contract Completion Certificate, and with respect to completed operations coverage for a period of not less than 24 months from the date of Contract Completion Certificate, and thereafter to be maintained for a further period of 4 years.
- .02 The Contractor shall provide the Owner, on a form acceptable to the Owner, proof of insurance prior to commencement of the Work, signed by an officer of the Contractor and either the underwriter or the broker.
- .03 The Contractor shall, on request of the Owner, promptly provide the Owner with a certified true copy of each insurance policy exclusive of information pertaining to premium or premium bases used by the insurer to determine the cost of the insurance. The certified true copy shall include a signature by an officer of the Contractor and in addition, a signature by an officer of the insurer or the underwriter or the broker.
- .04 Unless specified otherwise the Contractor shall be responsible for the payment of deductible amounts under the policies.
- .05 If the Contractor fails to provide or maintain insurance as required in these MTO General Conditions of Contract or elsewhere in the Contract Documents, then the Owner shall have the right to provide and maintain such insurance and give evidence thereof to the Contractor. The Owner's cost thereof shall be payable by the Contractor to the Owner on demand.

- .06 If the Contractor fails to pay the cost of the insurance placed by the Owner within 30 Days of the date on which the Owner made a formal demand for reimbursement of such costs, the Owner may deduct the costs thereof from monies which are due or may become due to the Contractor.

GC 6.04 Bonding

- .01 The Contractor shall provide the Owner with the surety bonds in the amount required by the tender documents.
- .02 Such bonds shall be issued by a duly licensed surety company authorized to transact a business of suretyship in the Province of Ontario and shall be maintained in good standing until the fulfilment of the Contract.

SECTION GC 7.0 - CONTRACTOR'S RESPONSIBILITIES AND CONTROL OF THE WORK

GC 7.01 General

GC 7.01.01 Site Visit

- .01 The Contractor warrants that the site of the Work has been visited during the preparation of the tender and the character of the Work and all local conditions which may affect the performance of the Work are known.

GC 7.01.02 Commencement of Work

- .01 The Contractor shall not commence the Work nor deliver anything to the Working Area until the Contractor has received written permission, on Owner standard form PH-CC-700, Permission to Start Work, duly signed by the Contract Administrator.

GC 7.01.03 Control and Responsibility

- .01 The Contractor shall have complete control of the Work and shall effectively direct, supervise, and undertake quality control activities for the work so as to ensure conformity with the Contract Documents. The Contractor shall be responsible for construction means, methods, techniques, sequences, and procedures and for coordinating the various parts of the Work.
- .02 The Contractor shall have the sole responsibility for the design, erection, operation, maintenance, and removal of temporary structures and other temporary facilities and the design and execution of construction methods required in their use.
- .03 Notwithstanding paragraph GC 7.01.03.02, where the Contract Documents include designs for temporary structures and other temporary facilities or specify a method of construction in whole or part, such facilities and methods shall be considered to be part of the design of the Work, and the Contractor shall not be held responsible for that part of the design or the specified method of construction. The Contractor shall, however, be responsible for the execution of such design or specified method of construction in the same manner that the Contractor is responsible for the execution of the Work.

GC 7.01.04 Compliance with the Occupational Health and Safety Act

- .01 The Contractor shall execute the terms of the Contract in strict compliance with the requirements of the *Occupational Health and Safety Act*, R.S.O. 1990, c. O.1 (*the Act*) and Ontario Regulation 213/91 (*Construction Projects*) and any other regulations under *the Act (the Regulations)* which may affect the performance of the Work, as the Constructor or employer, as the case may be. The Contractor shall ensure that:
- a) Worker safety is given first priority in planning, pricing, and performing the Work;
 - b) The Contractor's officers and supervisory employees have a working knowledge of the duties of a Constructor and employer under *the Act* and the provisions of *the Regulations* applicable to the Work, and a personal commitment to comply with them;
 - c) A copy of the most current version of *the Act* and *the Regulations* are available at the Contractor's office within the Working Area or, in the absence of an office, in the possession of the Superintendent responsible for the performance of the Work;
 - d) Workers employed to carry out the Work possess the knowledge, skills, and protective devices required by law or recommended for use by a recognized industry association to allow them to work in safety;

- e) The Contractor's supervisory employees carry out their duties in a diligent and responsible manner with due consideration for the health and safety of the workers; and
 - f) All Subcontractors performing part of the Work and their employees are properly protected from injury while they are at the work place.
- .02 When requested, the Contractor shall provide the Owner with a copy of its health and safety policy and program at the pre-start meeting and shall respond promptly to requests from the Owner for confirmation that its methods and procedures for carrying out the Work comply with *the Act* and *the Regulations*. The Contractor shall cooperate with representatives of the Owner and Ministry of Labour inspectors appointed to enforce *the Act* and *the Regulations* in any investigations of worker health and safety in the performance of the Work. The Contractor shall indemnify and save the Owner harmless from any additional expense that the Owner may incur to have the Work performed as a result of the Contractor's failure to comply with the requirements of *the Act* and *the Regulations*.
- .03 The Contractor shall immediately, upon receipt, provide the Owner a copy of all correspondence from the Ministry of Labour including but not limited to Project Forms, Stop Work Orders, or Certificates of Offence.
- .04 For work inside confined spaces, including box girder bridges, detailed written procedures addressing the confined space requirements of *the Act* and *Construction Projects*, shall be clearly posted at the project site and available to all personnel, including the Contractor's workers, the Contract Administrator, MTO personnel, and Ministry of Labour inspectors. The procedures shall include the rescue procedures to be followed during a rescue or evacuation of all personnel from an unsafe condition or in the event of personal injury. The Contractor shall have personnel trained in rescue procedures readily available on site.
- .05 Whenever the Contractor proposes to suspend a multi-support point work platform system from a permanent structure, the Contractor shall retain an Engineer to evaluate the structural adequacy of the permanent structure taking into account the loadings imposed by the work platform system and the actual condition of the structure during construction. The Engineer retained by the Contractor shall be deemed responsible for the structural integrity of the permanent structure in fulfilling the requirements of *the Act* and *the Regulations*.

Structural evaluation shall be according to CAN/CSA-S6-14 and all Owner policies and standards. The design and operation of the multi-support point work platform system shall not have an adverse impact on the long term durability of the structure and shall meet all operational constraints specified in the Contract Documents.

Two weeks prior to the installation of the multi-support point work platform system, the Contractor shall submit the following to the Contract Administrator for information purposes only:

- a) 3 sets of Working Drawings of the work platform system signed and sealed by two Engineers. The loading imposed by the work platform system on the permanent structure shall be clearly shown on the Working Drawings.
- b) 3 copies of the evaluation report of the permanent structure bearing the seal and signature of two Engineers. The evaluation report shall include a letter from the Engineers certifying that the permanent structure can safely carry the load imposed by the work platform system together with any other dead and live load that the structure is carrying during construction.

The Contractor shall not make any permanent alterations to the structure as part of the work platform system installation without written permission from the Owner.

GC 7.01.05 Contractor's Representatives

- .01 The Contractor shall have an authorized representative on the site while any work is being performed, to act for or on the Contractor's behalf. Prior to commencement of construction, the Contractor shall notify the Contract Administrator of the names, addresses, positions, and telephone numbers of the Contractor's representatives who can be contacted at any time to deal with matters relating to the Contract.
- .02 The Contractor shall designate a person to be responsible for traffic control and highway work zone safety. The designated person shall be a competent worker who is qualified because of:
- a) Knowledge, training, and experience to perform the duties;
 - b) Is familiar with Book 7 of the OTM; and
 - c) Has knowledge of all potential or actual danger to workers and motorists.

Prior to the commencement of construction, the Contractor shall notify the Contract Administrator of the name, address, position, and telephone number of the designated person. The designated person may have other responsibilities, including other construction sites, and need not be present in the Working Area at all times.

- .03 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 diary. The following information shall be included in the diary:
- a) A schematic of the location of each existing sign by station, offset, and height above pavement.
 - b) A schematic of the placement and re-location of all construction signs by station, offset, and height above pavement.
 - c) Traffic accidents, including time of inspection, location of incident, and photographs.
 - d) Time and date of daily sign inspections.

GC 7.01.06 Assistance to the Contract Administrator

- .01 The Contractor shall, at no additional cost to the Owner, furnish all reasonable aid, facilities, and assistance required by the Contract Administrator for the proper inspection and examination of the Work or the taking of measurements for the purpose of payment.

GC 7.01.07 Critical Path Schedule

- .01 Initial and updated critical path schedules shall be prepared and submitted as detailed below:
- a) 2 paper copies and 1 electronic copy in the format of the scheduling software and readable by the scheduling software of the initial construction schedule shall be submitted to the Regional Operations Office within 7 Business Days of receipt of the acceptance of the tender.
 - b) 1 hard copy of the initial construction schedule shall also be submitted to the Contract Management Office, St. Catharines, with the executed copies of the Contract.

- c) Where the Contractor has revised the initial construction schedule prior to the first site meeting, the revised construction schedule shall be submitted to the Contract Administrator at least 3 Business Days prior to the meeting.
- d) 2 paper copies and 1 electronic copy in the format of the scheduling software and readable by the scheduling software of an updated schedule shall be prepared and submitted to the Contract Administrator not less than 3 Business Days prior to all regularly scheduled site meetings. All revisions shall be highlighted on the updated schedule. Updated schedules submitted shall reflect actual progress of the Work and any additions, deletions, or revisions to the Work that have arisen since the previous update. At regularly scheduled site meetings, the Contractor shall explain the revisions and any increase or decrease in resources required to complete the Work on time. At the Contract Administrator's request, and at no additional cost to the Owner, the Contractor shall submit an updated schedule within 7 Business Days of any major increase or decrease in quantities, or major change in the staging or perceived change in character of the Work.
- e) All copies shall be legible and shall show the date the schedule was prepared.

.02 The requirements for the construction schedule are detailed below:

- a) The critical path method shall be used to prepare and update the construction schedule. The initial and updated construction schedules shall consist of a time scaled network diagram with its related bar charts or a time scaled linear diagram.
- b) For Contracts with a specified number of Working Days, the construction time shown on the initial schedule shall not exceed the specified number of Working Days. The activities on the critical path shall assist the Contract Administrator in determining the Controlling Operation for the purpose of the charging of Working Days. The construction schedule shall include all non-working periods and appropriate allowances for inclement weather.
- c) For Contracts which specify a Contract Completion date, the construction time shown on the initial construction schedule shall not extend beyond the specified Contract Completion date. The construction schedule shall include all non-working periods and appropriate allowances for inclement weather.
- d) The construction schedule shall reflect operational constraints, interim completion dates, and other scheduling requirements specified in the Contract Documents.
- e) A delay for an activity shall be deemed to have occurred when the activity is not complete on its late finish date established by the construction schedule or it exceeds the specified number of Working Days or specified Completion Date for the Contract.

.03 The requirements for diagrams and bar charts are detailed below:

- a) The Contractor may select to submit initial and updated construction schedules in either logic diagram format with accompanying time scaled bar charts or time scaled linear diagrams.
- b) The Contractor shall select the activities so that the Work is identifiable and the progress of each activity can be determined. The Owner reserves the right to limit or increase the number of activities on the diagram.
- c) Each activity in the initial and updated construction schedules shall include a description of the operation and the number of Days allocated or actually used for it. When the duration of an activity is dependent on weather conditions, the number of Days allocated shall include an allowance for normal frequency of inclement weather. In addition, for Contracts which specify the number of Working Days for the Contract Time, the expected number of Working Days shall

be shown for the activities on the critical path that may be subject to Working Day charges. When the activity has an associated tender item quantity, the approximate quantity shall also be shown.

- d) The construction schedule shall show the sequence and interdependence of all activities required to complete the Work under the Contract, including time for review of Working Drawings and mix design submissions, early start date, early finish date, and float times. All network connections used to create a logical schedule and the corresponding durations shall be shown. Activities on the critical path shall be identified clearly on the diagram.
 - e) The time scale of the construction schedule may be divided into Days or weeks.
- .04 The Contractor shall not be permitted to start work until a construction schedule, conforming to clause GC 7.01.07, Critical Path Schedule, is received by the Contract Administrator.
- .05 If, for any reason, the Contractor cannot produce an acceptable construction schedule within 30 Business Days of initial submission of the construction schedule, the Contractor shall be in default of the Contract.

GC 7.01.08 Errors Relating to the Contract

- .01 Where the Contractor finds any errors, inconsistency, or omissions relating to the Contract, the Contractor shall promptly report as a Request for Clarification to the Contract Administrator on Owner standard form PH-CC-750, Request for Clarification, and shall not proceed with the activity affected until receiving direction from the Contract Administrator.

GC 7.01.09 Utilities

- .01 The Contractor shall arrange with the appropriate Utility authorities for the stake out of all underground Utilities and service connections that may be affected by the Work. The Contractor shall be responsible for any damage done to the underground Utilities by the Contractor's forces during construction. The Contractor shall also be responsible for any damage done to the service connections. The Contractor shall attend such meetings with the Contract Administrator and the Utility authorities as may be required by the Contract Administrator to ensure coordination of activities among the Contractor and the Utility authorities for each Utility affected by the Contract.
- .02 In the case of damage to, or interference with any Utilities, pole lines, pipe lines, conduits, farm tiles, or other public or privately owned works or property, the Contractor shall immediately notify the Owner and the Contract Administrator of the location and details of such damage or interference.

GC 7.01.10 Public Ceremony

- .01 Only the Owner shall be permitted to make the first public announcements or hold the first public ceremonies about the award or acceptance of the Contract, project milestones, and Contract Completion. The Contractor shall not hold any public ceremony or make any public announcements about the above matters prior to the Owner doing so, without first obtaining the prior written approval of the Owner. The Contractor shall refer all media inquiries regarding such initial announcement and ceremonies to the Owner.
- .02 In paragraph GC 7.01.10.01, "project milestones" means any significant event in the completion of the Work, which includes the completion of a major component of the Work; the opening or closing of lanes, ramps, and structures; and any Work associated with incentives and disincentives described in the Contract Documents.

GC 7.02**Layout**

- .01 Prior to commencement of construction, the Contract Administrator and the Contractor shall locate on site those property bars and benchmarks that are necessary to delineate the Working Area and to lay out the Work, as shown on the Contract Drawings.
- .02 The Contractor shall be responsible for the preservation of all property bars while the Work is in progress, except those property bars that require removal to facilitate the Work. Any property bars disturbed, damaged, or removed by the Contractor's operations shall be replaced under the supervision of an Ontario Land Surveyor, at no cost to the Owner.
- .03 The Contractor shall provide qualified personnel to layout and establish all lines and grades necessary for construction. The Contractor shall notify the Contract Administrator of any layout work carried out.
- .04 The Contractor shall assume full responsibility for alignments, elevations, and dimensions of each and all parts of the Work.
- .05 All stakes, marks, and reference points provided by the Contract Administrator shall be carefully preserved by the Contractor. In the case of their destruction or removal, such stakes, marks, and reference points shall be replaced by the Contractor at no cost to the Owner.
- .06 The Contract Administrator shall provide a grading report to establish grading cross-sections. During the progress of the work the Contractor shall notify the Contract Administrator forthwith of any errors, omissions, or inconsistencies in the geometric information and the controls provided by the Owner. This report contains all necessary information relating to distance and elevation for each station necessary for the construction of the Work.
- .07 Certification shall be required for the layout of the following components of the Work:
 - a) Bridges;
 - b) Retaining walls;
 - c) Culverts having a span of 5 m or more;
 - d) Tunnelling, excluding augered tunnels;
 - e) Sewers of 2 m diameter or more.

For each of the identified components above, the Contractor shall provide to the Contract Administrator, on Owner standard form PH-CC-811, Certification of the Component, over the seal and signature of either an Engineer or an Ontario Land Surveyor, the following:

- a) Certification of the final pile location before proceeding with footings.
- b) Certification that the footings have been constructed to the designated lines and grades before proceeding with any work above the footings.
- c) Final elevations of bridge seats and certification of span dimensions before proceeding with any work on the superstructure of each bridge.
- d) Actual profiles on the beams before proceeding with any work on the deck of each bridge.
- e) Certification of the final screed rail elevations before proceeding with the deck placement.

- f) Certification that each of the identified components of the Work has been constructed to the designated lines and grades before the Contract Completion Certificate.
- .08 The Contractor shall supply the Owner with all as-constructed horizontal and vertical data related to the layout of the Work before the Contract Completion Certificate.
- .09 The Contractor shall advise the Contract Administrator of the intended layout schedule at the weekly meeting by identifying the survey activities planned for the following week, including any miscellaneous surveying items.
- .10 For the grading layout, stakes 25 x 50 x 600 mm, minimum, shall be installed left and right of centreline at or near the right-of-way limits and in the areas where additional staking is required, (e.g., intersections, bridges, and on horizontal and vertical curves). Staking intervals shall be as specified in Table 7.02-1 and Table 7.02-2. The only data to be shown on these stakes shall be profile grade, off-set distance from centreline, and station location. The Contractor shall erect butterfly rods or batter boards at grade stake locations.
- .11 The Contractor shall provide a complete set of off-set stakes with finished grade and stations for the following components of the Work:
- a) Drainage Items
Sewers, road culverts, entrance culverts, manholes, and similar items.
 - b) Pavement Items
Concrete base, concrete pavement, stabilized base, asphalt, Pavement, and similar items. Fine grading stakes shall be used for this work when Pavement items form part of grading or granular work.
 - c) Miscellaneous Items
Sidewalk, curb and gutter, slope paving, structures, fencing, noise barrier, lighting, guide rail barrier, rip-rap, and similar items as required by the Owner.
- .12 For fine grading layout, including paving, fine grading stakes 25 x 50 x 600 mm in size shall be installed left and right of the control line at or near the Subgrade Shoulder break. These stakes shall be installed at an interval of 30 m or less where the Contract Administrator deems appropriate, on horizontal and vertical curves, widening of intersections, and similar locations. The only data to be shown on these stakes shall be Profile Grade, elevation, off-set distance from the control line, and station.
- .13 For resurfacing layout, offset stakes shall be installed left or right of the control line and at or near the edge of Shoulder at an interval of 50 m or less. The only data to be shown on the stake shall consist of the final Pavement elevation, off-set distance from the control line, and station.

GC 7.03 Damage by Vehicles or Other Equipment

- .01 If at any time, in the opinion of the Contract Administrator, damage is being done or is likely to be done to any Roadway or any improvement thereon, within or outside the Working Area, by the Contractor's vehicles or other Equipment, whether licensed or unlicensed, the Contractor shall, on the direction of the Contract Administrator and at no extra cost to the Owner, make changes or substitutions for such vehicles or Equipment, alter loadings, or in some other manner, remove the cause of such damage to the satisfaction of the Contract Administrator.

GC 7.04**Excess Loading of Motor Vehicles**

- .01 Where a vehicle is hauling Material, in whole or in part upon a Highway, and where motor vehicle registration is required for such vehicle, the Contractor shall not cause or permit such vehicle to be loaded beyond the legal limit specified in the *Highway Traffic Act*, whether such vehicle is registered in the name of the Contractor or otherwise, except where there are designated areas within the Working Area where overloading is permitted. The Contractor shall bear the onus of weighing disputed loads.
- .02 Vehicles hauling Materials shall be accompanied by an Owner standard form SR-E-121, Record of Allowable Gross Weight certificate. The legal limit shall be the vehicle's registered gross weight or the allowable gross weight, whichever is less. The Contractor shall ensure that a copy of the Record of Allowable Gross Weight form is left with the weigh person for Owner use.

GC 7.05**Use of Construction Equipment and Unlicensed Vehicles**

- .01 Unlicensed vehicles and construction equipment, with the exception of rock trucks, shall not travel, work, or stop within 4 m of a lane carrying traffic, except where construction operations necessitates the Working Area be less than 4 m from the traffic in which case, the Contractor shall erect delineators along the edge of the travelled lane, according to paragraph GC 7.08.01.
- .02 The use of unlicensed rock trucks on facilities open to public traffic shall be permitted only when hauling rock material within the construction zone and subject to the following:
 - a) For unlicensed rock trucks that are less than 3.2 m wide and equipped with foot operated brakes, headlights, and front and rear turn signals, flagging is required at entrance and exit points to warn public traffic.
 - b) For all other unlicensed rock trucks, flagging is required at entrance and exit points and either pilot vehicles or flagging is required along the route to warn public traffic and control movement.
- .03 The use of unlicensed vehicles and construction equipment on bridges under construction and bridges within the Working Area shall be subject to the following requirements:
 - a) Loading shall not exceed the limits specified elsewhere in the Contract Documents.
 - b) Unlicensed vehicles and construction equipment that comply with the legal load limits specified in the *Highway Traffic Act* may be used. Except as noted in paragraph 7.05.02, c), the Contractor shall not cause or permit such vehicles to be loaded beyond the legal limit specified in the *Highway Traffic Act*, including bridge postings and load restrictions. The Contractor shall provide proof of load weight to the Contract Administrator for any disputed loads.
 - c) Unlicensed vehicles and construction equipment that is overloaded in terms of the *Highway Traffic Act* or track propelled equipment greater than 30 tonnes, which the Contractor proposes to drive over bridges under construction and bridges within the Working Area shall be subject to approval. The Contractor shall submit to the Contract Administrator a description and detailed configuration of every such equipment and a certificate, signed and sealed by an Engineer. The certificate shall list the site numbers of every bridge that may be traversed by the subject equipment and state that each Engineer has evaluated, according to the requirements of CAN/CSA-S6-14, every bridge listed, and that each bridge can safely support all loads.
- .04 Unless specified otherwise in the Contract Documents, pile driving equipment shall not be permitted to operate on bridges.

GC 7.06

Carrier Safety Compliance

GC 7.06.01

Contractor Operation of a Commercial Motor Vehicle

- .01 Where the Contractor is a Commercial Vehicle Operator's Registration (CVOR) Holder who intends to operate a Commercial Motor Vehicle in the performance of the Contract or in the haulage of Materials to, on, or from the Working Area, the Contractor shall provide to the Owner a copy of the Contractor's CVOR Abstract as follows:
- a) The first CVOR Abstract shall be provided to the Owner before the Contractor operates a Commercial Motor Vehicle in the performance of the Contract or in the haulage of Materials to, on, or from the Working Area, and
 - b) CVOR Abstracts shall be submitted to the Owner:
 - i. Annually in October.
 - ii. Periodically upon request anytime during the period of the Contract.

The search date recorded on any CVOR Abstract shall not exceed 30 Days from the date that it is provided to the Contract Administrator.

- .02 If at any time the Contractor holds an unsatisfactory or conditional CVOR rating, the Contractor shall advise the Contract Administrator within 72 hours:
- a) The Contractor's Commercial Motor Vehicles shall not operate in the performance of the Contract or in the haulage of materials to or from the Working Area while the Contractor holds an unsatisfactory CVOR rating.
 - b) The Contract Administrator may permit a Contractor with a Conditional CVOR rating to operate their vehicles in the performance of the Contract or in the haulage of materials to or from the Working Area, subject to the following performance criteria:
 - i. Within 10 Days of having a Conditional CVOR Rating, the Contractor produces an approved plan confirming that drivers and vehicles safety programs are in place to ensure compliance with the safety rating requirement, the *Highway Traffic Act*, and National Safety Code; and
 - ii. Achieve a satisfactory, satisfactory unaudited, or excellent safety rating under the MTO Carrier Safety Rating Program and have a violation rate of under 70% within 12 months of the date the plan is submitted to the Owner, or show improvement in the Carrier's Safety Performance over the term of the Contract by reducing the Carrier's pointable accidents, pointable convictions and out of service inspections.

Where a Contractor fails to achieve the performance criteria outlined above, the Contract Administrator may require the Contractor to subcontract all work requiring a CVOR Certificate and the Contractor's bidding privileges on future work with the Owner may be affected.

Provisions GC 7.06.01.02, b), i and ii, are in addition to any carrier interventions or sanctions imposed through the MTO CVOR program.

GC 7.06.02**Subcontractor and Other Operation of a Commercial Motor Vehicle**

- .01 Prior to any CVOR Holder operating a Commercial Motor Vehicle in the performance of the Contract or in the haulage of material to, on, or from the Working Area, the Contractor shall examine the CVOR Abstract of every CVOR Holder with whom the Contractor intends to subcontract, directly or indirectly, to operate a Commercial Motor Vehicle in the performance of the Contract or in the haulage of materials to, on, or from the Working Area. The Contractor shall provide the Contract Administrator with the CVOR Holder's name and CVOR Certificate number of all Subcontractors.

The search date of any CVOR Level 1 Abstract shall not exceed 30 Days from the date that it is provided to the Contractor.

The Contractor shall retain copies of all CVOR Abstracts for examination by the Owner, upon request.

- .02 The CVOR Holder shall not hold a dormant or inactive CVOR certificate at any time during the period of the Contract.

The Contractor shall, at all times throughout the duration of the Contract, ensure that no CVOR Holder with an unsatisfactory CVOR rating works, directly or indirectly, for the Contractor in the operation of a Commercial Motor Vehicle in the performance of the Contract or in the haulage of materials to, on, or from the Working Area. The Contractor shall require Subcontractors, in turn, to require compliance with subsection GC 7.06, Carrier Safety Compliance, from any Person with whom they contract.

If a CVOR Holder holds an unsatisfactory CVOR rating at any time during the period of the Contract, the Contractor shall inform the Contract Administrator, in writing, within 72 hours of becoming aware, having exercised all due diligence, of such CVOR Holder having an unsatisfactory CVOR rating.

The Contract Administrator may permit a Subcontractor with a conditional CVOR rating to operate their vehicles subject to the following:

- a) Within 10 Days of having a conditional CVOR record, the Subcontractor produces an approved plan confirming that drivers and vehicles safety programs are in place to ensure compliance with the safety rating requirement, the *Highway Traffic Act*, and National Safety Code; and
- b) Achieve a satisfactory, satisfactory unaudited, or excellent safety rating under the ministry's Carrier Safety Rating Program and have a violation rate of under 70% within 12 months of the date the plan is submitted to the Owner, or show improvement in the Carrier's Safety Performance over the term of the contract by reducing the Carrier's pointable accidents, pointable convictions, and out of service inspections.

Where a Subcontractor fails to achieve the performance criteria above the Contractor shall within 1 month replace the Subcontractor or CVOR Holder and the Contractor's bidding privileges on future work with the Owner may be affected.

Provisions GC 7.06.02.02, a), and GC 7.06.02.02, b), are in addition to any carrier interventions or sanctions imposed through the MTO CVOR program.

GC 7.07**Condition of the Working Area**

- .01 The Contractor shall maintain the Working Area in a tidy condition and free from the accumulation of debris, other than that caused by the Owner or others.

- .02 During night work, the Contractor shall ensure that the work zone is adequately illuminated to the Contract Administrator's satisfaction for work operations and inspections and the advance warning to traffic.
- .03 The Contractor shall take such steps as may be necessary to control dust resulting from the Contractor's operations or by public traffic, where it is the Contractor's responsibility to maintain a road through the Work, such that it does not:
 - a) Affect traffic;
 - b) Enter surface waters; or
 - c) Escape beyond the right-of-way to cause a nuisance to residents, businesses, or Utilities.

GC 7.08 Maintaining Roadways and Detours

- .01 Where an existing Roadway is affected by construction, it shall be kept open to traffic, and the Contractor shall, except as otherwise provided in subsection GC 7.08, Maintaining Roadways and Detours, be responsible for providing and maintaining a road through the Work for the duration of the Work, whether along an existing Highway, including the road under construction, or on detours within or adjacent to the Highway according to the OTM.
- .02 The Contractor shall not be required to maintain a Roadway through the Working Area before the Contractor has commenced the Work, or during seasonal shutdown or within any sections of the Roadway where a twelve (12) month general warranty period has commenced. Responsibility for maintenance shall be transferred between the Contractor and the Owner at the commencement of the Work, the start and end of each seasonal shutdown period, and the start of each twelve (12) month general warranty period. A minimum of 5 Business Days prior to an anticipated transfer date of responsibility for maintenance, the Contract Administrator, Contractor and a representative of the Owner's maintenance contractor shall perform a pre-turnover field inspection. The pre-turnover field inspection shall identify deficiencies within the right-of-way and the anticipated timeframe for correction. The Contract Administrator shall be the sole judge or whether or not the noted deficiencies require correction prior to or after the turnover date. Provided that the Contractor was given advance written notice of the pre-turnover inspection date, the Contractor shall not delay commencement of the Work or the assumption of responsibility for maintenance because of the existence of deficiencies. A Turnover Agreement Form PH-CC-771, prepared by the Contract Administrator, which identifies the date and time that responsibility for maintenance shall be transferred between parties shall be executed by both the Contract Administrator and Contractor prior to the actual turnover date. Where work under the Contract is discontinued for any extended period including seasonal shutdown, the Contractor shall, when directed by the Contract Administrator, open and place the roadway and detours in a passable, safe, and satisfactory condition for public travel. The Contractor shall not be required to apply de-icing chemicals or abrasives or carry out snow-plowing on a public road.
- .03 The Contractor shall ensure that the Roadway affected by construction is clear of debris. All debris on the travelled portion of the Roadway shall be removed as soon as possible after detection. Debris on the Shoulder shall be removed within 24 hours.
- .04 Where only localized and separated sections of the Highway are affected by the Contractor's operations, the Contractor shall not be required to maintain intervening sections of the Highway until such times as these sections are located within the limits of the Highway affected by the Contractor's general operations under the Contract.
- .05 The Owner shall bear the cost of maintaining, in a satisfactory condition for public traffic, a Roadway through the Working Area. The Contractor shall bring any defects to the attention of the Contract Administrator as soon as they are identified. Such defects include potholes, distortions,

pavement edge loss, washouts, drop-offs, and soft or wet areas. Compensation for all labour, Equipment, and Materials to address such defects shall be at the Contract prices appropriate to the work and, where there are no such prices, at negotiated prices. Notwithstanding the foregoing, the cost of providing an operated grader, required to maintain the surface of such Roadways, shall be deemed to be included in the prices bid for the various tender items and no additional payment shall be made.

- .06 Compliance with the foregoing provisions shall in no way relieve the Contractor of obligations under subsection GC 6.01, Protection of Work, Persons, and Property, dealing with the Contractor's responsibility for losses and damage.
- .07 The Contractor shall ensure that earth, mud, aggregate, and other construction debris are not tracked onto the Roadway by construction vehicles.

GC 7.09 Access to Properties Adjoining the Work and Interruption of Utility Services

- .01 At all times, the Contractor shall provide the following to properties adjoining the Working Area at no additional cost to the Owner:
 - a) Pedestrian and vehicular access; and
 - b) Continuity of Utility services.
- .02 At all times, the Contractor shall provide access to fire hydrants and water and gas valves located in the Working Area at no additional cost to the Owner.
- .03 Where any interruptions in the supply of Utility services are required and are authorized by the Contract Administrator, the Contractor shall give the affected property owners notice according to subsection GC 7.13, Notices by the Contractor, and shall arrange such interruptions so as to create a minimum of interference to affected property owners.

GC 7.10 Approvals and Permits

- .01 Except as specified in paragraph GC 7.10.02, the Contractor shall obtain any permits, licenses, and certificates required for the performance of the Work that are in force at the date of tender closing.
- .02 The Owner shall obtain and pay for the necessary plumbing and building permits.
- .03 The Contractor shall arrange for all necessary inspections.

GC 7.11 Suspension of Work

- .01 The Contractor shall upon written notice from the Contract Administrator, discontinue or delay any or all of the Work. The Work shall not resume until the Contract Administrator issues such written direction. Delays in these circumstances, shall be administered according to subsection GC 3.07, Delays.

GC 7.12 Contractor's Right to Stop the Work or Terminate the Contract

- .01 If the Owner is adjudged bankrupt or makes a general assignment for the benefit of creditors because of insolvency or if a receiver is appointed because of insolvency, the Contractor may terminate the Contract, without prejudice to any other right or remedy the Contractor may have, by giving the Owner or receiver or trustee in bankruptcy written notice.

- .02 If the Work is stopped or otherwise delayed for a period of 30 Days or more under an order of a court or other public authority and provided that such order was not issued as the result of an act or fault of the Contractor or of any Person directly employed or engaged by the Contractor, the Contractor may terminate the Contract, without prejudice to any other right or remedy the Contractor may have, by giving the Owner written notice.
- .03 The Contractor may notify the Owner in writing, with a copy to the Contract Administrator, that the Owner is in default of contractual obligations, if:
- a) The Contract Administrator fails to issue payment certificates according to the provisions of section GC 8.0, Measurement and Payment;
 - b) The Owner fails to pay the Contractor, within 30 Days of the due date, the amounts certified by the Contract Administrator or awarded by arbitration or court;
 - c) The Owner fails to comply with the requirements of the Contract to a substantial degree.
- .04 The Contractor's written notice to the Owner shall advise that if the default is not corrected in the 7 Days immediately following the receipt of the written notice the Contractor may, without prejudice to any other right or remedy the Contractor may have, stop the Work or terminate the Contract.
- .05 If the Contractor terminates the Contract under the conditions set out in subsection GC 7.12, Contractor's Right to Stop the Work or Terminate the Contract, the Contractor shall be entitled to be paid for all work performed according to the Contract Documents and for any losses or damage as the Contractor may sustain as a result of the termination of the Contract.

GC 7.13 Notices by the Contractor

GC 7.13.01 Advance Notice

- .01 Before any or all of the Work is carried out that may affect the property or operations of any owner or agency of government or any individual, company, partnership or corporation, including a municipal corporation or any board or commission thereof, and in addition to such notices of the commencement of specified operations as are prescribed elsewhere in the Contract Document, the Contractor shall give at least 48 hours advance written notice of the date of commencement of such work to the individual person, company, partnership, corporation, board, or commission so affected.

GC 7.13.02 Environmental Incident Management under Legislation Protecting the Environment and Natural Resources

- .01 The Contractor shall be in strict compliance with the requirements of the following legislation, as amended, regarding Environmental Incidents under the control of the Contractor or that are a result of the Contractor's operations:
- a) *Environmental Protection Act*, R.S.O. 1990, c. E.19
 - b) *Fisheries Act*, R.S.C. 1985, c. F.14
 - c) *Technical Standards and Safety Act*, 2000, S.O. 2000, c. 16
 - d) *Pesticides Act*, R.S.O. 1990, c. P.11
 - e) *Ontario Water Resources Act*, R.S.O. 1990, c. O.40
 - f) *Transportation of Dangerous Goods Act*, 1992 (S.C.1992, c. 34)

- .02 The requirements of the legislation listed in paragraph of GC 7.13.02.01 include but are not restricted to:
- a) Immediate containment of the material, pollutant, contaminant, deleterious substance, or dangerous good;
 - b) Immediate notification of the Environmental Incident to the proper authority; and
 - c) Cleanup and restoration of the environment to preconditions.
- .03 The Contractor shall possess a plan demonstrating that Environmental Incidents shall be managed to satisfy the requirements of paragraphs GC 7.13.02.01 and GC 7.13.02.02.
- .04 The Contractor shall also be responsible for informing the Contract Administrator forthwith of:
- a) An Environmental Incident when it occurs; and
 - b) Any actions taken or intended to be taken by the Contractor regarding the Environmental Incident.
- .05 Within 48 hours of an Environmental Incident, the Contractor shall provide to the Contract Administrator, on Owner standard form PH-CC-818, Environmental Incident Notification Form, details of such incident.
- .06 The Contractor shall indemnify and save the Owner harmless from any additional expense that the Owner may incur to have the Work performed as a result of the Contractor's failure to comply with the requirements of the legislation listed in paragraph GC 7.13.02.01.

GC 7.14 Obstructions

- .01 Except as otherwise noted in these MTO General Conditions of Contract, the Contractor assumes all the risks and responsibilities arising out of any obstruction encountered in the performance of the Work and any traffic conditions, including traffic conditions on any Highway or road giving access to the Working Area caused by such obstructions, and the Contractor shall not make any claim against the Owner for any loss, damage, or expense occasioned thereby.
- .02 Where the obstruction is an underground Utility such as a telephone cable, watermain, gas main or sewer or other man-made object, the Contractor shall not be required to assume the risks and responsibilities arising out of such obstruction, unless the location of the obstruction is shown on the plans or described in the specifications and the location so shown is within the tolerance specified in paragraph GC 2.01.01, a), or unless the presence and location of the obstruction has otherwise been made known to the Contractor or could have been determined by the visual site investigation made by the Contractor according to these MTO General Conditions of Contract.
- .03 During the course of the Contract, it is the Contractor's responsibility to consult with Utility companies or other appropriate jurisdictions for further information in regard to the exact location of these Utilities, to exercise the necessary care in construction operations, and to take such other precautions as are necessary to safeguard the Utilities from damage.

GC 7.15 Limitations of Operations

- .01 Except for such work as may be required by the Contract Administrator to maintain the Working Area in a safe and satisfactory condition, the Contractor shall not carry on operations under the Contract on Sundays without permission in writing from the Owner.

- .02 The Contractor shall cooperate with other contractors, Utility companies, and the Owner and they shall be allowed access to their work or plant at all reasonable times.

GC 7.16 Cleaning Up Before Contract Completion

- .01 Upon attaining Substantial Performance of the Work, the Contractor shall remove surplus materials, Hand Tools, Equipment not required for the performance of the remaining work. The Contractor shall also remove all temporary works and debris other than that caused by the Owner or others and shall leave the Work and Working Area clean and suitable for occupancy by the Owner unless otherwise specified.
- .02 The Work shall not be deemed to have reached Contract Completion until the Contractor has removed surplus materials, Hand Tools, Equipment. The Contractor shall also have removed debris, other than that caused by the Owner or others.

GC 7.17 Record Drawings

- .01 The Contractor shall provide 3 hard copies and 1 digital file, in PDF format, of Record Drawings prior to Contract Completion.
- .02 Record Drawings shall show all differences, design changes, and deviations from the original Contract Drawings in red with references to the Contractor's survey and quality control inspection records beside each entry.

GC 7.18 General Warranty

- .01 Unless otherwise specified in the Contract Documents for certain Materials or components of the Work, the Contractor shall be responsible for the proper performance of the Work only to the extent that the design and specifications permit such performance. The onus is on the Contractor to show through engineering analysis that the design and specifications are deficient for the proper performance of the Work.
- .02 Subject to the previous paragraph, the Contractor shall correct promptly at no cost to the Owner, defects or deficiencies in the Work that appear during the period of 12 months after the date of Substantial Performance as set out in the Certificate of Substantial Performance or such longer periods as may be specified for certain Materials or components of the Work. The Owner shall promptly give the Contractor written notice of observed defects or deficiencies. The Contractor shall submit a comprehensive repair proposal, including traffic control measures, to the Owner within 15 Days of receiving written notification of the defects or deficiencies.

Notwithstanding the above, on Contracts lasting more than 1 construction season, the Owner shall allow the 12 month general warranty period to commence prior to the date of Substantial Performance for complete sections of Roadways that have been completed in their entirety, have a value of greater than \$5,000,000, and are in use by public traffic. In such cases, the Contractor shall apply in writing to the Owner for approval of the start dates of the general warranty for the selected sections of completed Roadways. The written request shall be submitted to Contract Administrator no later than 10 Days prior to the proposed general warranty start dates and include details as to the limits, location, and start date requested. If a request is granted, the Contractor shall correct promptly at no cost to the Owner, defects or deficiencies in the completed section of Roadway, which appear during the period of 12 months after the date of commencement of the warranty on the completed section of Roadway

- .03 The Contractor shall correct or pay for damage resulting from corrections made under the requirements of paragraph GC 7.18.02.

GC 7.19 Accounts Payable

- .01 The Contractor shall pay interest after 30 Days on accounts payable to the Owner at the Rate of Interest.

GC 7.20 Stockpiling of Material

- .01 The Contractor shall not stockpile material weighing more than 1.5 kPa on spans of bridges in which concrete removal has commenced for rehabilitation.
- .02 In cases other than stipulated in paragraph 7.20.01 above, the Contractor shall not stockpile material weighing more than:
 - a) 5 kPa on decks of highway bridges unless specified otherwise in the Contract Documents.
 - b) 2 kPa on decks of pedestrian bridges unless specified otherwise in the Contract Documents.

SECTION GC 8.0 - MEASUREMENT AND PAYMENT

GC 8.01 Measurement

GC 8.01.01 Quantities

- .01 Quantities for progress payments shall be construed and held to be approximate. The final quantities for the issuance of the Contract Completion Certificate shall be based on the measurement of the Work completed.
- .02 Measurement of the quantities of the Work shall be either by Actual Measurement or by Plan Quantity as indicated in the Contract Documents. Adjustments to Plan Quantities shall normally be made by modifying boundary lines and grades of the work on the plans to calculate new adjusted Plan Quantities but may, where appropriate, be made using Actual Measurements. Those items identified on the tender by the notation (P) in the unit column shall be paid according to the Plan Quantity. Items where the notation (P) does not occur shall be paid according to Actual Measurement or lump sum.

GC 8.01.02 Variations in Tender Quantities

- .01 When it appears that the quantity of work to be done or Material to be supplied by the Contractor or both under a unit price tender item may exceed or be less than the tender quantity, the Contractor shall proceed to do the work or supply the Material or both required to complete the tender item and payment shall be made for the actual amount of work done or Materials supplied or both at the unit prices stated in the tender except as provided below:
- a) In the case of a Major Item, when the quantity of work performed or Material supplied by the Contractor or both exceeds the tender quantity by more than 15%, either party to the Contract may make a written request to the other party to negotiate a revised unit price for that portion of the Work performed or Material supplied or both which exceeds 115% of the tender quantity. The negotiation shall be carried out as soon as reasonably possible. Any revision of the unit price shall be based on the actual cost of doing the work or supplying the Material or both under the tender item plus a reasonable allowance for profit and applicable overhead.
 - b) In the case of a Major Item, when the quantity of work performed or Material supplied by the Contractor or both is less than 85% of the tender quantity, the Contractor may make a written request to negotiate payment for the portion of actual overheads and fixed costs applicable to the amount of the underrun in excess of 15% of the tender quantity. For purposes of the negotiation, the overheads and fixed costs applicable to the item are deemed to have been prorated uniformly over 100% of the tender quantity for the item. Overhead costs shall be confirmed by a statement certified by the Contractor's senior financial officer or auditor and may be audited by the Owner.
- Alternatively, where both parties agree, an allowance equal to 10% of the unit price on the amount of the underrun in excess of 15% of the tender quantity shall be paid. Written requests for compensation shall be received no later than 180 Days after Contract Completion.
- .02 When it appears that the amount of work to be done or Material to be supplied by the Contractor or both under a lump sum concrete item may exceed or be less than the amount shown in the Contract Documents, the Contractor shall proceed to do the work or supply the Material or both required to complete the tender item and payment shall be made on the basis of the lump sum price shown in the tender except as provided below:
- a) Where the theoretical quantity as determined from the design dimensions of the structure components exceeds the estimated quantity of concrete stated in the Contract Documents by more than 3% and when such increase does not result from a change in design made according to paragraph GC 3.10.01.01, then the Contractor may make a written request to the

Contract Administrator to negotiate the compensation payable for that portion of the concrete that exceeds 103% of the estimated quantity. The negotiation shall be carried out as soon as reasonably possible. Any increase in the compensation shall be based on the actual cost of supplying and placing that portion of the concrete which exceeds 103% of the estimated quantity plus a reasonable allowance for profit and overhead.

- b) Where the theoretical quantity as determined from the design dimensions of the structure components is less than 97% of the estimated quantity of concrete stated in the Contract Documents and where such difference does not result from a change in design made according to paragraph GC 3.10.01.01, then the Contract Administrator may make a written request to the Contractor to negotiate the compensation payable for the item to reflect the change in quantity. The negotiation shall be carried out as soon as reasonably possible. Any decrease in compensation shall be based on the estimated value of the amount of underrun in excess of 3% of the estimated quantity and shall include a reasonable allowance for profit and overhead.

- .03 The Contractor or the Contract Administrator may dispute the quantity that is specified for payment on a Plan Quantity basis. The dispute shall be supported by calculations, drawings, and any other evidence indicating why the Plan Quantity is believed to be in error. If the Plan Quantity is found to be in error, payment shall be made according to the adjusted Plan Quantity.

GC 8.02 Payment

GC 8.02.01 Non-Resident Contractor

- .01 The Contractor shall obtain all necessary approvals, consents, permits, licences, certificates, registrations, and other authorizations prior to execution of the Contract.
- .02 The Contractor shall ensure that all Subcontractors the Contractor proposes to use for carrying out any of the Work required by the Contract and who are non-resident in Ontario have obtained all necessary approvals, consents, permits, licences, certificates, registrations, and other authorizations prior to execution of the subcontract.

GC 8.02.02 Price for Work

- .01 Prices for the Work shall be full compensation for all labour, Equipment, and Material required to do the work. The term "all labour, Equipment, and Material" shall include Hand Tools, supplies, and other incidentals.
- .02 Payment for work as shown or detailed in the Contract Documents not specifically detailed as part of any one item and without specified details of payment shall be deemed to be included in the item with which it is associated.
- .03 Payment adjustments determined according to the Contract Documents shall be applied to the payment due to the Contractor.

GC 8.02.03 Advance Payments for Material

- .01 The Owner shall make advance payments for Material intended for incorporation in the Work upon the written request of the Contractor and according to the following terms and conditions:
 - a) In advance of receipt of the shipment of the Material, the Contractor shall, arrange for adequate and proper storage facilities and notify the Contract Administrator of the location of the facilities.

- b) The value of Aggregates, processed and stockpiled, shall be assessed by the following procedure:
 - i. Sources Other Than Commercial
 - (A) Granular A, B, and M shall be assessed at the rate of 60% of the tendered unit price.
 - (B) Coarse and fine aggregates for hot mix asphalt and surface treatment shall be assessed at the rate of 25% of the tendered unit price multiplied by the tonnage of each Aggregate in stockpile. Prior to payment, the Contractor shall provide test results and mix designs to demonstrate that the materials are capable of producing a mix design conforming to the Contract Documents.
 - ii. Commercial Sources

Payment for separated coarse and fine aggregates shall be considered at the same rate as sources other than commercial, when such Materials are stockpiled at a commercial source. Advance payments for other materials located at a Commercial Source shall not be made.
- c) Payment for all other Materials, unless specified otherwise elsewhere in the Contract Documents, shall be based on an invoice identifying the Contract and marked as "paid" and signed by the Material supplier. In the event of Materials supplied by a Subcontractor, the Contractor shall provide the original Material supplier invoice marked as paid and signed by the Material supplier and an invoice from the Subcontractor marked as paid and signed by the Subcontractor.
- d) The payment for all Materials shall be prorated against the appropriate tender item by paying for sufficient units of the item to cover the value of the Material. Such payment shall not exceed 80% of the tendered unit price for the item.
- e) All Materials for which the Contractor wishes to receive advance payment shall be placed in the designated storage location immediately upon receipt of the Material and shall thenceforth be held by the Contractor in trust for the Owner as collateral security for any monies advanced by the Owner and for the due completion of the Work. The Contractor shall not exercise any act of ownership inconsistent with such security or remove any Material from the storage locations, except for inclusion in the Work, without the consent of the Contract Administrator, in writing. The Contractor shall arrange for a lease agreement with any private property owner where such Material is to be stored on Owner standard form PH-CC-733, Owner Tenancy and Access Agreement, granting the Owner tenancy and access for any storage location on private property for the sum of \$1.
- f) Such Materials shall remain at the risk of the Contractor who shall be responsible for any loss, damage, theft, improper use, or destruction of the Material, however so caused.

GC 8.02.04 Certification and Payment

GC 8.02.04.01 Progress Payment Certificate

- .01 The Contractor shall submit an application for progress payment monthly after starting the Work on this Contract. This application for progress payment shall be for work completed at the agreed to monthly cut-off date.

Within 5 Business Days following the agreed to monthly cut-off dates, the Contractor shall submit an updated application to the Contract Administrator.

The application shall contain two parts:

Part 1 - Invoice detailing:

Item numbers, description, unit of measurement, original tender quantity, approved revised quantity, total quantity to date, quantity previous invoice, quantity this period, unit price, dollars this period, and total dollars to date.

Subtotals shall be detailed for tender items, Change Orders, incentives, disincentives, and quality assurance Material bonuses or penalties.

The item information appearing on the invoice shall agree exactly with those as shown in the bid tender document.

Part 2 - Quantity Sheets detailing:

Item numbers, sub-item numbers, unit of measurement, location description, original tender quantity, approved revised quantity, total quantity to date, quantity previous invoice, and quantity this period.

The item information appearing on the Quantity Sheets shall agree exactly with those provided in the bid tender document. The Quantity Sheet information shall be sufficient to allow the Contract Administrator to verify and approve the invoice for payment.

Invoices and Quantity Sheets shall be submitted in hard-copy and digital format. The Contract Administrator shall review the invoice for completeness and subsequent approval for payment within 5 Business Days.

The Owner shall pay the approved invoice within 30 Days after the application for progress payment date or after the date of receipt of any invoice that had to be resubmitted due to deficiencies, errors, or non-compliance with the Owner's request in the preceding paragraphs.

The Owner shall not process for payment any changes less than \$1,000 from the amount shown on the previous payment certificate.

GC 8.02.04.02 Payment Adjustment for Changes in the Fuel Price Index

- .01 The Owner shall adjust the payment to the Contractor based on changes to the Owner's fuel price index. The fuel price index shall be calculated by the Ontario Ministry of Energy and shall be based on the rack price, including taxes, of diesel fuel. The fuel price index shall be published monthly in the Owner's Contract Bulletin for each calendar month and shall reflect the previous month's prices. The Contractor shall use this index when calculating flow through to truckers, Subcontractors, and shippers and suppliers.
- .02 A payment adjustment, excluding any payments for Changes in the Work and Additional Work, shall be calculated monthly and applied to the monthly progress payment.
- .03 It is agreed by the parties to the Contract that it is impracticable and difficult to ascertain actual fuel consumed on the Contract, and the parties hereto agree that for the purpose of calculating the total fuel price adjustments, the amount of fuel consumed shall be determined using the rates in Table 8.02.04.02-1. The payment provided for the items listed in Table 8.02.04.02-1 shall be deemed to be for all Work.

- .04 Payments provided under clause GC 8.02.04.02, Payment Adjustment for Changes in the Fuel Price Index, shall be used to compensate all trucks, Subcontractors, and shippers and suppliers performing any Contract Work or delivering material for the Contract including items not listed in Table 8.02.04.02-1.
- .05 The compensation provided through this provision shall also be used for the purpose of providing fuel price adjustment compensation to suppliers and shippers. Should the Contractor be required by a supplier to negotiate and provide fuel price adjustment compensation to any party providing Materials to the Contract, the Owner shall not provide any compensation for this purpose in addition to that provided through these MTO General Conditions of Contract.
- .06 Fuel Price Adjustment Calculation
- a) The Contractor's payment adjustment for each month shall be calculated using the following formula:
- $$Cfpa = (Ctem) \times \frac{(I - Bc)}{100}$$
- Where:
- Cfpa = fuel price adjustment paid to Contractor or Owner, in dollars
- Ctem = total estimated monthly fuel consumption
- I = progress payment month fuel price index (for the month that the work was completed in)
- Bc = fuel price index in the month that the Contract was advertised for tender
- b) The progress payment month fuel index shall be published the first Friday of every month in the Owner's Contract Bulletin.
- c) The total monthly fuel consumption shall be calculated by multiplying the consumption rates in Table 8.02.04.02-1 by the work accomplished in the current month for each applicable item and totalling the volume in litres.
- d) Only tender item quantities or work done at the tender item price shall be included in the calculation.
- .07 Payment Certificate Documentation
- a) When (I-Bc)(progress payment month fuel price index – advertising month fuel price index) is positive, the Contractor shall receive a payment.
- b) When (I-Bc)(progress payment month fuel price index – advertising month fuel price index) is negative the Owner shall receive a credit.
- c) The Contractor shall show the fuel price adjustment as a line item on each progress payment certificate and the final payment certificate. The item shall be called fuel price adjustment.

.08 Fuel Price Adjustment Flow Through

- a) The Contractor agrees to adjust the payment to each trucker hired directly by the Contractor for execution of part of the Work according to the following formula:

$$Tfpa = (Tmpp) \times \frac{(I - Bt)}{Bt} \times 0.17$$

Where:

Tfpa = fuel price adjustment paid to trucker, in dollars

Tmpp= monthly payment to trucker, in dollars

Bt = fuel price index in the month that the Contract with the trucker was entered into either verbally or in writing

I = progress payment month fuel price index (for the month that the work was completed in)

The fuel price adjustment paid to each trucker (Tfpa) shall be calculated for each calendar month and may be positive or negative.

- b) The Contractor agrees to adjust the payment to each Subcontractor according to the following formula:

$$Sfpa = (Smpp) \times \frac{(I - Bs)}{Bs} \times \frac{Fn}{100}$$

Where:

Sfpa = fuel price adjustment paid to the Subcontractor, in dollars

Smpp= monthly progress payment to the Subcontractor, in dollars

Bs = fuel price index in the month that the Contract with the Subcontractor was entered into either verbally or in writing

I = progress payment month fuel price index (for the month that the work was completed in)

Fn = fuel consumption factor as negotiated between the Contractor and the Subcontractor as a percentage of the value of the subcontract

- c) The Contractor shall report the negotiated fuel consumption factor (Fn) on Owner standard form PH-CC-744, Fuel Consumption Listing Subcontractor, listing all subcontracts, and the corresponding negotiated fuel consumption factor. The form shall be updated monthly or as changes and additions arise.
- d) The Contractor also agrees that each subcontract shall contain a requirement that the Subcontractor shall make a fuel price adjustment to each trucker hired directly by the Subcontractor for execution of part of the work according to the same formula and conditions used by the Contractor to make fuel price adjustments to truckers, and provide such confirmation on Owner standard form PH-CC-745, Fuel Consumption Tracking Subcontractor, for each trucker.

GC 8.02.04.03 Certification of Subcontract Completion

- .01 Before the Work has reached the stage of Substantial Performance; the Contractor may notify the Contract Administrator, in writing that a subcontract is completed satisfactorily and ask that the Contract Administrator certify the completion of the subcontract.
- .02 The Contract Administrator shall issue on Owner standard form PH-CC-797, Certificate of Completion of Subcontract, if the subcontract has been completed satisfactorily and all required inspection and testing of the work covered by the subcontract have been carried out and the results are satisfactory.
- .03 Within 7 Days of the date the subcontract is certified complete, the Contract Administrator shall give a copy of the certificate to the Contractor and to the Subcontractor concerned.

GC 8.02.04.04 Subcontract Statutory Holdback Release Certificate and Payment

- .01 At the time of issuance of the Certificate of Completion of Subcontract, the Contract Administrator shall:
 - a) Prepare a subcontract completion payment certificate showing:
 - i. The final prices for items;
 - ii. The amount of holdback monies;
 - iii. The amount due the Contractor.
 - b) Mail to the Contractor, the subcontract completion payment certificate within 50 Days of the date the subcontract was certified complete, for the Contractor to sign and return within 25 further Days. The Contract Administrator shall release to the Subcontractor through the Contractor the 10% holdback retained by the Owner in respect of the work covered by the said subcontract after it is certified complete and providing that all lien claims have been discharged and providing that the Contractor has furnished to the Contract Administrator a statutory declaration in a form supplied by the Owner that the said Subcontractor has discharged all liabilities incurred by the Subcontractor in carrying out the said subcontract.
- .02 Payment of the holdback monies by the Owner shall be made within a period of 105 Days from the date on which the subcontract was certified complete, providing the Contractor returns the said certificate within the required time.
- .03 On receipt of the holdback monies from the Owner, the Contractor shall forthwith pass the payment due under the said subcontract to the Subcontractor concerned.
- .04 Release of holdback monies by the Owner in respect of a subcontract according to the foregoing shall not relieve the Contractor or the Contractor's Surety of any of their responsibilities.

GC 8.02.04.05 Certificate of Substantial Performance

- .01 Application for Substantial Performance by the Contractor shall be submitted in the form of a letter, accompanied with:
 - a) An application for payment at Substantial Performance in a form satisfactory to the Contract Administrator for all work to date, the amount of the 10% holdback, and the amount due.
 - b) A release, on Owner standard form PH-CC-817, Application for Substantial Performance/Contract Completion, by the Contractor releasing the Owner from all further claims related to the Contract qualified by stated exceptions such as outstanding work or matter arising out of subsection GC 3.14, Clarification and Claims.

- c) A statutory declaration, on Owner standard form PH-CC-817, Application for Substantial Performance/Contract Completion, that all liabilities incurred by the Contractor and the Subcontractors in carrying out the Contract have been discharged except for the statutory holdbacks properly retained.
 - d) A satisfactory Certificate of Clearance from the Workplace Safety and Insurance Board.
- .02 Upon written application by the Contractor for Substantial Performance, the Contract Administrator shall conduct an inspection of the Work to establish the date of Substantial Performance of the Work. The Contractor's application shall detail non-conformances, defects to be rectified, and work yet to be completed. The Contract Administrator shall provide a list of deficiencies and work yet to be completed in addition to the Contractor's list. The Contractor's list of non-conformances, defects, and works yet to be completed together with the Contract Administrator's list of same shall be combined and referred to as the Substantial Performance deficiency list. All deficiencies and work to be completed from the Substantial Performance Deficiency List shall be completed prior to Contract Completion. Any additional defects and deficiencies for work previously accepted as substantially performed shall be completed within 60 Days of Contract Completion, unless prevented by winter weather conditions; in such case, the defects and deficiencies shall be corrected by June 15th of the following year. Defects and deficiencies on work completed after Substantial Performance shall be completed prior to Contract Completion.
 - .03 Upon verifying that the Contract has been substantially performed, the Contract Administrator shall issue a Certificate of Substantial Performance and shall set out in the Certificate of Substantial Performance the date on which the Contract was substantially performed and within 7 Days after the signing the said certificate the Contract Administrator shall provide a copy to the Contractor.
 - .04 Upon receipt of a copy of the Certificate of Substantial Performance, the Contractor shall arrange to have the certificate published in the *Daily Commercial News* and the Contractor shall provide to the Contract Administrator proof that the certificate was published. Where the Contractor fails to publish a Certificate of Substantial Performance within 7 Days of receiving the certificate, the Owner may publish the certificate in the *Daily Commercial News* and charge the Contractor \$400 for the costs of advertising and administration. The 45-Day lien period shall start on the date the Certificate of Substantial Performance is published in the *Daily Commercial News*.
 - .05 Except as otherwise provided for in Section 31 of the *Construction Lien Act*, the 45-Day lien claim period prior to the release of holdback shall commence from the date of publication of the Certificate of Substantial Performance as provided for in paragraph GC 8.02.04.05.04.

**GC 8.02.04.06 Substantial Performance Payment and Statutory Holdback Release
Payment Certificates**

- .01 Upon receipt of the application for payment at Substantial Performance, the Contract Administrator shall check the invoice and advise the Contractor of any discrepancies. Any of these discrepancies that are unresolved prior to the expiry of the 45-Day lien period shall be treated as set-offs.
- .02 If there are no outstanding lien claims, the Owner shall issue payment, without holdback on the work done, exclusive of the set-offs, within 30 Days after the expiration of the 45-Day lien period.
- .03 In addition to set-offs, holdback is accrued at the rate of 10%, on all work performed after the date of the application for payment at Substantial Performance.
- .04 If this Contract extends over more than one construction season and there are no outstanding lien claims, the Owner shall issue payment to reduce the holdback on work done from 10% to 2½%, plus the amount of the Owner's set-offs, not more than 5 Days after January 31st in each calendar year the Contract extends, provided that the Contract had not been substantially performed and the estimated value of the work performed is greater than 60% of the original tender value for a

contract having an expected duration of two construction seasons or less, or 40% for a Contract having an expected duration of more than two construction seasons.

GC 8.02.04.07 Certificate of Contract Completion

- .01 Application for Contract Completion may be requested by the Contractor once all services and Material required by the Contract have been supplied, exclusive of any warranties, and shall be submitted in the form of a letter, accompanied with:
 - a) An application for payment at Contract Completion in a form satisfactory to the Contract Administrator for all work to date, the amount of the 10% holdback, and the amount due the Contractor.
 - b) A release, on the Owner standard form PH-CC-817, Application for Substantial Performance/Contract Completion, by the Contractor to the Contract Administrator releasing the Owner from all further claims related to the Contract qualified by stated exceptions (e.g., outstanding submissions or matters arising out of subsection GC 3.14, Clarifications and Claims).
 - c) A statutory declaration, on Owner standard form PH-CC-817, Application for Substantial Performance/Contract Completion, by the Contractor to the Contract Administrator that all liabilities incurred by the Contractor and Subcontractors in carrying out the Contract have been discharged, except for the statutory holdbacks properly retained.
 - d) A satisfactory Certificate of Clearance from the Workplace Safety and Insurance Board.
- .02 Upon confirming the Contract is complete, the Owner shall issue a Certificate of Contract Completion on the Owner standard form PH-CC-890, Certificate of Contract Completion, and shall set out in the form the date on which the Contract was completed (date of Contract Completion) and within 7 Days after the signing the said certificate, the Owner shall provide a copy to the Contractor. A Certificate of Substantial Performance shall also be provided, if not previously requested by the Contractor.
- .03 If the Contractor has not previously received a Certificate of Substantial Performance, upon receipt of a copy of the Certificate of Contract Completion and the Certificate of Substantial Performance, the Contractor shall arrange to have the Certificate of Substantial Performance published in the *Daily Commercial News* and the Contractor shall provide to the Contract Administrator proof that the certificate was published. Where the Contractor fails to publish a Certificate of Substantial Performance within 7 Days of receiving the certificate, the Owner may publish the certificate in the *Daily Commercial News* and charge the Contractor \$400 for the costs of advertising and administration. The 45-Day lien period shall start on the date the certificate is published in the *Daily Commercial News*.
- .04 The Certificate of Contract Completion may be issued although not all required Contractor submissions have been provided. The Contractor shall provide all outstanding submissions (e.g., test results, Record Drawings, and manuals) within 20 Business Days of the date of Certificate of Contract Completion. It is anticipated the Owner shall incur damages after such time should the submissions not be received within the above time. The parties agree that liquidated damages of \$400 per Day shall be charged to the Contractor for each Day after 20 Business Days of the date of Certificate of Contract Completion until all submissions have been received.
- .05 Upon receipt of the application for payment at Contract Completion, the Contract Administrator shall check the invoice and advise the Contractor of any discrepancies. Any of these discrepancies that are unresolved prior to the expiry of the 45-Day lien period may be treated as a set-off.

- .06 Upon conclusion of the 45-Day lien period, and provided no liens have been received, all remaining holdback, exclusive of set-offs, shall be paid by the Owner, within 30 Days.

GC 8.02.04.08 Interest

- .01 Interest due the Contractor is based on simple interest and is calculated using the applicable Rates of Interest.

GC 8.02.04.09 Interest for Late Payment

- .01 When the Contractor has complied with the requirements of the Contract and when payment by the Owner to the Contractor for Work performed or for release of statutory holdback is delayed by the Owner, then the Contractor shall be entitled to payment for Work performed at the Rates of Interest from a date or dates derived from the following:
- a) Progress payment due date: a date 30 Days after the cut-off date;
 - b) Subcontract completion and subcontract statutory holdback: a date 75 Days after the date the subcontract is certified complete;
 - c) Substantial Performance and statutory holdback: a date 75 Days after the date the Certificate of Substantial Performance is published;
 - d) Contract Completion and holdback: a date 75 Days after the date the Contract is certified complete.

GC 8.02.04.10 Interest for Clarifications and Claims

- .01 Except as hereinafter provided, where a Request for Clarification and any subsequent Claims are submitted according to the time limits and/or procedure described by section GC 3.14, Clarification and Claims, the Owner shall pay the Contractor the Rates of Interest on the amount of the negotiated price for the Work or on the amount of the settled Claim. Such interest shall commence from a date 30 Days next following the established cut-off date which immediately follows the completion of the work to which the negotiation applies.

GC 8.02.04.11 Owner's Set-Off

- .01 Pursuant to Section 12, Set-off by Trustee, of the *Construction Lien Act*, the Owner may retain from monies owing to the Contractor under this or any other contract an amount sufficient to cover any outstanding or disputed liabilities, including the cost to remedy deficiencies, the reduction in value of substandard portions of the Work, claims for damages by third parties that have not been determined in writing by the Contractor's insurer, undetermined claims by the Owner under paragraph GC 8.01.02, a), and any assessment due the Workplace Safety and Insurance Board.
- .02 Under these circumstances the Owner shall give the Contractor appropriate notice of such action.

GC 8.02.04.12 Contract Completion and Statutory Holdback Release Payments

- .01 Payment for subcontracts certified complete, including release of holdback shall be made within 105 Days of the date on which the Work was certified complete.
- .02 Payments for Work certified as substantially performed, including release of holdback, shall be made within 120 Days of the date of publication of substantial performance. The Owner shall reduce the holdback to 2½% at the end of the 45-Day lien period providing all liens are discharged. This payment shall be made within 30 Days of the expiry of the 45-Day lien period.

- .03 Final payment including release of holdback shall be made within 105 Days of the date of Contract Completion. Where the Contractor does not apply for Substantial Performance, final payment including release of holdback shall be made within 120 Days of the date of publication of Substantial Performance. In this case the Owner shall reduce the amount of holdback held to 2½% at the end of the 45-Day lien period providing all liens are discharged. This payment shall be made within 30 Days of the expiry of the 45-Day lien period.
- .04 The time periods stated in clause GC 8.02.04.12, Contract Completion and Statutory Holdback Release Payments, are all dependent on the Contractor returning the appropriate documents within the time stipulated in paragraph GC 8.02.04.07.04.

GC 8.02.04.13 Liens Filed Late

- .01 In cases where a lien is not preserved (i.e., the claimant files a claim outside the time limits prescribed in the *Construction Lien Act*), the Owner shall record the claim as an "out of time" lien. The Owner shall set-off the amount of the claim but only to the extent of the funds already held by the Owner with respect to the work which the claim has been filed against.
- .02 In cases where a lien has been preserved within the time allowed, but not perfected according to the *Construction Lien Act*, the Owner shall continue to hold the amount of the claim; however, the 25% security for costs held when the lien was preserved shall be released and included in the Contract payment.
- .03 The Owner shall be responsible for the final disposition of funds withheld under the circumstances noted in paragraphs GC 8.02.04.13.01 and GC 8.02.04.13.02.

GC 8.03 Payment on a Time and Material Basis

GC 8.03.01 Definitions

For the purpose of subsection GC 8.03, Payment on a Time and Material Basis, the following definitions apply:

Actual Payroll Burden means the payments in respect of the following list of items. No other items shall be permitted in the calculation of the Contractor's Actual Payroll Burden.

- a) **Vacation** means the Contractor's paid time off for vacation earned in each year calculated at salary cost, including overtime, according to the Contractor's policy.
- b) **Sick Leave** means the Contractor's paid time off due to sickness, accident, or injury or specific personal and family issues such as bereavement leave, jury duty, and similar leaves. Such paid time off is according to Contractor's policy and calculated at salary cost.
- c) **Statutory Holidays** means the Contractor's paid time off according to Ontario law and established custom.
- d) **Training** means the Contractor's paid time for employees to maintain and increase their level of skills pertaining to their position.
- e) **Employment Insurance** means the Contractor's portion of employment insurance premiums incurred according to the Employment Standards Act.
- f) **Group Life Insurance** means the premium paid by the Contractor to employee group life and short and long term disability insurance plans.

- g) **Employer Health Tax** means the premium incurred by the Contractor for the year according to the Employer Health Tax Act of Ontario.
- h) **Group Medical Plan** means the premium paid by the Contractor for group health insurance plans providing coverage of health care costs not covered by the basic government health plan.
- i) **Workplace Safety and Insurance Board** means the WSIB premium incurred by the Contractor for the year according to Workplace Safety and Insurance Act.
- j) **Contractor Pension Plan** means the Contractor's pension plan cost, including the cost of funding the pension benefits earned by employees and cost of services of third parties incurred for the pension plan.
- k) **Canada Pension Plan** means the Contractor's portion of Canada pension plan contribution incurred according to the Canada Pension Plan Act or its equivalent for non-residents.
- l) **Union Contributions** means the premium paid by the Contractor to a union according to active collective agreements. Items such as Industry Funds paid to a Trustee and Legal Benefits identified in such agreements are to be included under this item.

Cost of Labour means the amount of wages, salary, travel expenses, travel time, room and board, and Actual Payroll Burden paid or incurred directly by the Contractor to or in respect of labour and supervision actively and necessarily engaged on the Work on a Time and Material Basis based on the recorded time and hourly rates of pay for such labour and supervision but shall not include any payment or costs incurred for general supervision, administration, or management time spent on the entire Work or on any wages, salary, or Actual Payroll Burden for which the Contractor is compensated by any payment made by the Owner for Equipment.

Travel expenses, travel time, and room and board shall be justified by the Contractor and, if requested, the Contractor shall supply the Owner with proof of the expenditure. Reasonable costs for room and board shall only be paid if the Work on a Time and Material Basis extends the time that the Contractor's labour is on-site or if the Contractor hires labour that is not normal to the Contract and room and board is charged.

Cost of Material means the cost of Material purchased or supplied from stock and valued at current market prices for the purpose of carrying out Work on a Time and Material Basis by the Contractor or by others when such arrangements have been made by the Contractor for completing the Work on a Time and Material Basis, as shown by itemized invoices.

Mark-Up means the amount of administrative overhead and project overhead costs incurred by the Contractor and an amount for profit. Administrative overheads and project overheads include but are not limited to the following:

Advertising, amortization, association and convention fees, audit and accounting fees, bad debt, bank charges and interest, building repairs - head office, capital tax, computer costs, donations, freight and express, insurance - liability and property, interest on long term debt, licences and permits - non Equipment related, management bonuses, management fees subcontracts, management salaries, municipal taxes, office and land - rent or lease, performance, labour and Material bonds, pit rehabilitation - commercial, plans, postage, printing and stationary, promotions, radio, Hand Tools or equipment that are tools of the trade, clothing allowance, sundry, supplies - operation, Utilities: telephone, heat, light, and water, and vehicles repairs - light trucks and autos.

Operated Rented Equipment means Rented Equipment rented or leased for which an operator is provided by the supplier of the Equipment and for which the rent or lease includes the cost of the operator.

Rented Equipment means Equipment that is rented or leased from an individual, firm, or corporation that is not an associate or affiliate of the lessee as defined by the *Securities Act*, R.S.O. 1990, c. S.5, as amended, and is approved by the Contract Administrator.

Standby Time means any period of time that is not considered Working Time and that together with the Working Time does not exceed 10 hours in any one Working Day and during which time a unit of Equipment cannot practically be used on other Work and remains on the site in order to continue with its assigned task and during which time the unit is in fully operable condition.

The 127 Rate means the rate for a unit of equipment as listed in OPSS 127, Schedule of Rental Rates for Construction Equipment, Including Model and Specification Reference, which is current at the time the Work is carried out or, for Equipment that is not so listed, the rate that has been calculated by the Owner, using the same principles as used in determining The 127 Rates.

Work on a Time and Material Basis means Changes in the Work and Additional Work approved by the Contract Administrator for payment on a Time and Material basis. The Work on a Time and Material Basis shall be subject to all the terms, conditions, Standards, and provisions of the Contract.

Working Time means each period of time during which a unit of Equipment of necessity and is actively engaged on a specific operation and the first 2 hours of each immediately following period, during which the unit is not so engaged but during which the operation is otherwise proceeding and during which time the unit cannot practically be transferred to other Work and remains on the site in order to continue with its assigned tasks and during which time the unit is in a fully operable condition.

GC 8.03.02 Daily Work Records

- .01 Daily Work Records reporting the labour and Equipment employed and the Material used shall be prepared by the Contractor's representative. The Daily Work Records shall be signed each Day by both the Contractor's representative and the Contract Administrator. The Contract Administrator will note disagreements on the Daily Work Record prior to signing and return a copy to the contractor. These records shall be used for the basis of payment.
- .02 Daily Work Records shall report the labour and Equipment employed, both working time and downtime, and the Material used on Owner standard form PH-CC-754, Daily Work Record. Daily Work Records shall include a brief description of the work being carried out and location of such work.
- .03 For each Day that a Daily Work Record is required under these provisions, the Contractor shall deliver daily to the Contract Administrator's representative at the working area a Contractor signed copy of the Daily Work Record.
- .04 The Contractor's failure to keep or deliver Daily Work Records or to keep complete Daily Work Records may limit the Contractor's ability to recover its costs.

GC 8.03.03 Payment for Work

- .01 Payment as herein provided shall be full compensation for all labour, Equipment, and Material to do the Work on a Time and Material Basis, except where there is agreement to the contrary prior to the commencement of the Work on a Time and Material Basis.
- .02 Payment for labour, Rented Equipment, and Operated Rented Equipment intended for use on other Work but has been idled due to the circumstances giving rise to the Work on a Time and Material Basis shall be negotiated according to subsection GC 3.14, Clarification and Claims. Consideration shall be given to removing the labour and Equipment from the site until the idled Work can be resumed.

GC 8.03.04 Payment for Labour

- .01 The Owner shall pay the Contractor for labour used on each Time and Material basis at 100% of the Cost of Labour. Payroll Burden shall not be applied to room and board and or travel expenses when calculating the Cost of Labour.
- .02 Payments in respect of Payroll Burden shall be made at the following rates:
- a) Union workers - 40% of the wages and salary portion of the Cost of Labour.
 - b) Non-union workers - 30% of the wages and salary portion of the Cost of Labour.
 - c) Alternatively, the Contractor's external auditor shall complete, sign, and submit a copy of the Contractor's Actual Payroll Burden. The following shall apply when this option is used:
 - i. Actual Payroll Burden shall be calculated using Owner standard form PH-CC-819, Actual Payroll Burden, and only those items stated under clause GC 8.03.01, Definitions, shall be included.
 - ii. Owner standard form PH-CC-819, Actual Payroll Burden, shall be completed by the Contractor's external auditor and filed with the Contract Management Office, St Catharines.
 - iii. The Actual Payroll Burden shall be filed annually and shall be applied from April 1 of each year to March 31 of the following year. The Actual Payroll Burden can be adjusted once annually upon submission of a revised Owner standard form PH-CC-819, Actual Payroll Burden, completed by the Contractor's external auditor.
 - iv. The Owner shall apply union workers or non-union workers Payroll Burden whichever is applicable, to Contractors failing to provide an annual update by April 1 of the current year. Once Owner standard form PH-CC-819, Actual Payroll Burden, is received, the Owner shall apply the new rate from the date of receipt of an acceptable Actual Payroll Burden to March 31 of the following year.
 - v. The Contractor's Actual Payroll Burden rate shall apply universally to all labour areas across the province.
 - d) At the Owner's discretion, a review of the Actual Payroll Burden may be conducted, in which case, the Actual Payroll Burden so determined at the time of the review shall be applied to all Work on a Time and Material Basis affected. Upon request, the Contractor shall make available all records in support of the Actual Payroll Burden calculation submitted.

GC 8.03.05 Payment for Material

- .01 The Owner shall pay the Contractor for Material at 100% of the cost of the Material.

GC 8.03.06 Payment for Equipment

GC 8.03.06.01 Working Time

- .01 The Owner shall pay the Contractor for the Working Time of all Equipment other than Rented Equipment and Operated Rented Equipment used on the Work on a Time and Material Basis at 75% of The 127 Rates.
- .02 The Owner shall pay the Contractor for the Working Time of Rented Equipment used on the Work on a Time and Material Basis at 110% of the invoice price. A Contractor shall obtain approval from

the Contract Administrator prior to the use of the Rented Equipment, if 110% of the invoice price is greater than 75% of The 127 Rates.

- .03 The Owner shall pay the Contractor for the Working Time of Operated Rented Equipment used on the Work on a Time and Material Basis at 110% of the Operated Rented Equipment invoice price approved by the Contract Administrator, prior to the use of the Equipment on the Work on a Time and Material Basis.
- .04 When Equipment is transported solely for the purpose of the Work on a Time and Material Basis to or from the Working Area on a Time and Material basis, payment shall be made by the Owner only in respect of the transporting units. When Equipment is moved under its own power it shall be deemed to be Working. The method of moving Equipment and the rates shall be subject to the approval of the Contract Administrator.

GC 8.03.06.02 Standby Time

- .01 The Owner shall pay the Contractor for Standby Time of all Equipment other than Rented Equipment and Operated Rented Equipment at 50% of The 127 Rate.
- .02 The Owner shall pay for Rented Equipment and Operated Rented Equipment at 100% of the invoice price where it is necessary to retain Equipment in the Working Area for extended periods agreed to by the Contract Administrator.

GC 8.03.06.03 Payment for Work by Subcontractors

- .01 Where the Contractor arranges for Work on a Time and Material Basis, or a part of it, to be performed by Subcontractors on a Time and Material basis and has received approval prior to the commencement of the Work according to the requirements of subsection GC 3.09, Subcontracting by the Contractor, the Owner shall pay the cost of Work on a Time and Material Basis by the Subcontractor calculated as if the Contractor had done the work on a Time and Material basis.

GC 8.03.06.04 Mark-Up on Work on a Time and Material Basis

- .01 Payment for Mark-Up on Work on a Time and Material Basis shall be made at the following rates:
 - a) Contractor Mark-Up

15% applied to the total payment for labour, Equipment, and Material when the work was completed by the Contractor.
 - b) Subcontractor Mark-Up

15% applied to the total payment for labour, Equipment, and Material when the work was completed by the Subcontractor.
 - c) Contractor Mark-Up on Subcontractors Work on a Time and Material Basis:

10% mark-up allowed on Subcontractor's total labour, Equipment, and Material after Subcontractor Mark-Up is applied. If Work on a Time and Material Basis is assigned or sublet to an associate, as defined by the *Securities Act*, R.S.O. 1990, c. S.5, as amended, no Contractor Mark-Up is permitted.

GC 8.03.06.05 Submission of Invoices

- .01 At the start of the Work on a Time and Material Basis, the Contractor shall provide the applicable labour and Equipment rates not already submitted to the Contract Administrator during the course of the Work. The Contractor shall provide documented proof of labour and Equipment rates when requested by the Contract Administrator.
- .02 A separate Owner standard form PH-CC-796, Time and Material Summary for Payment, shall be completed for Contractor and Subcontractor Work on a Time and Material Basis. Each completed form shall include the Change Order number and covering dates of the Work on a Time and Material Basis and shall itemize separately payment for labour, payment for Materials, and payment for Equipment. Invoices for Materials, Rented Equipment, and other charges incurred by the Contractor on the Work on a Time and Material Basis shall be included with each summary.
- .03 Each month the Contract Administrator shall include with the monthly progress payment certificate, the costs of the Work on a Time and Material Basis incurred during the preceding month all according to the Contract administrative procedures and the Contractor's invoice of the Work on a Time and Material Basis.
- .04 The final Owner standard form PH-CC-796, Time and Material Summary for Payment, shall be submitted by the Contractor within 60 Days after the completion of the Work on a Time and Material Basis.

GC 8.04 Release from Warranty

- .01 At the expiry of the last warranty period and after correction of all deficiencies, the Owner shall issue to the Contractor the Owner standard form PH-CC-895, Release from Warranty Certificate.

GC 8.05 Records

- .01 The Contractor shall maintain and keep accurate Records relating to the Work, Changes in the Work, and Claims arising there from in sufficient detail to support the total cost of the Work, Changes in the Work, and Claims. The Contractor shall preserve all such original Records until 12 months after the Release from Warranty Certificate is issued or until all claims have been settled, whichever is longer. The Contractor shall require that Subcontractors preserve all original Records pertaining to the Work, Changes in the Work, and Claims arising there from for a similar period of time.
- .02 If, in the opinion of the Contract Administrator, Daily Work Records are required, the Contractor shall complete such Daily Work Records for the Work or such specific part of the Work requested.

GC 8.06 Taxes and Duties

- .01 Where a change in Canadian Federal or Provincial taxes occurs after the date of tender closing for this Contract, and this change could not have been anticipated at the time of bidding, the Owner shall increase or decrease Contract payments to account for the exact amount of tax change involved.
- .02 Claims for compensation for additional tax cost shall be submitted by the Contractor to the Contract Administrator on Owner standard form, PH-CC-725 Tax Change Statement. Such claims for additional tax costs shall be submitted not later than 30 Days after the date of completion of the Work.
- .03 Where the Contractor benefits from a change in Canadian Federal or Provincial taxes, the Contractor shall submit a statement of such benefits to the Contract Administrator on Owner

standard form, PH-CC-725 Tax Change Statement. This statement shall be submitted not later than 30 Days after the date of completion of the Work.

- .04 The Contract Administrator reserves the right to make deductions from regular progress payments to compensate for the estimated benefit from decreased tax costs. Such deductions shall be set-off from Contract payments pending receipt of the statement itemizing the benefits that have resulted from a decrease in tax costs at which time the final payment adjustment shall be determined.
- .05 The Contractor shall add the HST to all invoices.

GC 8.07 Liquidated Damages

- .01 When liquidated damages are specified in the Contract and the Contractor fails to complete the Work according to the Contract, the Contractor shall pay such amounts as are specified in the Contract Documents.

TABLE 7.02-1
Layout Intervals and Measurement Accuracy
for Construction Survey - Layout

Activity	Interval m	Measurement Accuracy mm	Remarks
Layout - Rock - Earth	10 25	-	With the exception of plus sections, layout is normally at the same interval as the cross-sections/grade calculations. This may be varied when extreme changes in horizontal and vertical alignment are encountered.
Maximum for setting structure footing grades	10	-	
Set structure grades	-	1	
Adjustment to slope stake distances to allow for grubbing losses	-	300	
Set grades for earth grading	-	10	
Set grades for granular	-	5	
Layout stake offset for curb and gutter	-	-	2 m but may be varied to suit conditions
Stake layout for curb and gutter	10	-	May be necessary to reduce for very sharp curves
Set curb and gutter grades	-	1	
Staking maximum for layout of a radius, intersections	3	-	
Layout stake offset for concrete pavement	-	-	2 m offset
Set concrete pavement grades	-	1	

TABLE 7.02-2
Layout Intervals and Measurement Accuracy
for Construction Survey - Cross-Sections

Activity	Interval m	Measurement Accuracy mm	Remarks
Backsight and foresight readings	-	1	
Maximum allowable error between adjacent Bench Marks	-	5	
Intermediate road readings - earth cut - rock cut - rock cut with overburden - muskeg excavation - fills with stripping, sub-excavation, or ditching - transition from cut to fill - fills - earth or rock fills - borrow pits	25 10 10 25 25 25 25 25 25 25	10	
Maximum transverse interval for cross-section elevations - earth - rock - borrow	25 10 25	-	
Measure offset distances	-	100	

**TABLE 8.02.04.02-1
Fuel Consumption Rates**

	Item Description	Notes	Diesel Fuel Consumption Rates
1	Clearing including Close Cut Clearing		237 l/ha
2	Grubbing		163 l/ha
3	Earth Excavation and Earth Borrow	1	1.7 l/m ³
4	Rock Excavation	2	0.6 l/m ³
5	Rock Embankment		1.6 l/m ³
6	Rock Face		1.2 l/m ²
7	Select Subgrade Material (SSM)		1.0 l/t
8	Granular A, B ,O, and RSS Backfill	9	1.9 l/t
9	All Asphalt Pavement, except Superpave FC2 Pavement	10	11.5 l/t
10	Superpave FC2 Pavement	10	14.3 l/t
11	Concrete Pavement		4.9 l/m ²
12	Structural Concrete	3	5.5 l/m ³
13	Tall Wall, any non-precast barrier wall, including asymmetric		3.2 l/m
14	Milling by m ² Items	4	0.4 l/m ²
15	Milling by tonne Items	5	3.0 l/t
16	Pulverize		0.2 l/m ²
17	Cold In Place Recycling		0.4 l/m ²
18	Concrete Removal, all complete structural concrete	6	1.0 l/m ³
19	Concrete Removal, concrete base and pavements		0.9 l/m ²
20	Asphalt Removal	7	0.4 l/m ²
21	Piling & Caissons		5.0 l/m
22	Sewers & Drainage	8	8.0 l/m
23	Rock Supply		1.4 l/m ³

Notes:

- Also includes the tender item Earth Excavation for Structures when the quantity is greater than 100 m³.
- If the Contract has a Rock Excavation item but not the Rock Embankment item, the diesel fuel consumption rate for Rock Excavation shall be 2.2 l/m³.
- Structural concrete is normally a lump sum item that has no quantity listed in the Contract Documents. The Contract Administrator shall calculate the quantity for this item or get concrete ticket summary sheets for this item. This item does not include deck joint assemblies or modifications, concrete patches, or precast units.

Includes the following items:

- concrete in deck	- high performance concrete in sub structures
- concrete in substructure	- concrete in structure
- concrete in culverts	- concrete in approach slab
- high performance concrete in deck	- high performance concrete in barrier walls
- concrete in footing, structure	- concrete in parapet walls
- concrete in substructure and retaining wall	

Table continued on next page

Table continued from previous page

4. Includes the following items:
 - removal of asphalt pavement from concrete surfaces
 - removal of asphalt pavement, partial depth
 - removal of asphalt pavement from concrete surfaces on structures
 - reclaim asphalt pavement, full depth
 - remove asphalt pavement and salvage; full depth
 - reclaim asphalt pavement, full depth over concrete
5. Includes the following items:
 - reclaim asphalt pavement, partial depth
 - remove asphalt pavement and salvage, partial depth
6. Includes the following items:
 - removal of bridge structures
 - concrete removal, full depth
 - concrete removal, complete deck
7. Includes the following items:
 - removal of asphalt pavement
8. Sewers and drainage is to be applied to sewers that are 300 mm in diameter or larger. Subdrains do not receive compensation. Catch basins with a single stub outlet receive no compensation nor do flexible pipe culverts.
9. 60% of the Diesel Fuel Consumption Rate shall apply to the production and stockpiling of Granular A, B, O, and RSS Backfill. 40% of the Diesel Fuel Consumption Rate shall apply to Granular A, B, O, and RSS Backfill supplied from existing stockpiles that are the property of the Owner.
10. When measurement for payment of asphalt is by square metre, for the purpose of fuel price index payment adjustment calculation, square metre asphalt quantities shall be converted to tonnage (T_{mix}) using the following formula, rounded to one decimal according to LS-100:

$$T_{mix} = [BRD_s \times (T_D/1000) \times A_{mix}]$$

Where: $BRD_s = 2.50 \text{ t/m}^3$
 TD = average asphalt thickness from core measurements, mm
 A_{mix} = quantity of asphalt placed, m^2



GENERAL SPECIFICATION FOR THE MANAGEMENT OF EXCESS MATERIALS

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APPENDICES

180-A Commentary

180.01 SCOPE

This specification covers requirements for the management of excess materials.

Where the management of excess material requirements of other Ontario Provincial Standard Specifications differs from this specification, the requirements of this specification will take precedence.

180.01.01 Specification Significance and Use

This specification has been developed for use in provincial-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

180.01.02 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.

180.02 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.

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

Ontario Provincial Standard Specifications, Construction

OPSS 206	Grading
OPSS 209	Swamp Excavation

Ontario Provincial Standard Specification, Material

OPSS 1004	Aggregates - Miscellaneous

Canadian and Provincial Statutes

Environmental Protection Act, R.S.O. 1990, c.E.19 & R.R.O. 1990, Regulation 347
Transportation of Dangerous Goods Act, 1992, S.C. 1992, c. 34
Fire Protection and Prevention Act, 1997, S.O. 1997, CHAPTER 4

180.03 DEFINITIONS

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

Bituminous Pavement means any combination of asphaltic material and aggregate, excluding asbestos modified asphaltic material.

Commercial Waste means waste described as commercial waste in Regulation 347, under the Environmental Protection Act, Ontario.

Concrete means concrete mixtures produced with Portland cement and may include blended hydraulic cement, supplementary cement materials, spent debris and silica sand abrasive blasting media from abrasive cleaning of concrete and reinforcing steel, and concrete brick and block and associated mortar. It may include embedded steel and excludes asbestos modified Portland cement concrete mixtures.

Disposable Fill means excess material other than that disposed of at a certified disposal site and that is managed in berms and mounds and as fill other than in road embankments.

Earth means earth as defined in OPSS 206.

Excess Material means material removed under the Work specified in the Contract Documents for which management is not specified and includes surplus and unsuitable materials.

Fabricated Metal and Plastic Products means metal and plastic products such as culverts, fence materials, and guide rails. It does not include containers, other packaging materials, storage tanks, septic tanks and ancillary equipment associated with sanitary sewage systems, septic systems, and fuel or lubricant dispensing and storage systems.

Groundwater means subsurface water and water that occurs beneath the water table in soils and rock formations that are fully saturated.

Manufactured Wood means wood that is not entirely natural wood.

Masonry means clay brick and associated mortar.

Natural Wood means stumps, trunks, branches, debris from tree and shrub removal, and wood products that are not treated, coated, or glued.

Non-Hazardous Solid Industrial Waste means waste described as non-hazardous solid waste in Regulation 347, under the Environmental Protection Act, Ontario.

Re-Use means using, processing, re-processing, or recycling of excess material into a construction material or other useful product and managed by these means for the Contract and other work.

Rock means rock as defined in OPSS 206.

Subject Waste means waste defined as subject waste in Regulation 347, under the Environmental Protection Act, Ontario.

Swamp Material means swamp material as defined in OPSS 209.

Waste means excess material that is not managed by re-use, open burning, or as disposable fill and includes any excess material.

Waterbody means waterbody as defined in OPSS 182.

180.04 DESIGN AND SUBMISSION REQUIREMENTS

180.04.01 Submission Requirements

180.04.01.01 Notification of Site Selection, and Property Owner Release

A copy of the completed MTO form PH-CC-181, Site Selection Notification for Stockpiling Materials Managed Through Re-Use, or MTO form PH-CC-182, Site Selection Notification for Material Managed as

Disposable Fill or both shall be submitted to the Contract Administrator and the property owner at least two weeks prior to the use of the property. These forms are not required for property owned by the Owner or designated for use in the Contract Documents.

At the completion of such work, a completed copy of the MTO form PH-CC-183, Property Owner's Release, shall be provided to the Contract Administrator.

180.04.01.02 Verification of Management by Disposal as Non-Hazardous Solid Industrial or Commercial Waste

When excess material is managed by disposal as non-hazardous solid industrial or commercial waste, a copy of the weigh ticket or receipt provided by the disposal site operator shall be submitted to the Contract Administrator on a weekly basis. When such documentation is not available, written confirmation that the waste has been received shall be obtained from the operator of the disposal site and submitted to the Contract Administrator within two weeks after disposal activities are complete.

Within three weeks of the completion of all disposal activities associated with the work, a completed copy of the MTO form PH-CC-184, Waste Quantity Report, shall be submitted to the Contract Administrator and shall account for all excess material managed by disposal as solid non-hazardous industrial or commercial waste.

180.04.01.03 Notification of Forest Resource Licensees

Forest resource licensees identified in the Contract Documents shall be notified at least two weeks prior to commencement of open burning.

180.04.01.04 Environmental Compliance Approval

When Environmental Compliance Approval(s)/Certificates of Approval for a Waste Management System or a Waste Disposal Site are required, a copy of such approval shall be submitted to the Contract Administrator prior to transporting excess material or waste from the Working Area.

180.04.01.05 Subject Waste Documentation

For each subject waste specified in the Contract Documents that is being shipped from the Working Area to a waste disposal site, the following shall be completed:

- a) The Contract Administrator shall be notified at least two weeks prior to the first shipment of subject waste, and at least 24 hours prior to each subsequent shipment of subject waste.
- b) A Regulation 347 manifest with Part B completed by the carrier for each truckload of subject waste, shall be submitted to the Contract Administrator for Part A completion. Copies #1 and #2 of the manifest with Part A and B completed shall be retained by the Contract Administrator and the remaining copies #3 to #6 returned to the carrier.
- c) Copy #6 of the Regulation 347 manifest shall be submitted to the Contract Administrator at the mailing address indicated on Part A of the manifest, within four weeks of the shipment of subject waste from the Working Area.

For each subject waste that is generated by the Contractor's operations and that is not specified in the Contract Documents that is being shipped from the Working Area to a waste disposal site, the following documentation shall be submitted to the Contract Administrator.

- a) Prior to shipment of the subject waste:

- i. Test results from testing to determine the Regulation 347 waste class and characteristics of the subject waste from the Canadian Association for Laboratory Accreditation (CALA) accredited laboratory selected by the Contractor;
- ii. Notification from the Ministry of the Environment and Climate Change (MOECC) Hazardous Waste Information Network (HWIN) of the registration of the subject waste to obtain a Regulation 347 Generator Registration Number (GRN); and
- iii. A duplicate of Copy #2 of the Regulation 347 manifest with Parts A and B completed and signed by the generator and carrier respectively.

b) After shipment of the subject waste:

- i. Notification of payment of all registration, manifest, and tonnage fees associated with the shipment from the MOECC HWIN;
- ii. A duplicate of Copy #6 of the Regulation 347 manifest with Part C completed and signed by the receiver; and
- iii. Notification of de-activation of the Regulation 347 GRN in the MOECC HWIN.

A record of all test sample numbers and sample dates shall be kept and submitted to the Contract Administrator upon request.

180.04.01.06 Excess Material Audit or Inventory Document

When an excess material audit or inventory is imposed by statute or is a condition specified in the Contract Documents, a copy of the audit or inventory documents shall be provided to the Contract Administrator.

180.04.01.07 Alternative Management Condition Approvals

When certain excess material is to be managed according to the conditions approved in writing by the local District office of the MOECC and such conditions differ from those specified in Table 1, a copy of such approval shall be submitted to the Contract Administrator at least two weeks prior to commencement of the work governed by the condition.

180.07 CONSTRUCTION

180.07.01 Conditions on Management of Excess Material - General

Management of excess material shall be as described in Tables 1 and 2 and the appropriate subsections of this specification, unless prior alternative management conditions are approved in writing by the MOECC.

When an excess material is a mixture of materials, it shall be managed in compliance with the most stringent conditions associated with any of the constituent excess material.

When excess material includes asbestos waste, the asbestos waste shall be managed as specified in the Contract Documents.

Excess materials shall not be permitted in waterbodies, and environmentally sensitive areas as identified in the Contract Documents, except when re-used according to the appropriate Ontario Provincial Standard.

180.07.02 Conditions on Management by Re-Use

Management of excess material by re-use for incorporation into the Work or for other designated re-use shall be as specified in the Contract Documents.

Management by re-use shall otherwise be outside the Owner's property.

Distance separations described in Table 2 do not apply for the following:

- a) Re-use of excess materials for the same purpose.
- b) Re-use of bituminous pavement, concrete, and masonry within a road right-of-way.
- c) Re-use of concrete as aggregate in bituminous pavement.
- d) Re-use of concrete as rip-rap, gabion stone, or rock protection according to the requirements of OPSS 1004.

Except cutting for construction purposes, excess material consisting of manufactured wood shall not be reprocessed.

180.07.03 Conditions on Management as Disposable Fill

Management of excess material as disposable fill, including sidecasting of swamp material, within the Owner's property and on other property designated in the Contract Documents shall be as specified in the Contract Documents.

Natural wood and debris from open fires may be managed as disposable fill only within a road right-of-way or on property with a boundary common to a road right-of-way, both within the Contract limits.

Such material shall be top covered by at least 300 mm of earth or topsoil.

180.07.04 Conditions on Management by Open Burning

Management of excess material by open burning is permitted only when specified in the Contract Documents. Where management by open burning is permitted, it shall be subject to the following conditions and conducted according to the Fire Protection and Prevention Act, 1997 where it applies, and with any applicable, local, municipal by-law(s):

- a) A permit from the Ministry of Natural Resources and Forestry (MNRF) under the Fire Protection and Prevention Act, and/or applicable local or municipal by-law shall be obtained by the Contractor for open burning, as required.
- b) Open burning is prohibited in areas subject to a restricted fire zone order as issued by MNRF or to a smog alert advisory as issued by MOECC.

180.07.05 Conditions on Management by Disposal as Non-Hazardous Solid Industrial or Commercial Waste

Management of excess material by disposal as non-hazardous solid industrial or commercial waste at receiving sites designated in the Contract Documents shall be as specified in the Contract Documents.

When receiving sites are not specified in the Contract Documents for management by disposal as non-hazardous solid industrial or commercial waste, such material shall be disposed of at sites identified by the Contractor.

Non-hazardous solid industrial or commercial waste shall be transported from the Working Area directly to a site that has an Environmental Compliance Approval/ Certificate of Approval for a Waste Disposal Site that is valid for non-hazardous solid industrial or commercial waste.

180.07.06**Conditions on Management by Stockpiling**

Management of excess material by stockpiling within the Owner's property and on other property designated in the Contract Documents shall be as specified in the Contract Documents.

Stockpiling shall otherwise be outside the Owner's property.

Stockpiles of bituminous pavement, concrete, and masonry shall be separated according to Table 2 unless either of the following occurs:

- a) Stockpiles are located within a road right-of-way or on property with a boundary common to a right-of-way, both within the Contract limits for a period not exceeding 120 Days.
- b) Stockpiles are located within a provincial or municipal works yard or in a commercially licensed pit or quarry.

For all other excess materials, where Table 1 indicates that stockpiling is subject to management conditions in Table 2, such management conditions shall only apply to stockpiles that are to be in place for a period exceeding 120 Days.

180.07.07**Conditions on Management by Disposal as Subject Waste**

When an excess material is identified as a dangerous goods waste, or a subject waste specified in the Contract Documents, management shall be as follows:

- a) Subject waste shipments shall be manifested and transported directly to a certified waste disposal site.
- b) When the subject waste is also a dangerous good as defined in the Transportation of Dangerous Goods Act (TDGA), the carrier shall provide all necessary TDGA labels and placards.

When an excess material generated by the Contractor's operations may be subject waste and it is not specified in the Contract Documents, the Contractor shall be responsible to manage it according to the following:

- a) Conduct sampling and testing using a laboratory certified by the CALA selected by the Contractor to determine whether it is subject waste and to determine the Regulation 347 waste class and characteristics.
- b) Register all subject waste in the MOECC HWIN and obtain a Regulation 347 GRN for disposal.
- c) Package and label all subject waste for transportation and disposal.
- d) Arrange for shipment of all subject waste to a certified waste disposal site using a certified carrier.
- e) Complete Part A of a Regulation 347 manifest including the GRN obtained from the MOECC HWIN and provide the manifest to the certified carrier for completion of Part B.
- f) Provide a duplicate of Copy #2 of the Regulation 347 manifest to the Contract Administrator with Parts A and B completed and signed.
- g) Pay all registration, manifest and tonnage fees associated with subject waste disposal in the MOECC HWIN.

- h) De-activate the GRN in the MOECC HWIN after shipment of all subject waste to a certified waste disposal site is complete and acceptance of the subject waste is acknowledged by the receiver completing and signing Part C of the Regulation 347 manifest.
- i) Provide a duplicate of Copy #6 of the Regulation 347 manifest to the Contract Administrator upon receipt from the receiver.

When an excess material is tested and found not to be a dangerous good waste or a subject waste, it shall be managed by disposal as Non-Hazardous Solid Industrial or Commercial Waste according to this specification.

180.10 BASIS OF PAYMENT

Payment for the management of excess material shall be included in the tender items requiring such management and shall include all costs associated with acquiring approvals, releases, and agreements.

Payment for the management of excess material that is subject waste generated by the Contractor's operations and not specified in the Contract Documents by the Owner, and is in addition to the cost of disposal as non-hazardous, solid industrial, or commercial waste, shall be administered as a Change in the Work, with provisions subject to testing to verify that the excess material is subject waste.

Table 1
Excess Material Management Conditions

EXCESS MATERIAL DESCRIPTION	Subsection in This Specification				
	Conditions on Management by Re-Use	Conditions on Management as Disposable Fill	Conditions on Management by Open Burning	Conditions on Management by Disposal as Non-hazardous Solid Industrial or Commercial Waste	Conditions on Management by Stockpiling
EARTH	Yes	Yes	n/a	Yes	Yes
SWAMP MATERIAL	Yes	Yes TABLE 2	n/a	Yes	Yes TABLE 2
AGGREGATE	Yes	Yes	n/a	Yes	Yes
ROCK	Yes	Yes	n/a	Yes	Yes
BITUMINOUS PAVEMENT	Yes TABLE 2	Not Permitted	n/a	Yes	Yes
CONCRETE	Yes TABLE 2	Not Permitted	n/a	Yes	Yes
MASONRY	Yes TABLE 2	Not Permitted	n/a	Yes	Yes
MANUFACTURED WOOD	Yes	Not Permitted	Not Permitted	Yes	Yes TABLE 2
NATURAL WOOD	Yes	Yes TABLE 2	Yes	Yes	Yes TABLE 2
DEBRIS FROM OPEN FIRES	n/a	Yes TABLE 2	n/a	Yes	Yes TABLE 2
METAL/PLASTIC POLYSTYRENE PRODUCTS	Yes	Not Permitted	Not Permitted	Yes	Yes
SUBJECT WASTE	Subject waste shall be managed as specified in the subsection for Conditions on Management by Disposal as Subject Waste.				
MATERIALS SUSPECTED OF BEING CONTAMINATED	When excess materials that were not generated by the Contractor's operations and are not specified in the Contract Documents, are suspected of being contaminated, direction on their management shall be obtained from the Contract Administrator.				
OTHER MATERIALS	Excess materials that are not listed above shall be managed as specified in the subsection for Conditions on Management by Disposal as Non-Hazardous Solid Industrial or Commercial Waste, unless prior alternative management conditions are approved in writing by the MOECC.				

Table 2
Excess Material Management Distance Separation Requirements

Adjacent Feature	Minimum Distance Separation
Groundwater	2 m (Above)
Waterbodies	30 m
Water Wells	100 m
Residences	100 m

Appendix 180-A, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.



CONSTRUCTION SPECIFICATION FOR SINGLE AND DOUBLE SURFACE TREATMENT

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304-A	Commentary

304.01	SCOPE

This specification covers the requirements for surface preparation, application of bituminous binder, and application of aggregate for single and double surface treatment.

304.01.01 Specification Significance and Use

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

304.01.02 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.

304.02 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.

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

Ontario Provincial Standard Specifications, Material

OPSS 1006	Aggregates - Surface Treatment
OPSS 1102	Liquid Asphalt
OPSS 1103	Emulsified Asphalt

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:
LS-100 Rounding-Off of Test Data and Other Numbers

Ontario Traffic Manual (OTM):
Book 7 - Temporary Conditions

304.03 DEFINITIONS

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

Appurtenances mean maintenance hole, catch basin, valve chamber, and water valve covers and similar Utility access covers located within the paved portion on the roadway.

Binder means an emulsified asphalt with or without polymer modification used to bind aggregates.

Double Lap means the coverage produced from the application of binder where the binder from each spray bar nozzle overlaps the binder application from the adjacent nozzle by one half.

Double Surface Treatment means two successive single surface treatments.

End Nozzle means a spray bar nozzle which delivers binder to the inside half of a standard spray pattern.

Lot means the quantity of work completed with a tanker truck shipment of binder.

Single Surface Treatment means a single application of bituminous binder followed by a single application of Class 1, Class 2, Class 3, Class 4, Class 5, or Class 6 aggregate.

Triple Lap means the coverage produced from the application of binder where the binder from each spray bar nozzle overlaps the binder application from the adjacent nozzle by two thirds.

304.05 MATERIALS

304.05.01 Binders

Binders shall be according to OPSS 1103.

304.05.02 Aggregates

Aggregates shall be according to OPSS 1006 and as specified in the Contract Documents.

304.06 EQUIPMENT

304.06.01 Pressure Distributor

The pressure distributor shall be designed and manufactured to spray binder on the road surface. The pressure distributor shall be capable of applying binder at the specified rates and in a continuous and uniform manner both longitudinally and transversely for a full lane width.

304.06.02 Mechanical Aggregate Spreader

The mechanical aggregate spreader shall be designed and manufactured to be self-propelled and capable of continuously and uniformly distributing aggregate at the specified application rate.

304.06.03 Rotary Power Brooms

Brooms shall be capable of cleaning gravel, sand, dirt, and other debris from the roadway surface.

304.06.04 Rollers

304.06.04.01 General

Rollers shall be ballasted according to the manufacturer's recommendations.

304.06.04.02 Steel Drum Rollers

Steel drum rollers shall be single drum vibratory rollers according to Table 1 and shall be operated in the static mode, if the drum is not rubber coated. Drive wheels shall not mark the aggregate.

304.06.04.03 Pneumatic-Tired Rollers

Pneumatic-tired rollers shall be self-propelled and be according to Table 2. The wheels shall be mounted with smooth tread rubber tires. Tire inflation pressure shall be a minimum of 350 kPa when the tires are cold. All tires shall have equal pressure. Each roller shall be equipped with a suitable tire pressure gauge for checking tire inflation pressure.

304.06.05 Pilot Vehicle

The pilot vehicle shall be equipped according to the requirements of the OTM, Book 7.

304.07 CONSTRUCTION

304.07.01 Operational Constraints

Surface treating operations shall not be carried out when the ambient temperature at the work location is less than 10 °C or where climatic or site conditions preclude the curing of the binder.

The application of binder and aggregate shall terminate one hour before sunset.

Surface treatment shall not be carried out prior to May 15th south of a line through Pembroke, Magnetawan, and Pointe au Baril Station or prior to June 1st north of the line.

Surface treatment shall not be carried out after September 1st except with the approval of the Contract Administrator. Surface treatment may be extended to September 30th provided a high float emulsion is used.

304.07.02 Sampling

304.07.02.01 Binder

Binder field samples shall be provided for testing purposes as specified in the Contract Documents.

The work shall include sampling, labelling, packaging, and delivery of samples to the laboratory designated in the Contract Documents within 5 Business Days.

A lot shall be deemed to be the quantity of work completed with a shipment (truck tank) of binder. A sample of binder shall be taken at the job site from each shipment of binder and this sample shall represent the lot.

Each binder sample shall consist of a minimum size of two full 4-litre samples of material. The sample containers shall be new triple tight cans with lids or suitable plastic containers of similar capacity which can be closed to prevent any leakage.

Sample containers shall be supplied and filled, leaving only sufficient space to allow for liquid expansion. The sample shall be taken from a sampling spigot on the transfer line, or, if one is not available, from the end of the transfer line. Each sample shall be taken after sufficient material has been drawn from the truck tank to purge the transfer line.

The sample shall be identified using tag PH-CC-349, supplied by the Contract Administrator. In addition, a tag shall be placed on each pail and labelled as A1 of 2" or A2 of 2". Tag PH-CC-349 is only for use by the Owner in the identification of the sample for contract administration purposes.

304.07.02.02 Aggregates

Aggregate samples shall be provided for testing purposes as specified in the Contract Documents.

304.07.03 Determination of Binder and Aggregate Application Rates

The application rate for the binder and the aggregate shall be as specified in the Contract Documents.

Satisfactory compliance to the specified application rates of binder and aggregate shall be demonstrated to the Contract Administrator. At the Contract Administrator's option, this compliance may include a minimum 300 m one lane width trial section to ensure that the binder and aggregate are applied at the specified rate.

304.07.03.01 Equipment

The following equipment shall be supplied for the determination of binder and aggregate application rates:

- a) A portable electronic balance with the following characteristics:
 - i) five digit display,
 - ii) accuracy to 0.1%,
 - iii) capacity 10 kg,
 - iv) minimum platform size of 300 mm by 400 mm.
- b) Sheet metal trays, each 500 mm x 500 mm inside dimension ± 1 mm, with sides 7 mm in height ± 1 mm. The sheet metal shall be a minimum of 18 gauge (approximately 1.3 mm) with soldered corners.
- c) One 5 kg test mass.
- d) A carpenter's level for levelling the balance.

304.07.03.02 Sampling Frequency

Field sampling shall be carried out by the Contractor to determine the binder application rates:

- a) At the start of each Day's work. If the Contractor provides two distributors, the binder application rate of one distributor shall be determined at this time.
- b) When approximately half of the total Day's production is completed. If the Contractor provides two distributors, the binder application rate of the second distributor shall be determined at this time.

Field sampling shall be carried out by the Contractor to determine the aggregate application rates at the start of each Day's work.

304.07.03.03 Procedure

Each section of road used to obtain the application rates shall be a maximum of 50 m in length. Field sampling shall be conducted in the presence of the Contract Administrator, to determine the binder and aggregate application rates as follows:

- a) Set up and level the balance in a firm location protected from the wind.
- b) Check the tolerance of the balance with the 5 kg test mass.
- c) Obtain the tare mass (in kg to three decimal places) of two clean trays and record.
- d) Place the two trays in the centre of the lane being treated approximately 30 cm apart and parallel to the centreline.
- e) Remove the first tray after the binder has been sprayed and before the aggregate has been applied.
- f) Remove the second tray after the binder and aggregate have been applied and before rolling.

- g) Obtain and record the gross mass (in kg to three decimal places) of each tray.
- h) Carefully patch the marks left by the trays using the binder and aggregate specified in the Contract Documents. The patches shall be rolled.
- i) Clean the trays for reuse.

304.07.03.04 Calculations

The following calculations shall be performed in the presence of the Contract Administrator:

- a) Obtain the net mass of the binder applied to the first tray.

Net Mass of Binder = Gross Mass - Tare Mass

- b) Calculate the binder application rate correct to two decimal places.

Binder Application Rate (kg/m²) = Net Mass of Binder x 4

- c) Obtain the net mass of binder and aggregate on the second tray.

Net Mass of Binder and Aggregate = Gross Mass - Tare Mass

- d) Obtain the net mass of aggregate on the second tray.

Net Mass of Aggregate = Net Mass of Binder and Aggregate (from 3 above) - Net Mass of Binder (from 1 above)

- e) Calculate the aggregate application rate correct to one decimal place.

Aggregate Application Rate (kg/m²) = Net Mass of Aggregate (from 4 above) x 4

- f) The calculations shall be promptly reported to the Contract Administrator.

304.07.03.05 Acceptance of Binder Application Rate

The binder application rate is acceptable when the rate is within a tolerance of $\pm 5\%$ of the specified rate.

The binder application rate is unacceptable when the test result is outside the tolerance of $\pm 5\%$ of the desired rate and work shall stop. Field sampling shall be repeated in a maximum of 50 m sections until two consecutive acceptable test results or four unacceptable test results are obtained.

When two consecutive acceptable binder test results are obtained, work may proceed. When four unacceptable binder test results are obtained before two consecutive acceptable test results, the distributor shall be permanently removed from the Working Areas.

304.07.03.06 Acceptance of Aggregate Application Rate

The aggregate application rate is acceptable when the rate of aggregate application is within a tolerance of $\pm 10\%$ of the specified rate.

The aggregate application rate is unacceptable when the test result is outside the tolerance of $\pm 10\%$ of desired rate and work shall stop. Work may proceed when the application rate has been adjusted to the desired rate.

304.07.04 Surface Preparation

Existing bituminous surfaces shall be clean and free of all debris and standing water before application of binder.

Where a binder is to be applied on a granular surface, the surface shall be free of standing water and shall be prepared by dampening, fine grading, and compacting immediately prior to the application of the binder. The surface shall be finish rolled to ensure a compacted smooth and float free surface.

304.07.05 Binder Application Temperatures

Binder application temperatures shall be according to OPSS 1103.

304.07.06 Application of Binder

After the surface has been prepared, the binder shall be uniformly sprayed on the road surface at the specified application rate. When binder is to be applied to two adjacent lanes, the application of binder on the initial pass shall be done without the use of an end nozzle. When binder is applied to the adjacent lane, the nozzle positioned closest to the first application of binder shall be an end nozzle.

The spray bar height shall be adjusted to ensure that there is triple lap of the binder application. At the written request of the Contractor, the Contract Administrator may allow the use of a double lap application.

Longitudinal joints shall be constructed to ensure full coverage on the centreline.

The application of binder shall terminate at the same station for both lanes at the end of each Day.

All roadway appurtenances within the area to be surfaced shall be properly covered and protected immediately prior to single and double surface treatment.

304.07.07 Application of Aggregate

Aggregate shall be uniformly applied at the rate specified. The distance between the pressure distributor and the spreader shall not be more than 30 m.

If excess aggregate is present when constructing a double surface treatment, the excess shall be removed prior to the second application of binder.

304.07.08 Rolling

Immediately after spreading, the aggregate shall be rolled with a minimum of two pneumatic-tired rollers. The entire treated area shall receive two passes from each pneumatic-tired roller.

When the surface treatment is placed on a prepared granular grade, one pneumatic-tired roller shall be replaced by a steel drum roller. The entire treated area shall receive two passes from the pneumatic-tired roller and one pass from the steel drum roller.

Rollers shall be operated at such a speed as to prevent aggregate pick-up, but in no case shall the speed of rollers exceed 10 km/h.

All rolling shall be completed within 300 m of the aggregate spreader. When the combination of rollers is not sufficient to maintain the completed rate of progress, additional rollers shall be used.

304.07.09 Traffic Convoy

When specified in the Contract Documents, traffic shall be convoyed according to the OTM, Book 7.

The pilot vehicle shall guide one-way traffic through or around construction. The maximum speed of the convoy shall be 30 km/h. Convoying shall be maintained until such time as the surface treatment is able to carry traffic without damage.

304.07.10 Protection of the Work

Damaged areas shall be repaired until such time as the work has been accepted by the Contract Administrator.

Signs indicating fresh surface treatment, or similar wording, shall be erected at the limits of the Working Area and any intersections throughout the Working Area immediately after placement of surface treatment and shall remain in place for a minimum of 72 hours.

304.07.11 Management of Excess Material

Management of excess material shall be as specified in the Contract Documents.

304.08 QUALITY ASSURANCE

304.08.01 Binder Material Requirements

Acceptance of the binder shall be based on testing conducted by the Owner or the Owner's agent, using current LS test methods of the MTO Laboratory Testing Manual or ASTM test procedures as specified in OPSS 1102 or 1103.

The Contract Administrator shall determine the acceptability of each lot according to OPSS 1102 or 1103. Lots that are not acceptable shall be removed and repaired or accepted with a price adjustment.

If the Contractor elects to repair the lot in lieu of a payment adjustment, the lot shall be repaired and re-evaluated to the satisfaction of the Contractor Administrator.

304.09 MEASUREMENT FOR PAYMENT

304.09.01 Actual Measurement

304.09.01.01 Binder

Measurement of binder shall be by mass in kilograms.

304.09.01.02 Class 1, 2, 3, 4, 5 or 6 Aggregate

Measurement of aggregate shall be by mass or volume as specified in the Contract Documents

304.09.01.02.01 By Mass

Measurement of aggregate shall be by mass in tonnes.

304.09.01.02.02 By Volume

Measurement of aggregate shall be by volume in cubic metres, loose, by predetermined truck capacities. The predetermined capacity of each truck shall be that computed from its box dimensions.

Loading of each truck shall be kept to not less than the predetermined capacity. The Contractor shall not be required to load trucks in excess of this capacity to allow for bulking, and no deduction shall be made for any settlement of the load during transportation, provided that such settlement is not caused by spillage or leakage.

Each truck shall be uniquely and readily identifiable.

304.09.01.03 Traffic Convoy

Measurement for traffic convoy shall be in hours based on the number of hours that the pilot vehicle is conveying traffic.

304.10 BASIS OF PAYMENT

304.10.01 Binder "type" - Item Class 1 Aggregate - Item Class 2 Aggregate - Item Class 3 Aggregate - Item Class 4 Aggregate - Item Class 5 Aggregate - Item Class 6 Aggregate - Item Traffic Convoy - 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.

Damaged areas requiring repair prior to the acceptance of the work shall be repaired by the Contractor at no additional cost to the Owner.

Payment for any lot of binder which does not meet all Contract requirements shall be subject to a price adjustment, except when the lot sample has been delivered within 5 Business Days of sampling and testing is not started within 14 Days of sampling.

A calculated price adjustment shall be determined, through a system of adjustment points based on test results for any lot sample when tested providing the sample remains in a condition suitable for testing. Where more than one test result is available on any one sample, the test result with the least deviation from the specification limit shall be used to calculate the price adjustment. The price adjustment percentage for the lot is the total number of adjustment points for each sample divided by 25.

A fixed price adjustment of 20 percent of the Contract price shall be made for lots for which the following conditions apply:

- a) A lot sample has not been received for testing; or
- b) The lot sample contains insufficient material for testing; or
- c) The lot sample does not remain in a condition suitable for testing for 14 Days after sampling (e.g., broken emulsion or foam-over during distillation).

304.10.02 Adjustment Points for Emulsified Asphalt Binders

The total number of adjustment points shall be equal to the summation of the number of units that each test deviates from the specification limits times the multiplier as specified in Table 3, plus:

- a) 1000 adjustment points for failure of the Particle Charge Test when the binder type is RS-2, CRS-2, RS-2P, or CRS-2P, HFMS-2(ON) and;

- b) 200 adjustment points for failure of the Coating Test when the binder type is HF-100S, HF-150S, HF-250S, HFMS-2(ON), HF-100SP, HF-150SP or HFMS-2P(ON).

Prior to the summation, all adjustment points shall be rounded to one decimal place according to LS-100.

TABLE 1
Requirements for Steel Drum Rollers

Minimum Drum Diameter mm	Minimum Drum Width mm	Minimum Static Mass per mm of Drum Width kg
1500	2100	2

TABLE 2
Requirements for Pneumatic-Tired Rollers

Roller Class	Minimum Mass t	Minimum Mass per Tire kg
R1	8	900
R2	18	2500
R3	25	3600

TABLE 3
Tests, Units and Multipliers for Emulsified Asphalt Binder

Test	Unit	Multiplier
Residue by Distillation	%	200
Viscosity (less than minimum)	SFs	30
Viscosity (greater than maximum)	SFs	5
Demulsibility (Note 1)	%	50
Residue Penetration @ 25oC	0.1 mm	15
Settlement (Note 2)	%	30
Storage Stability (Note 3)	%	50
Oil Portion of Distillate, by Volume of Emulsion (Note 4)	%	50
Sieve Test	%	1000
Residue Float Test @ 60oC	s	2
Residue Solubility in Trichloroethylene (Note 5)	%	10
Ash Content of Residue, by Mass (Note 5)	%	1000
Residue Elastic Recovery @ 10oC (Note 6)	%	30
Residue Force Ductility @ 800% Elongation, 5 cm/min. pull rate @ 4oC (Note 7)	kg	1000
Residue Apparent Viscosity @ 60oC (Note 8)	Pa.s	10 (Note 9)
Residue Ductility @ 25oC (Note 10)	cm	10
Notes: - For all emulsified asphalt binder types except HF250S. - For emulsified asphalt binder types RS-2, CRS-2, RS-2P, and CRS-2P only. - For emulsified asphalt binder types HF-100S, HF-150S, HF-250S, HFMS-2(ON), HF-100SP, HF-150P, HFMS-2P(ON), and HFRS-2 only. - For emulsified asphalt binder types CRS-2, HF-100S, HF-150S, HF-250S, HFMS-2(ON), CRS-2P, HF-100SP, HF-150SP, and HFMS-2P(ON) only. - The ash content test shall be used instead of the solubility test for Emulsified Asphalt Binder Types RS-2P, CRS-2P, HF-100SP, HF-150SP and HFMS-2P(ON) when the manufacturer indicates that the polymer additive is not soluble in trichloroethylene. - For emulsified asphalt binder types RS-2P, CRS-2P, HF-100SP, HF-150SP and HFMS-2P(ON) only. - For emulsified asphalt binder types RS-2P, CRS-2P, HF-100SP and HFMS-2P(ON) only. - For emulsified asphalt binder types HF-100S, HF-150S, and HF-250S only. - The multiplier will be used when the apparent viscosity plots below AB or AB extrapolated, CD or CD extrapolated, EF or EF extrapolated on Figure: Viscosity Requirements for Distillation Residues from High Float Emulsified Asphalt of OPSS 1103. - For emulsified asphalt binder types RS-2, CRS-2 and HFRS-2 only.		

Appendix 304-A, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.



CONSTRUCTION SPECIFICATION FOR GRANULAR SEALING

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305-A	Commentary

305.01	SCOPE

This specification covers the materials and requirements for the work of surface preparation and the supply and application of sealer to granular shoulders, shoulder rounding, and all other designated areas.

305.01.01 Specification Significance and Use

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

305.01.02 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.

305.02 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.

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

Ontario Provincial Standard Specifications, Construction

OPSS 304	Single and Double Surface Treatment
OPSS 501	Compacting

Ontario Provincial Standard Specifications, Materials

OPSS 1010	Aggregates – Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1102	Liquid Asphalt
OPSS 1103	Emulsified Asphalt
OPSS 2510	Tall Oil Pitch Emulsion

Ontario Ministry of Transportation, Publications

MTO Laboratory Testing Manual:

LS-100	Rounding-Off of Test Data and Other Numbers
LS-200	Penetration of Bituminous Materials
LS-202	Method of Test for Kinematic Viscosity of Asphalts
LS-204	Solubility of Bituminous Materials in Trichloroethylene
LS-205	Ductility of Bituminous Materials
LS-216	Determination of Residue by Distillation of Emulsified Asphalts
LS-217	Determination of Oil Portion of Distillate in Emulsified Asphalt Primers
LS-218	Particle Charge of Emulsified Asphalt and Emulsified Asphalt Primers
LS-219	Viscosity of Emulsified Asphalts

LS-221	Settlement and Storage Stability of Emulsified Asphalt
LS-223	Sieve Test for Emulsified Asphalts

ASTM International

D 1310-14	Standard Test Method for Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus
D 402/D 401M-14	Standard Test Method for Distillation of Cutback Asphaltic (Bituminous) Products

305.03 DEFINITIONS

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

Lot means a specific quantity of material or a specific amount of construction obtained from a single source and produced by the same process.

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

305.05 MATERIALS

Sealers may consist of one or more of the following materials:

- a) Type I-a: RC-30 and MTO primer according to OPSS 1102; or
Type I-b: Emulsified asphalt primer according to OPSS 1103.
- b) Type II: Solvent-free emulsified asphalt according to OPSS 1103.
- c) Type III: Tall oil pitch (TOP) emulsion according to OPSS 2510.

305.06 EQUIPMENT

The pressure distribution system used for sealer application shall be according to OPSS 304 and, when applicable, shall include an attachment for hand spraying.

Rollers shall be steel-drum or pneumatic-tired according to OPSS 304.

305.07 CONSTRUCTION

305.07.01 Operational Constraints

A sealer shall only be applied when:

- a) The ambient temperature is a minimum of 5 °C and rising.
- b) The designated area to be sealed is not frozen.
- c) Precipitation is not occurring or imminent and, for Type III emulsion applications, precipitation has not occurred within the 24 hours prior to application.
- d) The surface is free of standing water.

- e) The wind is not strong enough to cause drifting of sealer spray.
- f) The shoulder is smooth and conforms to the crossfall and grade specified in the Contract Documents.

305.07.02 Surface Preparation

As soon as is practical prior to applying sealer, the granular shoulder shall be rolled with a minimum of two passes. The shoulder rounding surface shall not be rolled.

Granular materials to be sealed with Type I or Type II sealers shall be uniformly dampened immediately prior to applying.

The moisture content of granular materials to be sealed with a Type III sealer shall be according to the manufacturer's recommendations.

305.07.03 Application

The sealer types and the locations where they shall be used are specified elsewhere in the Contract Documents.

Type I-a or Type I-b sealers may be used in any areas where Type I sealers have been specified.

Sealers shall be uniformly applied in all areas using a pressure distribution system.

Sealer application rates and temperatures shall be as specified in Table 1.

Sealers shall be overlapped a minimum of 100 mm onto adjacent paved surfaces.

All other application requirements shall be in accordance with the Manufacturer's recommendations and the application performed to the satisfaction of the Contract Administrator.

305.07.04 Management of Excess Material

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

305.08 QUALITY ASSURANCE

305.08.01 General

The Owner reserves the right to make inspections, take samples, and perform QA tests, at such times and locations as the Owner may consider necessary, in order to ensure that the materials supplied and placed are in accordance with this specification.

305.08.02 Sampling of Sealer for Acceptance

Sealers shall be randomly sampled in lots as specified in Table 2.

If the remaining quantity after completing a lot is less than one-half the quantity for a complete lot, then that quantity shall be added to the previous lot. Otherwise the remaining quantity shall form its own lot.

The Contract Administrator shall randomly-choose one sample of sealer from the designated truck tanker representing each lot.

Duplicate samples shall be taken from a sampling spigot on the transfer line or, if one is not available, from the end of the transfer line. Each sample shall be taken after sufficient material has been drawn

from the truck tank to purge the transfer line. Sample containers shall be supplied and filled, leaving sufficient space to allow for expansion.

Sampling requirements shall be as specified below and elsewhere in the Contract Documents.

Sample containers for each portion of each duplicate sample shall be triple tight one-litre cans for Type I-a or Type III sealers or triple tight four-litre pails, or suitable plastic containers of similar capacity that can be closed to prevent any leakage for Type I-b or Type II sealers.

Identification tags, provided by the Contract Administrator, shall be completed and attached to each sample container. All sample containers shall be supplied with appropriate WHMIS labels.

Samples shall be delivered within the required time and to the appropriate laboratory specified by the Owner.

305.08.03 Sealer Quality

305.08.03.01 Acceptance

One portion of each duplicate sample shall be tested for material properties by the QA laboratory according to OPSS 1102 for Type I-a sealers, OPSS 1103 for Type I-b and Type II sealers, and OPSS 2510 for Type III granular sealers, respectively.

Individual test results shall be forwarded to the Contractor as they become available.

A lot of sealer shall be deemed to be acceptable, if all of the test results and other requirements specified in OPSS 1102 for Type I-a sealers, OPSS 1103 for Type I-b and Type II sealers, and OPSS 2510 for Type III granular sealers are respectively met.

A lot of sealer not meeting all of the sealer quality requirements shall be given a payment adjustment, as specified in the clause under Payment Adjustments for Sealers.

The Owner shall be responsible for all costs associated with QA testing for acceptance.

305.08.03.02 Referee Testing

The Contractor may invoke referee testing for one or more tested attributes by submitting a written request to the Contract Administrator, within 2 Business Days following notification that the sealer does not meet the requirements of this specification.

Referee testing shall be carried out as specified below and elsewhere in the Contract Documents.

All referee test results for any lot shall replace the respective QA tests for acceptance of the applicable lot and shall be binding on both the Owner and the Contractor.

If a lot is not accepted at full payment based on the referee test results, then the Contractor shall be responsible for the cost of the referee testing of that lot at the rates specified elsewhere in the Contract Documents. In all other cases, the Owner shall bear the cost of the referee testing of that lot.

305.08.04 Visual Deficiencies

All surfaces deemed visually unacceptable by the Contract Administrator due to uneven application of sealer, surface damage, flushing, bleeding or contamination, shall be repaired to the satisfaction of the Contract Administrator.

305.08.04.01 Repairs

All surfaces deemed unacceptable due to uneven application of sealer shall be repaired.

Deficiencies other than uneven application of sealer shall be repaired by removing all deficient areas of sealed granular material, then replacing it with clean, compacted Granular A meeting the requirements specified in OPSS 1010 and OPSS 501.

All repaired areas shall be resprayed with the same sealer type or a sealer with a lower sealer type number, as originally specified in the Contract Documents.

305.09 MEASUREMENT FOR PAYMENT

305.09.01 Granular Sealing

305.09.01.01 Actual Measurement

Measurement shall be by the area sealed in square metres or by mass in kilograms of sealer used, as specified in the Contract Documents.

305.09.01.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurements shall be based on the units shown in the clause under Actual Measurement.

305.10 BASIS OF PAYMENT

305.10.01 Granular Sealing

305.10.01.01 Granular Sealing - 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.

Sprayed areas damaged by the Contractor's operations or identified by the Contract Administrator as being inadequately treated shall be repaired and resprayed, at no additional cost to the Owner.

Sprayed areas damaged by others shall be repaired and resprayed and shall be administered as a Change in the Work.

305.10.01.02 Payment Adjustments for Sealers

305.10.01.02.01 General

Payment for any lot of sealer that does not meet all Contract requirements shall be subject to a price adjustment. A calculated price adjustment shall be determined through a system of adjustment points based on the test results for any lot sample, provided the sample remains in a condition suitable for testing.

Adjustment points related to the test results for each test shall be individually rounded to one decimal place according to LS-100.

The total number of adjustment points for the tested sample representing a lot shall be divided by 25 to obtain the payment adjustment, expressed as a percentage for the lot.

A fixed adjustment of 50% of the Contract price shall be made for lots to which at least one of the following conditions apply:

- a) A lot sample has not been received by the QA laboratory within sufficient time for the sample to be tested;
- b) The lot sample contains insufficient material for testing; or
- c) The lot sample does not remain in a condition suitable for testing for 14 Days after sampling (e.g., broken emulsion or foam over during distillation).

305.10.01.02.02 Adjustment Points for Type I-a Sealers

For each lot, the total number of adjustment points shall be equal to the summation of the number of units that each test deviates from the specification limits times the multiplier specified for each particular test in Table 3.

305.10.01.02.03 Adjustment Points for Type I-b and Type II Sealers

For each lot, the total number of adjustment points shall be equal to the summation of the number of units that each test deviates from the specification limits times the multiplier specified for each particular test in Table 4, plus:

- a) 1,000 adjustment points, if the test result for the LS-218, the Particle Charge Test, fails to meet the requirement specified in OPSS 1103; plus
- b) 1,000 adjustment points, if the test result for LS-221, the Storage Stability Test, 24 hour, fails to meet the requirement specified in OPSS 1103.

305.10.01.02.04 Adjustment Points for Type III Sealers

For each lot, the total number of adjustment points shall be equal to 62.5 for every 0.1% less than 8% solids for the sample tested according to the procedure given in OPSS 2510 plus an additional 1000 adjustment points, if the material is determined to be anionic according to the Particle Charge Test, LS-218.

Table 1
Application Rates and Temperatures

Type of Sealer	Application Rate (kg/m ²)		Application Temperature
	Hand-Sprayed Areas	Machine-Applied/Other Areas	
I-a	3.4	2.6	30 to 45 °C
I-b	3.4	2.6	At Manufacturer's Recommendations
II			
III	5.5	4.5 (Note 1)	Ambient Temperature (Note 2)

Notes:

- 1) Type III sealers shall be applied in 2 or 3 coats for emulsions with 12% and 8% solids, respectively, to deliver a total of 4.5 kg/m².
- 2) Type III sealers shall not be applied if there is any chance that the ambient temperature will reach 0 °C or below within 24 hours after application.

Table 2
Lot Sizes

Tender Quantity in m ² or kg		Lot Size (Maximum)
Sealed Area in m ²	Mass of Sealer Used in kg	
< 500	< 1500	Sampling and Testing at CA's Discretion
500 to 5,000	1,500 to 15,000	One lot
> 5,000 to 10,000	>15,000 to 30,000	5,000 m ² / 15,000 kg
> 10,000 to 50,000	>30,000 to 150,000	10,000 m ² / 30,000 kg
> 50,000	> 150,000	20,000 m ² / 60,000 kg

TABLE 3
Tests, Units, and Multipliers for Type I-a Sealers

Test Method	Test Description	Unit	Multiplier
ASTM D 402	Residue by Distillation to 360 °C	%	200
ASTM D 402	Distillate, as % of Total Distillate to 360 °C		
	to 190 °C	%	10
	to 225 °C	%	10
	to 260 °C	%	10
	to 316 °C	%	10
LS-202	Kinematic Viscosity at 60 °C	mm ² /s	20
Tests on Residue			
LS-200	Residue Penetration at 25 °C	0.1 mm	15
LS-204	Residue Solubility	%	10
LS-205	Residue Ductility at 25 °C	cm	10

TABLE 4
Tests, Units, and Multipliers for Type I-b and Type II Sealers

Test Method	Test Description	Unit	Type I-b Multiplier	Type II Multiplier
LS-216	Residue by Distillation	%	200	200
LS-217	Oil Portion of Distillate, By Volume	%	50	50
LS-219	Viscosity at 50 °C, Less Than Minimum	Saybolt Furol Seconds	30	-
	Viscosity at 50 °C, Greater Than Maximum	Saybolt Furol Seconds	5	-
	Viscosity at 25 °C, Less Than Minimum	Saybolt Furol Seconds	-	30
	Viscosity at 25 °C, Greater Than Maximum	Saybolt Furol Seconds	-	5
LS-223	Sieve Test	%	-	1000
ASTM D 1310	Flash Point, Open Tag	°C	10	-
Tests on Residue				
LS-200	Residue Penetration at 25 °C	0.1 mm	15	15
LS-204	Residue Solubility	%	10	10
LS-205	Residue Ductility at 25 °C	cm	10	10

Appendix 305-A, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here

Related Ontario Provincial Standard Drawings

No information provided here.



CONSTRUCTION SPECIFICATION FOR HOT MIX ASPHALT - END RESULT

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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".

313.01.01 **Specification Significance and Use**

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

313.01.02 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.

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 178-08 Standard Practice for Dealing with Outlying Observations

American Association of State Highway and Transportation Officials (AASHTO)

- M 320-10 Standard Specification for Performance Graded Asphalt Binder
R 35-14 Superpave Volumetric Design for Hot - Mix Asphalt
T 166-13 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 312-14 Standard Method of Test for Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the Superpave Gyrotory 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 μ m 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 specific lift as specified in the Contract Documents, or
- b) For multiple binder course lifts of the same mix type, it means the total thickness in millimetres of the successive binder lifts of the same mix type, at the same location.

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 as follows:

25.0 mm	for Superpave 37.5
19.0 mm	for Superpave 25.0
12.5 mm	for SMA 19.0, Superpave 19.0
9.5 mm	for SMA 12.5, Superpave 12.5, 12.5FC 1 and 12.5FC 2
4.75 mm	for SMA 9.5, 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 HMA square metre item when only a single lift is placed, or
- b) The total thickness of all placed and compacted HMA square metre items when placed in contact with another lift of the same mix type at the same location also 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 subplot 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.

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.

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 subplot 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 60°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 60 °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 Ramp Downs clause.

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 may be used, at the Contractor's option.

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 Widening 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 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, RST, 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 $\pm$ 1,000 tonnes of mix production, and thereafter at further intervals of 20,000 tonnes as required. The aggregate, RAP, and RST 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. The Contractor shall deliver them to the Owner's QA laboratory as specified in the Contract Documents.

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, subplot 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 subplot 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 subplot, the Contract Administrator shall provide notification of each random sample location in writing. Pavement core samples shall be obtained in duplicate, from each subplot no later than the next Business Day after the completion of the subplot. 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 subplot 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.

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 subplot, 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 subplot not later than the next Day after the completion of the subplot. 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 subplot 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 subplot 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 subplot'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 subplot 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 subplot, 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, subplot 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, subplot 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, RST, 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 Tables 5 and 6. The PWL of the lot for each criterion shall be used to determine the payment adjustment factor from Table 7. 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 subplot by subplot basis. The subplot shall be considered acceptable if the AC content, gradation, air voids, and compaction of each subplot 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 subplot, 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 subplot'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 subplot shall be checked for mathematical errors. If there are no mathematical errors, the subplot with the outlier is treated as a lot with one subplot 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 subplot.

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 8. Such a challenge shall be resolved by a representative of the Owner determining the Macrottexture Ratio, according to LS-317. Table 8 shall be used with the Macrottexture 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 subplot 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 subplot lift thickness as specified in Table 9 for the item's T_D .

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

- a) The lift thickness measurement is less than the minimum subplot lift thickness as specified in Table 9, or
- b) For successive binder lifts of the same item, the combined lift thickness for these successive lifts is less than the minimum subplot lift thickness as specified in Table 9, 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 9, the thickness subplot in which the compaction core was located shall be rejectable and shall be repaired.

The Contract Administrator shall calculate the lot mean to one decimal point and the lot thickness payment adjustment based on all the subplot lift thickness measurements in the lot, according to LS-101 and Table 10. If the lot mean is less than 85% of the T_D the lot is rejectable.

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

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 subplot 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 subplot 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 subplot.

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 subplot; otherwise, a repair limit shall coincide with one end of the subplot 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 subplot 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 subplot proposed for repair is deemed to be rejectable. If the proposed repair limit coincides with the beginning of a subplot 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 subplot 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 subplot tonnage, the Contract Administrator may waive testing demonstrating the suitability of the remainder of that subplot.

The unrepaired sublots combined with the remainder 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 subplot being repaired.

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

313.09 MEASUREMENT FOR PAYMENT

313.09.01 Actual Measurement

313.09.01.01 SMA 9.5
SMA 9.5 - ... mm Lift Thickness
SMA 12.5
SMA 12.5 - ... mm Lift Thickness
SMA 19.0
SMA 19.0 - ... mm Lift Thickness
Superpave 4.75
Superpave 9.5
Superpave 9.5 - ... mm Lift Thickness
Superpave 12.5
Superpave 12.5 - ... mm Lift Thickness
Superpave 12.5 – Warm Mix
Superpave 12.5 – Warm Mix - ... mm Lift Thickness
Superpave 12.5FC 1
Superpave 12.5FC 1 - ... mm Lift Thickness

Superpave 12.5FC 1 – Warm Mix
 Superpave 12.5FC 1 – Warm Mix - ... mm Lift Thickness
 Superpave 12.5FC 2
 Superpave 12.5FC 2 - ... mm Lift Thickness
 Superpave 12.5FC 2 – Warm Mix
 Superpave 12.5FC 2 – Warm Mix - ... mm Lift Thickness
 Superpave 19.0
 Superpave 19.0 - ... mm Lift Thickness
 Superpave 19.0 – Warm Mix
 Superpave 19.0 – Warm Mix - ... mm Lift Thickness
 Superpave 25.0
 Superpave 25.0 - ... mm Lift Thickness
 Superpave 25.0 – Warm Mix
 Superpave 25.0 – Warm Mix - ... mm Lift Thickness
 Superpave 37.5
 Hot Mix Asphalt Miscellaneous

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:

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

Where:

BRD_{MD} = the bulk relative density in t/m^3 , 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 SMA 9.5 - Item**
- SMA 9.5 - ... mm Lift Thickness - Item**
- SMA 12.5 - Item**
- SMA 12.5 - ... mm Lift Thickness - Item**
- SMA 19.0 - Item**
- SMA 19.0 - ... mm Lift Thickness - Item**
- Superpave 4.75 - Item**
- Superpave 9.5 - Item**
- Superpave 9.5 - ... mm Lift Thickness - Item**
- Superpave 12.5 - Item**
- Superpave 12.5 - ... mm Lift Thickness - Item**
- Superpave 12.5 – Warm Mix - Item**
- Superpave 12.5 – Warm Mix - ... mm Lift Thickness - Item**
- Superpave 12.5FC 1 - Item**
- Superpave 12.5FC 1 - ... mm Lift Thickness - Item**
- Superpave 12.5FC 1 – Warm Mix - Item**
- Superpave 12.5FC 1 – Warm Mix - ... mm Lift Thickness - Item**
- Superpave 12.5FC 2 - Item**
- Superpave 12.5FC 2 - ... mm Lift Thickness – Item**
- Superpave 12.5FC 2 – Warm Mix - Item**
- Superpave 12.5FC 2 – Warm Mix - ... mm Lift Thickness - Item**
- Superpave 19.0 - Item**
- Superpave 19.0 - ... mm Lift Thickness - Item**
- Superpave 19.0 – Warm Mix - Item**
- Superpave 19.0 – Warm Mix - ... mm Lift Thickness - Item**
- Superpave 25.0 - Item**
- Superpave 25.0 - ... mm Lift Thickness - Item**
- Superpave 25.0 – Warm Mix - Item**
- Superpave 25.0 – Warm Mix - ... mm Lift Thickness - Item**
- Superpave 37.5 - Item**
- Hot Mix Asphalt Miscellaneous - Item**

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:

$$PA_{MC} = \text{lot quantity} \times \text{price} \times [PF_{MC} - 1.000] \quad (\text{Formula 1})$$

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,
- 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.

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 7, based on PWL, determined for gradation, AC content, voids, and compaction using LS-101, 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 either:

- a) The payment factor it is added to in Formulae 8, 13, or 16, if that payment factor is less than 1.0; or,
- b) 1.0, if the payment factor it is added to in Formulae 8, 13, or 16 is equal to or greater than 1.0.

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:

$$PF_{G(SUB)} = PF_{DLS} + PF_{4.75} + PF_{75} \quad (\text{Formula 2})$$

If $PF_{G(SUB)}$ is greater than or equal to 3, the equation for PF_G is
 If $PF_{G(SUB)}$ is less than 3, the equation for PF_G is

$$PF_G = PF_{G(SUB)} - 2 \quad (\text{Formula 3})$$

$$PF_G = PF_{G(SUB)} / 3 \quad (\text{Formula 4})$$

For Superpave 9.5, Superpave 4.75, and SMA 9.5:

$$PF_{G(SUB)} = PF_{4.75} + PF_{75} \quad (\text{Formula 5})$$

If $PF_{G(SUB)}$ is greater than or equal to 2, the equation for PF_G is
 If $PF_{G(SUB)}$ is less than 2, the equation for PF_G is

$$PF_G = PF_{G(SUB)} - 1 \quad (\text{Formula 6})$$

$$PF_G = PF_{G(SUB)} / 2 \quad (\text{Formula 7})$$

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 μ m 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 formulae:

$$PF_{GAC(SUB)} = PF_G + PF_{AC} \quad (\text{Formula 8})$$

If $PF_{GAC(SUB)}$ is greater than or equal to 2, then

$$PF_{GAC} = PF_{GAC(SUB)} - 1 \quad (\text{Formula 9})$$

If $PF_{GAC(SUB)}$ is less than 2, then

$$PF_{GAC} = PF_{GAC(SUB)} / 2 \quad (\text{Formula 10})$$

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:

$$\text{If } (VMA_{min} - VMA_{mean}) \geq 2.5, \text{ then } PF_{VMA} = 0 \quad (\text{Formula 11})$$

$$\text{If } (VMA_{min} - VMA_{mean}) < 2.5 \text{ then, } PF_{VMA} = 0.8000 - 0.4(VMA_{min} - 0.5 - VMA_{mean}) \quad (\text{Formula 12})$$

Where:

PF_{VMA} = payment factor for VMA

VMA_{mean} = lot mean VMA

VMA_{min} = minimum VMA specified for mix design

For Superpave mixes, when the payment factor for VMA is less than 1.000, it shall be compared to the payment factor for air voids and the lesser of the two is the payment factor for voids (PF_{VOIDS}). When the payment factor for VMA is equal to 1.000, PF_{VOIDS} shall be the same as the payment factor for air 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:

$$\text{If } (VMA_{min} - VMA_{mean}) \geq 3.0, \text{ then } PF_{VMA} = 0 \quad (\text{Formula 13})$$

If $(VMA_{min} - VMA_{mean}) < 3.0$ then, $PF_{VMA} = 0.8000 - 0.4(VMA_{min} - 1.0 - VMA_{mean})$ (Formula 14)

Where:

PF_{VMA} = payment factor for VMA

VMA_{mean} = lot mean VMA

VMA_{min} = minimum VMA specified for mix design

For SMA mixes, when the payment factor for VMA is less than 1.000, it shall be compared to the payment factor for air voids and the lesser of the two is the payment factor for voids (PF_{VOIDS}). When the payment factor for VMA is equal to 1.000, PF_{VOIDS} shall be the same as the payment factor for air 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 formulae:

$$PF_{M(SUB)} = PF_{GAC} + PF_{VOIDS} \quad (\text{Formula 15})$$

Where:

PF_M = payment factor for combined mix properties

If $PF_{M(SUB)}$ is greater than or equal to 2 then $PF_M = PF_{M(SUB)} - 1$ (Formula 16)

If $PF_{M(SUB)}$ is less than 2 then $PF_M = PF_{M(SUB)} / 2$ (Formula 17)

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 the following formulae:

$$PF_{MC(SUB)} = PF_C + PF_M \quad (\text{Formula 18})$$

If $PF_{MC(SUB)}$ is greater than or equal to 2 then $PF_{MC} = PF_{MC(SUB)} - 1$ (Formula 19)

If $PF_{MC(SUB)}$ is less than 2 then $PF_{MC} = PF_{MC(SUB)} / 2$ (Formula 20)

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 subplot shall be assigned a PF_{MC} of 1.000 if the subplot is not rejectable. If the subplot is determined to be rejectable, it shall be administered as described in the Repairs for Mix Properties and Compaction clause. If a rejectable subplot is allowed to remain in the work, a payment factor of 1.000 shall be given to each attribute that is not rejectable, and the payment factor for PWL = 50%, 25% for each sieve analysed for gradation, from Table 5, shall be given to each attribute that is rejectable. The PF_{MC} for the subplot shall be calculated using the formulae detailed in the Calculations clause.

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 11. A payment adjustment for aggregate density for each lot for these tender items shall be calculated by the following formulae:

$$MF = D_R / (BRD_{mix}) \quad (\text{Formula 21})$$

$$PA_{AD} = M_{mix} \times \text{Contract Price} \times [MF - 1.000] \quad (\text{Formula 22})$$

Where:

D_R = the reference density in t/m³, as specified in Table 11

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:

$$T_{mix} = [0.975 \times BRD_{mix} \times (T_D / 1000) \times A_{mix}] \quad (\text{Formula 23})$$

Where:

BRD_{mix} = the lot average bulk relative density in t/m^3 , 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:

$$PA_{AC} = T_{mix} \times [Price_{AC} \times (AC_{ERS} - AC_{BID})/100] \quad (\text{Formula 24})$$

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 12.

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 or roof shingle tabs.

For mixes which contain reclaimed asphalt pavement, or roof shingle tabs or both, 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, or the roof shingle tabs or both 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 10 shall be used to calculate the thickness payment adjustment.

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

$$PA_T = 0.5 \times (\text{subplot quantity} \times \text{Contract price}) \quad (\text{Formula 25})$$

Where:

PA_T = payment adjustment for lift thickness

subplot quantity = the area of the subplot

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, subplot, or visually defective HMA; or
- b) The Contract Administrator has determined that a rejectable lot or subplot 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 subplot 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.

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	Mass of Production Samples (Note 1) kg	Frequency of Sampling
SMA mixes, Superpave 9.5, 12.5, 12.5FC 1, 12.5FC 2, and 19.0	20 to 30 or 30 to 40 (Notes 2 and 3)	Every subplot
Superpave 25.0 and 37.5	25 to 35 or 35 to 45 (Notes 2 and 3)	Every subplot
HMA Aggregates for Density Testing	Coarse aggregate 10 Fine aggregate, RAP 5	Every 20,000 tonnes or when new samples requested
SMA mixes for draindown testing	3 to 5	Once per lot
WMA for moisture sensitivity testing	50	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. 3. One set of cores, with each core a minimum thickness of 35 mm.		

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

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 subplot using the BRD_m for the subplot, 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	Superpave Mixes, SMA	2.5	5.5
Pavement Compaction	Superpave 12.5 and 12.5FC 1	91.5	97.0
	Superpave 12.5FC 2 Design Lift Thickness <50 mm	91.5 (Note 2)	98.0
	Superpave 12.5FC 2 Design Lift Thickness ≥50 mm	91.5	98.0
	Superpave 37.5, 25.0 and 19.0 Design Lift Thickness <60 mm	91.5 (Note 2)	97.0
	Superpave 37.5, 25.0 and 19.0 Design Lift Thickness ≥60 mm	91.5	97.0
	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. 2. Compaction shall be analysed using a LL of 90.5%. If the PWL compaction using a LL of 90.5% is greater than 95, the compaction PWL shall also be calculated using a LL of 91.5%, and the payment factor shall be determined for each LL using Table 6. The highest calculated payment factor shall be used.			

TABLE 6
Superpave 12.5FC 2, 19.0, 25.0 and 37.5 Pay Factors for Per Cent Within Limits > 95%

PWL	LL = 90.5%	LL = 91.5%
100	1.015	1.030
99	1.012	1.024
98	1.009	1.018
97	1.006	1.012
96	1.003	1.006

TABLE 7
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	1.0033	1.0033	1.0034	1.010	1.020	1.030
99	1.0026	1.0027	1.0027	1.008	1.013	1.024
98	1.0020	1.0020	1.0020	1.006	1.007	1.018
97	1.0013	1.0013	1.0014	1.004	1.000	1.012
96	1.0006	1.0007	1.0007	1.002	1.000	1.006
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
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

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

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

TABLE 8
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 9
Minimum 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	$0.70 \times T_D$

TABLE 10
Thickness Payment Adjustment

Course	T_L	Thickness Payment Adjustment, PA_T
Surface Course	All	$PA_T = \text{lot quantity} \times \text{price} \times \{[1.000 - (T_L / T_D)] \times 2.0\}$
Binder Course	$T_L \geq [0.95 \times T_D]$	$PA_T = \text{lot quantity} \times \text{price} \times \{[1.000 - (T_L / T_D)]\}$
	$[0.95 \times T_D] > T_L \geq [0.85 \times T_D]$	$PA_T = \text{lot quantity} \times \text{price} \times \{[1.000 - (T_L / T_D)] \times 2.0\}$
	$T_L < [0.85 \times T_D]$	$PA_T = \text{lot quantity} \times \text{price} \times \{[1.000 - (T_L / T_D)] \times 3.0\}$
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		

TABLE 11
Reference Densities, D_R

Region	Reference Densities, D_R tonnes/m ³
West Region	2.530
Central Region Northeastern Region Northwestern Region	2.520
Eastern Region	2.390

TABLE 12
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.	

Appendix 313-A, Commentary for OPSS.PROV 313, November 2016

Note: This appendix does not form part of the standard specification. It is intended to provide information to the designer on the use of this specification in the Contract.

Designer Action/Considerations

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.



**CONSTRUCTION SPECIFICATION FOR
HOT IN-PLACE RECYCLING AND HOT IN-PLACE RECYCLING
WITH INTEGRAL OVERLAY**

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332-A	Commentary
332.01	SCOPE

This specification covers the requirements for the preparation of the existing pavement surface; heating and hot milling the existing hot mix asphalt (HMA); adding and mixing in one or more of rejuvenating agent and beneficiating HMA; and redistribution and compaction of the Hot In-Place Recycled (HIR) mix in a single operation.

332.01.01 Specification Significance and Use

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

332.01.02 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.

332.02 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.

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

Ontario Provincial Standard Specifications, Construction

OPSS 308	Tack Coat
OPSS 313	Hot Mix Asphalt - End Result

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 Mixes
LS-264	Theoretical Maximum Relative Density of Bituminous Paving Mixtures
LS-265	Determination of Percent Air Voids in Compacted Dense Bituminous Pavement Mixtures
LS-282	Quantitative Extraction of Asphalt Cement and Analysis of Extracted Aggregate from Bituminous Paving Mixtures
LS-284	Recovery of Asphalt from Solution by Abson Method or Rotavapor
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 Course 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 178-08	Standard Practice for Dealing with Outlying Observations

American Association of State Highway and Transportation Officials (AASHTO)

R 35-14	Superpave Volumetric Design for Hot - Mix Asphalt
T 166-13	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
T 312-14	Standard Method of Test for Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor

332.03 DEFINITIONS

For the purpose of this specification, the definitions in OPSS 313, OPSS 1151, and the following definitions apply:

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, compaction, or recovered asphalt cement (RAC) performance grade.

Beneficiating HMA means a HMA designed such that the final HIR mix shall be according to the Contract Documents.

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

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

Hot In-Place Recycled (HIR) Mix means the mixture of hot milled material containing one or more of the following components: rejuvenating agent and beneficiating HMA.

Hot Milled Material means the material produced during the heating and hot milling of the existing HMA.

Hot Milling means the process of applying adequate heat to the pavement to sufficiently soften the pavement, followed by the use of milling heads to uniformly remove the heated material to the depth specified in the mix design submission with minimal fracturing of the existing aggregates.

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

Lift Thickness means the thickness in millimetres of the placed and compacted HIR mix.

Loose Mix means a representative sample of uncompacted HIR mix for testing mix properties or the RAC performance grade.

Mix Design means the design of the proportions of new and existing aggregates; new and existing AC; rejuvenating agent; and additives; when uniformly mixed, that results in an acceptable HIR mix.

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

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

Recovered Asphalt Cement (RAC) means the AC recovered from the HIR mix according to the Rotavapor Method in LS-284, using re-agent grade trichloroethylene, or other solvent acceptable to the Owner.

Rejuvenating Agent means a product that when added to the hot milled material; the RAC from the HIR mix meets the requirements of the Contract Documents.

Screed means the unit of the placement unit of the recycling train that strikes off and imparts initial compaction to the HIR mix.

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.

332.04 SUBMISSION AND DESIGN REQUIREMENTS

332.04.01 Design Requirements

The HIR mix design shall be according to the Design Requirements subsection of OPSS 1151 and as specified in the Contract Documents.

332.04.02 Submission Requirements

A copy of all mix design and JMF documents, signed, dated, and certified correct by the person accountable for the engineering and management responsibility for the laboratory that conducted the work, shall be submitted to the Contract Administrator.

The mix shall not be placed until the Contract Administrator provides written confirmation that the submitted mix design and JMF documents meet the Contract requirements. Within four Business Days following the delivery of all required documentation, the Contract Administrator shall provide written confirmation that the mix design and all samples meet the Contract requirements or; advise of any requirements that have not been met.

Confirmation of conformance to the Contract requirements of the submitted mix design does not constitute any guarantee that the mix can be produced or constructed or both to Contract requirements, and does not relieve the Contractor of the responsibility for ensuring the specified quality of Materials and workmanship.

The following additional information shall be submitted to the Contract Administrator in writing with the mix design:

- a) The amount, name, manufacturer, and supplier of the rejuvenating agent or beneficiating HMA or both, if to be used;
- b) The hot milling depth to meet the required mix properties and the design lift thickness with a maximum increase in pavement elevation of 15.0 mm;
- c) The mix proportions, gradation, and source of the materials in the beneficiating HMA, if to be used;
- d) A copy of all calculations that were completed to determine the amount of rejuvenating agent or beneficiating HMA or both, if to be used;
- e) Air void laboratory test results and calculations for the HIR mix; and
- f) A graph of temperature-kinematic viscosity relationship for the combined rejuvenating agent, the recovered AC present in the existing pavement, and the new AC in the beneficiating HMA.
- g) When applicable, a declaration that the percentage of the beneficiating HMA comprising quartzite and dolomitic sandstone aggregates, or combinations thereof, is more or less than 75%.

The mix design shall be valid for a maximum of 14 months from when the mix design was prepared and for the section of roadway it was designed for.

332.05 MATERIALS

332.05.01 Hot In-Place Recycled Mix

The HIR mix produced shall be according to the mix design and meet the requirements of Table 1.

332.05.01.01 Recovered Asphalt Cement

The RAC recovered from the HIR mix produced shall be according to OPSS 1101 and as specified in the Contract Documents.

332.05.01.02 Beneficiating Hot Mix Asphalt

Beneficiating HMA shall be according to OPSS 1151 for the specified mix type.

RAP, RST, or both shall not be used in the composition of the beneficiating HMA.

332.05.02 Release Agents

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

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

332.06 EQUIPMENT

332.06.01 Heating Unit

Heating units shall apply heat in a uniform manner to the surface of the existing pavement to be hot milled. Open flame heating of the existing HMA pavement shall not be permitted.

Heaters shall be spaced and operated such that:

- a) Sufficient heat penetration of the pavement shall be achieved, with heat penetration into the underlying pavement beneath the hot milling depth specified in the mix design submission,
- b) The desired HIR mix temperatures are achieved, and
- c) The existing HMA surface is not burnt or scorched.

332.06.02 Recycling Train

The recycling train shall be self-contained mechanical units specifically designed for HIR of HMA pavements. The recycling train shall have the capability to process the existing pavement to a depth of at least 50 mm.

Heaters used as part of the recycling train shall be according to the Heating Unit subsection.

The recycling train shall include hot milling, blending, and placement units.

332.06.02.01 Hot Milling Unit

The hot milling unit shall be capable of uniformly milling the preheated HMA to the hot milling depth specified in the mix design submission.

332.06.02.02 Blending Unit

The blending unit shall be capable of thoroughly mixing the hot milled material, rejuvenating agent, and beneficiating HMA.

332.06.03 Diamond Grinding

A diamond grinder shall be power-driven, self-propelled, and designed for grinding HIR mix or 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 HIR mix or HMA to the required profile and shall also include a slurry pick-up system.

332.07 CONSTRUCTION

332.07.01 Quality Control

QC procedures shall be conducted to ensure the HIR mix 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 HIR mix.

If the Contractor wishes to obtain additional samples for QC purposes, up to three cores may be taken in each lot. 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.

332.07.02 Laboratory Correlations

On request, the Contract Administrator shall provide the opportunity to conduct a correlation of mix properties, AC grading, or compaction, or a combination between the QA and QC laboratories prior to the HIR operation. The correlation may occur once for each mix type and shall be a maximum of three samples.

The Contract Administrator shall be provided with the samples and compaction temperature for the correlation testing. The Contract Administrator shall provide the QA test results on completion of the correlation testing.

332.07.03 Preparation of Existing Pavement

Prior to the HIR operation:

- a) Existing HMA surfaces shall be clean and free of all loose, broken, and foreign materials.
- b) Milled existing HMA surfaces shall be clean and free of all loose, broken, and foreign materials and shall be swept with a power broom.

Existing surfaces to be HIR may be corrected by additional cold milling, hot milling, addition of beneficiating HMA or a combination, in order to place and compact the HIR mix to the design thickness specified in the Contract Documents.

Removal of the existing pavement by the hot milling unit shall be performed in such a manner as to leave adjacent pavement and structures remaining in place undisturbed and undamaged. All damaged or disturbed portions shall be corrected expeditiously and repaired to the satisfaction of the Contract Administrator. Broken edges of portions to be left in place that are visible after construction shall be squared and neatly trimmed.

332.07.04 Transportation of Beneficiating 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.

332.07.05 Placing Hot In-Place Recycled Mix

332.07.05.01 Operational Constraints

The HIR process shall be carried out when the roadway is clean and free of standing water. The HIR process shall not proceed in the rain.

The supply of any materials to the recycling train shall be accomplished with no traffic on the uncompacted mat. Public traffic shall not be permitted on freshly laid HIR mix until the temperature of the mat is 50 °C or less.

332.07.05.02**Paving**

The heating units and recycling train shall heat and hot mill the HMA pavement across the complete lane width, and partial width shoulder if applicable, to the hot milling depth specified in the mix design submission.

The underlying pavement shall be heated to a minimum temperature of 50 °C.

When inspection and testing indicates that the required average depth of heating and hot milling is not being met, the process shall be immediately corrected.

Rejuvenating agent and/or beneficiating HMA shall be added to and mixed with the hot milled material in the amount specified in the mix design. The HIR mix shall be homogeneous after mixing.

The final placement of the HIR mix by the recycling train shall be uniformly distributed to the specified profile and crossfall. The HIR mix shall be compacted to the design lift thickness specified in the Contract Documents and meet all acceptance criteria specified in the Contract Documents.

Each successive pass of the recycling train shall overlap the previously HIR adjacent surface by a minimum of 100 mm.

The HIR mix shall be of a minimum temperature, immediately behind the screed, to meet the compaction requirements specified in the Contract Documents.

Prior to roller compaction, obvious defects in the HIR mix placed shall be corrected. Irregularities in the alignment and grade along the outside edges shall be corrected. Excess HIR mix shall not be cast onto the surface of the freshly laid mat. After final compaction the surface shall be smooth and true to the established crown and grade, uniform in texture and shall be free of any defects.

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

Areas that are not accessible to the heating and hot milling equipment shall have the HMA removed to the depth required to meet the design lift thickness requirements specified in the Contract Documents. These areas shall be tacked coated according to OPSS 308 and paved with the mix type specified in the Contract Documents according to OPSS 313. The surface of each layer placed and compacted shall be level with the adjacent pavement. The paving of such areas shall be completed prior to the placing of any subsequent course on the HIR mix, if applicable, and as a separate operation from any other paving.

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 HIR operations until the problem has been corrected.

332.07.06**Longitudinal and Transverse Joints**

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.

Longitudinal and transverse joints between the new HIR pavement and the existing pavement shall be butt joints as specified in the Contract Documents. All longitudinal joints at intersecting roads shall be butt joints. Heating beds on the heating units shall heat and soften material beyond the hot milling width by a minimum of 100 mm to achieve proper thermal bonding between the existing asphalt pavement and the HIR mix along the

longitudinal joints. The longitudinal joints shall be parallel to the lane and visually uniform longitudinally, and within 50 mm of the demarcation between the lanes specified in the Contract Documents.

When matching a compacted joint, the depth of the uncompacted mat shall be set to allow for compaction. The paver screed shall overlap the adjoining mat by at least 50 mm.

332.07.07 Compaction

Compaction of the HIR mix shall be conducted using appropriate methods and equipment to provide a uniformly compacted mat according to the requirements of the Contract Documents.

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

332.07.08 Field Adjustments to the Job Mix Formula

The JMF may be adjusted to more closely reflect the HIR mix being produced. 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 2 in comparison to the original JMF submitted under the current mix design.

A field adjustment to the JMF during production shall be permitted under the following situations:

- a) To more closely reflect the actual HIR mix being produced, when test results for the last lot produced to the submitted JMF accrued a payment reduction for AC content or gradation or both but met all other specified HIR mix requirements. The test results (lot mean) shall show that the design requirements for VMA, percent G_{mm} at N_{max} , VFA, and dust proportion were met, and that there was no payment reduction for air voids. The adjusted JMF may be applied to the lot being placed at the time the confirmation of receipt of the adjusted JMF is issued and to the previous lot if requested as part of the written submission for a JMF adjustment.
- b) To permit minor changes in the constituent proportions, when test results for the last lot produced to the submitted JMF indicate no negative price adjustments for AC content or gradation, but changes are designed to improve either the air voids or RAC performance grade or both. For this situation, the air voids PWL shall be at least 50. The adjusted JMF may be applied to the lot being placed at the time the confirmation of receipt of the adjusted JMF is issued.

JMF adjustments shall not be accepted once placement of the HIR mix has been completed. The adjusted JMF shall be submitted in writing on a form supplied by the Contract Administrator. Within one Business Day of receiving the JMF adjustment submission, the Contract Administrator shall give a written confirmation of receipt of the adjusted JMF confirming conformance to the Contract requirements or advising of any non-conformance.

332.07.09 Sampling

332.07.09.01 Mix Properties and Recovered Asphalt Cement Performance Grade

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

The Contract Administrator shall advise the Contractor of each random sample location from which the sample is to be taken. A set of two samples shall be taken according to Table 3. 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 3, the sample shall be discarded and a new one taken immediately.

332.07.09.02 Compaction

Upon completion of each subplot, the Contract Administrator shall provide notification of each random sample location in writing. Pavement core samples shall be obtained in duplicate from each subplot no later than the next Working Day after the completion of the subplot. 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.

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.

When the design lift thickness is at least 40 mm, and the lift thickness of the pavement core is less than 35 mm, the core shall be submitted to the Contract Administrator and a replacement core shall be extracted at a location within the same subplot selected by the Contract Administrator. If the thickness of the replacement core is also less than 35 mm, the core shall be submitted to the Contract Administrator and the situation reviewed the Contract Administrator prior to any further coring of the subplot.

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

HIR mix 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.

332.07.09.03 Lift Thickness

Single cores consisting of the HIR mix placed shall be used to evaluate the lift thickness of the HIR tender item placed at each sample location. Sample locations shall be determined based on the surface area of the HIR mix placed on the Contract.

All areas of HIR paving within the Contract limits, including paved shoulders, shall be sampled for lift thickness.

Upon completion of each subplot, 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 subplot not later than the next Working Day after completion of the subplot. This one core shall be used for both QA and possible referee testing.

Each core shall have a nominal diameter of 50 mm and shall consist of the HIR mix placed in the subplot and at least one underlying HMA 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 subplot number shall be clearly marked with a permanent marker on each core.

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 subplot'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.

332.07.10 Management of Excess Material

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

332.08 QUALITY ASSURANCE

332.08.01 Acceptance Criteria

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. Payment factors and payment adjustments for each lot shall be determined by the Contract Administrator as specified in the Contract Documents, based on the QA test results, unless when applicable, the Contractor invokes referee testing, in which case referee results shall be used.

Acceptance of HIR mix shall be based on the following criteria:

- a) Air Voids and Compaction
- b) Gradation and AC Content
- c) RAC Performance Grade
- d) Surface Tolerance
- e) Surface Appearance
- f) Surface Smoothness
- g) Lift Thickness
- h) Geometrics and Longitudinal Joint Location

332.08.01.01 Air Voids and Compaction

332.08.01.01.01 Lot Size

The Contract Administrator shall determine the size and location of the lots and sublots, after discussion with the Contractor and before HIR operations start. Guidelines for the breakdown of the tender item quantity into lots are as listed in Table 5. Generally, lot size is 40,000 m² with sublots of 4,000 m²; however, subplot sizes shall be adjusted to ensure a minimum of three sublots per lot.

When the tender 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.

When only 1 or 2 sublots are completed at the end of placement of 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 placement of 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.

332.08.01.01.02 Basis of Acceptance

Acceptance for HIR mix for air voids and compaction is based on the lot PWL for each attribute. PWL shall be determined using lot test results, LS-101, and lower and upper limits as specified in Table 1. 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 air voids or compaction, the lot is rejectable and shall be subject to repair or payment adjustment.

When the tendered item quantity is less than 4,000 m², the HIR mix 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 three 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 the Contract Documents.

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 a payment adjustment. 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 detailed in the Repairs subsection.

332.08.01.02 Gradation and Asphalt Cement Content

332.08.01.02.01 Lot Size

The lots and sublots for gradation and AC content shall be according to the Lot Size clause under the Air Voids and Compaction clause of the Acceptance Criteria subsection.

332.08.01.02.02 Basis of Acceptance

Acceptance for HIR mix for gradation and AC content shall be determined using the lot mean; LS-282, LS-291, or LS-292; the specification limits specified in Table 1; and subplot acceptability.

Sublot test results shall be acceptable if they meet the specification limits specified in Table 1. If a subplot test result for any payment adjustment sieve or AC content does not meet the specification limits specified in Table 1, the subplot shall be deemed rejectable and shall be repaired as detailed in the Repairs subsection. When a lot contains any subplot that is deemed rejectable, the lot is rejectable until the subplot has been repaired and re-evaluated as acceptable. The repaired subplot shall be re-evaluated using the test results for the repaired subplot and used in determining payment and acceptance of the lot. When the Contract Administrator allows a rejectable subplot to remain in place without repair, the subplot test result for the rejectable subplot shall be treated as a lot with one subplot, and the remaining sublots shall form a separate lot.

The Contract Administrator shall calculate the gradation payment adjustment and AC content payment adjustment for the lot once all subplot test results for the lot have been completed. The Contract Administrator shall calculate the lot mean to one decimal point and the lot gradation and the lot AC content payment adjustments based on all the subplot test results in the lot, according to LS-101. If the lot mean does not meet the specification limits specified in Table 1, the lot is rejectable.

332.08.01.03 Recovered Asphalt Cement Performance Grade

332.08.01.03.01 Basis of Acceptance

Acceptance of the RAC performance grade in the HIR mix shall be as specified in the Contract Documents.

332.08.01.03.02 Disposition of Hot In-Place Recycled Mix with Recovered Asphalt Cement with Borderline and Rejectable Lots

The Owner shall review the test results and determine the disposition of the HIR mix with any RAC that does not meet the requirements of the Contract Documents. This shall also include the identification of any trends evident through the analysis of the additional testing. HIR mix with RAC, for which test results indicate that the product did not meet the requirements of the Contract Documents shall be dealt with as follows:

Minor Borderline: HIR mix shall be accepted at full payment.

Major Borderline: HIR mix shall be accepted into the Work with a payment reduction, according to the Payment Adjustment for Recovered Asphalt Cement Performance Grade clause. Alternatively, at the Contractor's option, the HIR mix may be repaired according to the Repairs subsection.

Rejectable: HIR mix shall be repaired according to the Repairs subsection. The Contract Administrator shall determine if rejectable mix may remain in the work without repairs, with a payment adjustment.

332.08.01.04 Surface Tolerance

Surface tolerance shall be according to OPSS 313. Surface tolerance related repairs shall be carried out according to the Repairs subsection.

332.08.01.05 Surface Appearance

HIR mix deemed by visual appearance to have flushing, bleeding, segregation, fat spot, surface damage, 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.

332.08.01.05.01 Segregation

HIR mix exhibiting medium or severe midlane segregation shall be assessed a payment reduction or shall be repaired at the discretion of the Contract Administrator.

HIR mix exhibiting other segregation shall be addressed in accordance with the following:

- a) Slightly segregated HIR mix shall be accepted into the work with no payment reduction.
- b) Medium segregated HIR mix shall be assessed a payment reduction, or repaired at the discretion of the Contract Administrator.

- c) Severely segregated HIR mix shall be repaired by removal and replacement according to the Repairs subsection.

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.

332.08.01.06 Surface Smoothness

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

332.08.01.07 Lift Thickness

332.08.01.07.01 Lot Size

The Contract Administrator shall determine the size and location of the lots and sublots before the HIR process starts. Generally there shall be one lot of the total pavement quantity. When more than one T_D is specified for the HIR tender item, there shall generally be a separate lot for each T_D specified in the Contract Documents for the HIR tender item. Each lot shall be divided into sublots, which shall normally be 2,000 m² in size. A minimum of three sublots are required for each lot.

332.08.01.07.02 Basis of Acceptance

Acceptance of HIR mix for lift thickness is based on lift thickness measurements determined using subplot test results, LS-294, and the minimum lift thicknesses given in Table 7. The Contract Administrator shall calculate the thickness payment adjustment for the lot once all measurements for the lot have been completed.

Individual subplot thickness measurements shall be acceptable if they are equal to or greater than the minimum subplot lift thickness specified in Table 7. If an individual subplot thickness measurement is less than the minimum subplot lift thickness specified in Table 7, the subplot shall be deemed rejectable and shall be repaired.

The repaired subplot shall be re-evaluated using the lift thickness measurement for the repaired subplot and used in determining payment of the lot.

In addition, when a core taken for compaction testing does not meet the minimum lift thickness specified in Table 7, the thickness subplot in which the compaction core was located shall be rejectable and shall be repaired.

The Contract Administrator shall calculate the lot mean to one decimal point and the lot payment adjustment for lift thickness based on all the subplot lift thickness measurements in the lot, according to LS-101 and the Payment Adjustment for Lift Thickness clause. If the lot mean is less than 85% of the T_D , the lot will be rejectable.

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

332.08.01.08 Geometrics and Longitudinal Joint Location

332.08.01.08.01 Basis of Acceptance

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

The Contract Administrator shall conduct spot checks of the width of the HIR mix to determine if the complete lane and shoulder widths, when specified in the Contract Documents, have been HIR processed, placed, and compacted for acceptance.

The width of HIR mix shall be accepted provided:

- a) the outside edges of the lanes and the paved shoulders are parallel to the lane and visually uniform longitudinally,
- b) the width across all the adjacent HIR lanes and shoulders, when specified, from the outside edge to outside edge is not less than the sum of the specified widths, and
- c) the width of retrofitted partially paved shoulder is not less than the specified width, when 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 three Business Days of receiving the notification.

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

332.08.01.09 Optional Trial

When the HIR tender item quantity is 40,000 m² or more, an optional trial of one lot, not exceeding 4,000 m², with one subplot shall be permitted. If the Contractor elects to plan this optional trial, he shall advise the Contract Administrator in writing prior to placing the trial lot. The optional trial shall not be placed in a critical location. The optional trial will be treated as a small quantity lot for basis of acceptance and payment.

332.08.01.10 Small Quantity Lots

Any lot comprised of one or two sublots, shall not be subject to payment adjustment unless the HIR mix is rejectable. Acceptance for these lots shall be on a subplot by subplot basis. The subplot shall be considered acceptable if the HIR mix complies with the limits specified in Table 1. HIR mix that does not comply with Table 1 shall be considered rejectable.

332.08.02 Referee Testing

332.08.02.01 General

Referee testing by a referee laboratory can only be invoked for a given lot within five Business Days of the Contractor receiving the QA test results, and where applicable the Contract Administrator's calculated QA payment factors and payment adjustments for that lot.

Referee testing may only be invoked if all referee samples have been received in a condition suitable for testing.

332.08.02.02 Mix Properties and Compaction

Referee testing may only be requested 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 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 affected 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 will be supplied by the Contract Administrator.

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 HIR mix. The referee test results are binding on both the Owner and the Contractor.

332.08.02.03 Recovered Asphalt Cement Performance Grade

Referee testing for RAC performance grade shall be as specified in the Contract Documents.

332.08.02.04 Challenging Severity of Segregation

The Contractor may challenge, in writing, the severity of any segregated area assessed as either medium or severe, within five 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 240,000 m² of HIR mix, the Contractor shall be allowed a maximum of two separate written challenges for each tender item. However, for Contracts with more than 240,000 m² of HIR mix, 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 five 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. Such a challenge shall be resolved by a representative of the Owner determining the Macrottexture Ratio, according to LS-317. Table 8 shall be used with the Macrottexture 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.

332.08.02.05 Lift Thickness

The Contractor may only challenge the individual lift thickness measurement by requesting referee testing within five Business Days of the Contractor receiving the subplot 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 subplot at an alternative Owner designated QA laboratory together with the Owner's representative. The re-measured lift thickness measurement shall be considered binding and shall replace the original lift thickness measurement for assessment of the subplot.

332.08.02.06 Outlier in Referee Results

Where an entire lot of three or more sublots has been referee tested, the Contractor may question an individual value for any attribute of a subplot's test result, excluding lift thickness. The request shall be made within three 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 or a payment adjustment applies. 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 subplot shall be checked for mathematical errors. If there are no mathematical errors, the subplot with the outlier is treated as a lot with one subplot 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 subplot.

332.08.04 Repairs

332.08.04.01 General

The Contractor shall perform all repairs.

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

Repairs shall be full lane or full shoulder width except where localized repairs are allowed 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 repairs being carried out.

All transverse joints in repairs shall butt up to a full depth vertical surface. Repairs shall consist of the removal and replacement of the full thickness of the HIR mix or the placement of an overlay when permitted by the Contract Administrator. A paver or recycling train shall be used in carrying out the repair.

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 seven 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.

332.08.04.02 Mix Properties, Compaction, and Recovered Asphalt Cement Performance Grade

The Contractor may elect to carry out repairs in lieu of accepting a payment adjustment, if the lot is not rejectable and for air voids and compaction 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 HIR mix in a lot are to be repaired subject to the minimum lengths and widths 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 subplot.

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 subplot; 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 metres 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 five 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, RAC performance grade, or compaction, or all 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 HIR mix is rejectable, the mix properties, RAC performance grade, 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 HIR mix is not rejectable. If the Contractor's repair proposal results in the removal of at least half the sublot quantity, the Contract Administrator may waive testing demonstrating the suitability of the remainder of that sublot.

The unrepaired sublots combined with the remainder of any repaired sublots shall comprise one lot and shall be assessed on the basis of the loose mix or core or both samples 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 HIR or HMA 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 and assessed for all acceptance criteria specified in the Acceptance Criteria subsection.

The two reconfigured lots shall be accepted at the full Contract price, subjected to a payment adjustment or rejected according to the Payment Adjustment for Air Voids and Compaction clause, Payment Adjustment for Gradation clause, Payment Adjustment for Asphalt Cement Content clause, and Payment Adjustment for Recovered Asphalt Cement Performance Grade clause.

332.08.04.03 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.

332.08.04.04 Lift 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 subplot shall be based on the individual subplot lift thickness measurement and the lot thickness payment adjustment shall be calculated based on the re-evaluated subplot measurement.

332.09 MEASUREMENT FOR PAYMENT

332.09.01 Actual Measurement

332.09.01.01 Hot In-Place Recycled Mix

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

332.09.01.02 Tonne to Square Metre Conversion

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

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

Where:

- BRD_{MD} = the bulk relative density in t/m^3 , provided in the HIR mix design submitted for HIR mix, the Q_A is calculated for
- T_D = the design thickness, in millimetres, of the HIR mix
- Q_t = non-payment tonnage quantity referred to elsewhere in the Contract Document for the HIR mix under the measurement by square metre item

332.09.02 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 subsection.

332.10 BASIS OF PAYMENT

332.10.01 Hot In-Place Recycled Mix – Item

Payment at the Contract price for the above tender item shall include full compensation for all labour, Equipment, and Materials required to do the work, including rejuvenating agent and beneficiating HMA quantities if used, and the applicable payment adjustments.

No additional payment shall be made for the work, labour, Equipment, and Materials required to remove the existing pavement, and place HMA in areas not accessible to the heating and hot milling equipment.

The preparation and correction of existing HMA surfaces carried out in order to meet the requirements of the Contract Documents, including removal of materials such as cold mix patching material, crack sealant, and spray patch material; cold milling, hot milling, and the addition of beneficiating HMA; shall be at no cost to the Owner.

HMA required to retrofit partially paved shoulders or for pavement widening shall be paid for at the Contract price for the appropriate HMA tender item. No additional payment shall be made under this item for HMA required to retrofit partially paved shoulders or for pavement widening.

When repairing HIR mix, 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 HIR operations 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.

332.10.01.01 Payment Adjustment for Air Voids and Compaction

When the Contractor is not required to or does not elect to repair a lot, the payment adjustment for that lot due to air voids and compaction requirements shall be:

$$PA_{AVC} = \text{lot quantity} \times \text{Contract price} \times [PF_{AVC} - 1.0000] \times \text{TODRF} \quad (\text{Formula 2})$$

Where:

PA _{AVC}	=	payment adjustment for air voids and compaction
lot quantity	=	the horizontal area of HIR mix in the lot in m ²
Contract price	=	for the purposes of payment adjustment due to air voids and compaction, means the Contract price of the HIR tender item
PF _{AVC}	=	payment factor for combined air voids and compaction as determined according to the Calculations clause
TODRF	=	means the tender opening date reduction factor given in Table 9

When the PF_{AVC} is:

- a) less than 1.0000, there shall be a reduction in payment,
- b) equal to 1.0000 there shall be no adjustment, and
- c) greater than 1.0000 there shall be an increase in payment for the lot.

332.10.01.01.01 Calculations

332.10.01.01.01.01 General

The PF_{AVC} shall be based on the individual payment factors obtained from Table 6, based on PWL, determined for air voids and compaction using LS-101 and the formulae in the Payment Factor for Combined Air Voids 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 either:

- a) the payment factor it is added to in Formula 3, if that payment factor is less than 1.0000; or,
- b) 1.0000, if the payment factor it is added to in Formula 3, is equal to or greater than 1.0000.

332.10.01.01.01.02 Payment Factor for Combined Air Voids and Compaction

The payment factor for combined air voids and compaction (PF_{AVC}) shall be calculated using the following formulae:

$$PF_{AVC(SUB)} = PF_C + PF_{AV} \quad \text{(Formula 3)}$$

$$\text{If } PF_{AVC(SUB)} \text{ is greater than or equal to 2, then } PF_{AVC} = PF_{AVC(SUB)} - 1 \quad \text{(Formula 4)}$$

$$\text{If } PF_{AVC(SUB)} \text{ is less than 2, then } PF_{AVC} = PF_{AVC(SUB)} / 2 \quad \text{(Formula 5)}$$

Where:

PF_C = payment factor for compaction from Table 6

PF_{AV} = payment factor for air voids from Table 6

The PF_{AVC} 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_{AVC} for the unrepaired area shall be 1.0000.

332.10.01.01.01.03 Small Quantity Lots

For any lot comprised of one or two sublots, the lot shall be assigned a PF_{AVC} of 1.0000 if the lot is not rejectable. If the subplot is determined to be rejectable, it shall be administered as described in the Repairs subsection. If a rejectable subplot is allowed to remain in the work, a payment factor of 1.0000 shall be given to each attribute that is not rejectable, and the payment factor for PWL = 50% from Table 6 shall be given to each attribute that is rejectable. The PF_{AVC} for the subplot shall be calculated using the formulae detailed in the Calculations clause.

332.10.01.02 Payment Adjustment for Gradation

When the Contractor is not required to repair a lot, the payment adjustment for that lot due to gradation requirements shall be a reduction in payment. The payment adjustment for gradation shall be calculated using the following formula:

$$PA_G = \text{lot quantity} \times \text{Contract price} \times [PF_{DLS} + PF_{4.75} + PF_{75}] \times \text{TODRF} \quad \text{(Formula 6)}$$

If DLS gradation is rejectable then $PF_{DLS} = 0.04$

If DLS gradation is acceptable then $PF_{DLS} = 0$

If the 4.75 mm sieve gradation is rejectable then $PF_{4.75} = 0.04$

If the 4.75 mm sieve gradation is acceptable then $PF_{4.75} = 0$

If the 75 μ m sieve gradation is rejectable then $PF_{75} = 0.04$

If the 75 μ m sieve gradation is acceptable then $PF_{75} = 0$

Where:

PA_G = payment adjustment for gradation

PF_{DLS} = payment factor for the DLS gradation

$PF_{4.75}$ = payment factor for the 4.75 mm sieve gradation

PF_{75} = payment factor for the 75 μ m sieve gradation

lot quantity = shall be the horizontal area of HIR mix in the lot in m^2

Contract price = for the purposes of payment adjustment due to gradation, means the Contract price of the HIR tender item

TODRF = means the tender opening date reduction factor given in Table 9

332.10.01.03**Payment Adjustment for Asphalt Cement Content**

The payment adjustment for AC content shall apply to all placed and compacted HIR mix 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:

$$T_{HIR} = [0.975 \times BRD_{HIR} \times (T_D/1000) \times \text{lot quantity}] \quad (\text{Formula 7})$$

Where:

T_{HIR}	=	the theoretical tonnage of HIR mix in the lot
BRD_{HIR}	=	the lot average bulk relative density in t/m ³ , calculated from values obtained in the testing of bulk samples obtained during production of the first complete lot of at least three sublots of HIR mix placed in the work. The values shall be the same as those used in calculating the final air voids payment factor for the lot.
T_D	=	the design thickness, in millimetres, of the HIR mix
lot quantity	=	shall be the horizontal area of HIR mix in the lot in m ²

A payment adjustment per tonne of AC shall be established for each lot.

The payment adjustment per tonne shall apply to the quantity of AC in the lot. The quantity of AC includes the existing AC and all grades of AC supplied by the Contractor with and without polymer modifiers.

A payment adjustment shall be applied based on the Ministry's PGAC price index. The price index is published monthly in the Contract Bulletin. The price index shall be used to calculate the amount of the payment adjustment per tonne of AC accepted into the Work.

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

The payment adjustment for AC content for each lot shall be calculated using the following formulae:

When $AC_{HIR} < AC_{SPEC} - 0.2\%$:

The payment adjustment for AC content shall be a reduction in payment for the lot.

$$PA_{AC} = T_{HIR} \times I_{TO} \times \{[AC_{HIR} - (AC_{SPEC} - 0.2)]/100\} \times TODRF \quad (\text{Formula 8})$$

When $AC_{HIR} \geq AC_{SPEC}$ and $\leq AC_{SPEC} + 0.5\%$:

The payment adjustment for AC content shall be an increase in payment for the lot.

$$PA_{AC} = T_{HIR} \times I_{TO} \times \{[AC_{HIR} - AC_{SPEC}]/100\} \times TODRF \quad (\text{Formula 9})$$

When $AC_{HIR} > AC_{SPEC} + 0.5\%$:

The payment adjustment for AC content shall be a reduction in payment for the lot.

$$PA_{AC} = T_{HIR} \times I_{TO} \times \{[(AC_{SPEC} + 0.5) - AC_{HIR}]/100\} \times TODRF \quad (\text{Formula 10})$$

Where:

AC_{HIR}	=	the lot mean percentage by mass of AC in the HIR mix
AC_{SPEC}	=	the percentage by mass of AC specified for the work as specified elsewhere in the Contract Documents
PA_{AC}	=	payment adjustment for AC content
T_{HIR}	=	the theoretical tonnage of HIR mix in the lot as calculated in Formula 7

I_{TO} = PGAC price index for the month prior to Tender Opening
TODRF = means the tender opening date reduction factor given in Table 9

332.10.01.04 Payment Adjustment for Recovered Asphalt Cement Performance Grade

The payment adjustment for RAC performance grade shall be a reduction in payment. The payment adjustment for RAC performance grade shall be calculated using the following formula:

$$PA_{RAC} = \text{sublot quantity} \times \text{Contract price} \times 0.05 \times \text{TODRF} \quad (\text{Formula 11})$$

Where:

PA_{RAC} = payment adjustment for RAC performance grade
sublot quantity = the horizontal area of HIR mix in the sublot in m^2
Contract price = the Contract price of the HIR tender item
TODRF = means the tender opening date reduction factor give in Table 9

332.10.01.05 Payment Adjustment for Segregated Hot In-Place Recycled Mix

Where a payment reduction for segregation is allowed in lieu of repairs, the payment reduction shall be calculated as follows:

- a) \$2,000 once for each tender item regardless of the existence of payment increases;
- b) an additional payment reduction of \$2.50/m for mid-lane segregation; and
- c) an additional payment reduction of \$5.00/ m^2 for other segregation. The area of each repair shall be computed by multiplying the full lane width by the length of the repair and rounded to the next whole square metre.

332.10.01.06 Payment Adjustment for Surface Smoothness

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

332.10.01.07 Payment Adjustment for Lift Thickness

The payment adjustment for lift thickness shall apply to all placed and compacted HIR mix using the horizontal area of the HIR mix in the lot. The payment adjustment for lift thickness shall be a reduction in payment. The payment adjustment for lift thickness shall be calculated using the following formula:

$$PA_T = \text{lot quantity} \times \text{Contract price} \times \{[1.000 - (T_L / T_D)] \times 2.0\} \times \text{TODRF} \quad (\text{Formula 12})$$

Where:

PA_T = payment adjustment for lift thickness
 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 HIR mix in the lot in m^2
Contract price = the Contract price of the HIR tender item
TODRF = means the tender opening date reduction factor given in Table 9

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 payment adjustment for sublot lift thickness shall be:

$$PA_{\text{SUBLOT}} = \text{sublot quantity} \times \text{Contract price} \times 0.5 \times \text{TODRF}$$

(Formula 13)

Where:

PA_{SUBLOT}	=	payment adjustment for lift thickness of a sublot
sublot quantity	=	the horizontal area of HIR mix in the sublot in m ²
Contract price	=	the Contract price of the HIR tender item
TODRF	=	means the tender opening date reduction factor given in Table 9

332.10.02 Referee Testing and Segregation Challenge

332.10.02.01 Air Voids and Compaction

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

When there is an outlier in the referee test results, the Contractor shall be charged 50 per cent 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 specified elsewhere in the Contract Documents.

332.10.02.02 Gradation and Asphalt Cement Content

The cost of the referee testing, including sample delivery, shall be borne by the Contractor, unless the testing confirms total conformance of the attribute to the Contract Documents, in which case the costs shall be borne by the Owner.

332.10.02.03 Recovered Asphalt Cement Performance Grade

The cost of the referee testing, including sample delivery, shall be borne by the Contractor, unless the testing confirms total conformance of the RAC performance grade to the Contract Documents or that the lot is categorized as minor borderline, in which case the costs shall be borne by the Owner.

332.10.02.04 Segregation Challenge

If under a challenge, as described in the Challenging Severity of Segregation clause, the Contractor is successful, then 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 assessment, including the cost of delays.

If the Contractor is not successful, the Contractor shall be responsible for all costs associated with the assessment, including the cost of traffic control and delays.

332.10.02.05 Lift Thickness

If the referee test result is 3.0 mm or more 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 more greater

than the original QA test result for the subplot retested, the Contractor shall be charged the cost of the referee testing.

332.10.03 Repairs

No payment shall be made for the:

- a) Quantity of HIR mix 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, subplot, or visually defective HIR mix; or
- b) the Contract Administrator has determined that a rejectable lot or subplot requires repair.

No payment shall be made to repair areas of HIR mix damaged by traffic.

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.

TABLE 1
Specification Limits for Hot In-Place Recycled Mix Acceptance Attributes

Properties and Attributes	Mix Type HIR Mix is Required to Meet	Lower Limit (LL) %	Upper Limit (UL) %
AC Content	Any HMA type	$AC_{SPEC} - 0.2$ (Note 1)	$AC_{SPEC} + 0.5$ (Note 1)
Designated Large Sieve (DLS)	Superpave 12.5, 12.5FC 1, and 12.5FC 2	40	95
4.75 mm Sieve	Superpave 12.5, 12.5FC 1, and 12.5FC 2	40	65
75 μ m Sieve	Superpave 12.5, 12.5FC 1, and 12.5FC 2	2	13
Air Voids	Any HMA type	2.0	5.5
Pavement Compaction	Superpave 12.5 and 12.5FC 1	91.5	97.0
	Superpave 12.5FC 2	91.5 (Note 2)	98.0
Notes: 1. AC_{SPEC} is the AC content specified in the Contract Documents. 2. Compaction shall be analyzed using a LL of 90.5% if the design lift thickness is less than 50 mm. If the PWL compaction using a LL of 90.5% is greater than 95, the compaction PWL shall also be calculated using a LL of 91.5%, and the payment factor shall be determined for each LL using Table 10. The highest calculated payment factor shall be used.			

TABLE 2
Maximum Field Adjustments For Job Mix Formula

JMF Properties	Maximum Field Adjustment % (Notes 1 and 2)
AC Content	± 0.2
Per cent passing DLS sieve	± 5.0
Per cent passing 4.75 mm sieve	± 3.0
Per cent passing 75 μ m sieve	± 1.0
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 3
Sample Size and Frequency

Material Sample	Properties and Attributes	Quantity of Production Samples (Note 1)	Frequency of Sampling
HIR Loose Mix	Air Voids, Gradation, and AC Content	20 to 30 kg (Note 2)	Every subplot
	RAC Performance Grade	10 kg	Every lot
HIR Core	Compaction	One set of cores (Note 3)	Every subplot
	Lift Thickness	Single core	Every subplot

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.
3. Each core a minimum thickness of 35 mm.

TABLE 4
Testing Requirements

Properties and Attributes	Testing Method (Note 1)	Calculations, Values, and Results Required
HIR Mix Properties		
AC Content and Gradation for HIR mix samples	LS-291, LS-282, or LS-292	% AC % passing DLS sieve % passing 4.75 mm sieve % passing 75 µm sieve
Volumetric Properties of HIR Mix		
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 2) AASHTO T 312, LS-264 In addition to compacting all samples to the design number of gyrations, one sample from each lot of HIR mix shall be compacted to the maximum number of gyrations. Bulk Relative Density for HIR mix samples, BRD _m	BRD _m BRD at N _{des} BRD at N _{max} G _{mm} %G _{mm} @ N _{des} %G _{mm} @ N _{max}
Voids in Mineral Aggregate (VMA)	LS-604, LS-605, AASHTO R 35 (Note 3)	VMA (Note 4)
Voids Filled with Asphalt (VFA)	AASHTO R 35	VFA (Note 4)
Air Voids for mix (V _a)	LS-265	V _a
Dust to Binder Ratio (D _p)	AASHTO R 35	D _p (Note 4)
Compaction of HIR Mix		
Compaction and Thickness of Cores	BRD _c = Bulk Relative Density for core samples, LS-262 (Note 2) MRD _m = G _{mm} (Maximum Relative Density for loose mix samples, LS-264) % Compaction = (100 x BRD _c /MRD _m)	Thickness of Core % Compaction
Lift Thickness of HIR Mix		
Lift Thickness	LS-294	Thickness of Lift
Notes: 1. The rounding-off procedure, for all values, shall be according to LS-100. 2. For all gyratory-compacted specimens and cores, 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. 3. Calculate to two decimal places for each subplot using the BRD _m for the subplot, 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. 4. For information only.		

TABLE 5
Breakdown of the Tender Item Quantity into Lots for Air Voids and Compaction

Quantity of Square Metres	Number of Lots
< 40,000	1
40,000 to 80,000	2
80,000 to 100,000	2 or 3 (Note 1)
> 100,000	3 +
Notes: 1. As determined by the Contract Administrator in consultation with the Contractor.	

TABLE 6
Payment Factors Based on Per Cent Within Limits

PWL	Air Voids	Compaction (Note 1)	PWL	Air Voids	Compaction (Note 1)	PWL	Air Voids	Compaction (Note 1)
100	1.020	1.030	64	0.858	0.773	28	0.280	0.364
99	1.013	1.024	63	0.839	0.764	27	0.270	0.351
98	1.007	1.018	62	0.820	0.755	26	0.260	0.338
97	1.000	1.012	61	0.799	0.746	25	0.250	0.325
96	1.000	1.006	60	0.778	0.738	24	0.240	0.312
95	1.000	1.000	59	0.755	0.729	23	0.230	0.299
94	1.000	1.000	58	0.731	0.720	22	0.220	0.286
93	1.000	1.000	57	0.706	0.711	21	0.210	0.273
92	1.000	1.000	56	0.680	0.703	20	0.200	0.260
91	1.000	1.000	55	0.653	0.694	19	0.190	0.247
90	1.000	1.000	54	0.624	0.685	18	0.180	0.234
89	1.000	0.991	53	0.595	0.676	17	0.170	0.221
88	1.000	0.983	52	0.564	0.668	16	0.160	0.208
87	1.000	0.974	51	0.533	0.659	15	0.150	0.195
86	1.000	0.965	50	0.500	0.650	14	0.140	0.182
85	1.000	0.956	49	0.490	0.637	13	0.130	0.169
84	1.000	0.948	48	0.480	0.624	12	0.120	0.156
83	1.000	0.939	47	0.470	0.611	11	0.110	0.143
82	1.000	0.930	46	0.460	0.598	10	0.100	0.130
81	1.000	0.921	45	0.450	0.585	9	0.090	0.117
80	1.000	0.913	44	0.440	0.572	8	0.080	0.104
79	0.999	0.904	43	0.430	0.559	7	0.070	0.091
78	0.998	0.895	42	0.420	0.546	6	0.060	0.078
77	0.995	0.886	41	0.410	0.533	5	0.050	0.065
76	0.991	0.878	40	0.400	0.520	4	0.040	0.052
75	0.986	0.869	39	0.390	0.507	3	0.030	0.039
74	0.980	0.860	38	0.380	0.494	2	0.020	0.026
73	0.973	0.851	37	0.370	0.481	1	0.010	0.013
72	0.964	0.843	36	0.360	0.468	0	0.000	0.000
71	0.955	0.834	35	0.350	0.455			
70	0.944	0.825	34	0.340	0.442			
69	0.933	0.816	33	0.330	0.429			
68	0.920	0.808	32	0.320	0.416			
67	0.906	0.799	31	0.310	0.403			
66	0.891	0.790	30	0.300	0.390			
65	0.875	0.781	29	0.290	0.377			

Notes:

1. HIR mix required to meet the requirements of Superpave 12.5FC 2 compaction with a design lift thickness less than 50 mm, shall be analyzed using a lower limit (LL) of 90.5%. If the PWL compaction using a LL of 90.5% is greater than 95, the compaction PWL shall also be calculated using a LL of 91.5%, and the payment factor shall be determined for each LL using Table 10. The highest calculated payment factor shall be used.

TABLE 7
Minimum Lift Thickness

Design Lift Thickness (T_D) mm	Minimum Sublot Lift Thickness mm
< 40	$T_D - 7$
≥ 40	$T_D - 10$

TABLE 8
Allowable Macrottexture Ratios for Hot In-Place Recycled Mixes

Macrottexture Ratio (M_R)		
Degree of Segregation		
Slight	Medium	Severe
< 1.6	1.6 to 2.2	> 2.2

TABLE 9
Tender Opening Date Reduction Factor

Year of Tender Opening	Tender Opening Date Reduction Factor (TODRF)
2015	0.50
2016	0.50
2017	0.75
2018 +	1.00

TABLE 10
Superpave 12.5FC 2 with Design Lift Thickness less than 50 mm
Pay Factors for Per Cent Within Limits > 95%

PWL	LL = 90.5%	LL = 91.5%
100	1.015	1.030
99	1.012	1.024
98	1.009	1.018
97	1.006	1.012
96	1.003	1.006

**Appendix 332-A, Commentary for OPSS 332, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS**

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here

Related Ontario Provincial Standard Drawings

No information provided here.



**ONTARIO
PROVINCIAL
STANDARD
SPECIFICATION**

**METRIC
OPSS.PROV 402
NOVEMBER 2016**

(Formerly, OPSS 402, NOVEMBER 2013)

Note: The PROV implemented in November 2016 replaces OPSS 402 COMMON, November 2013 with no content changes.

**CONSTRUCTION SPECIFICATION FOR
EXCAVATING, BACKFILLING, AND COMPACTING
FOR MAINTENANCE HOLES, CATCH BASINS,
DITCH INLETS, AND VALVE CHAMBERS**

TABLE OF CONTENTS

402.01	SCOPE
402.02	REFERENCES
402.03	DEFINITIONS
402.04	DESIGN AND SUBMISSION REQUIREMENTS - Not Used
402.05	MATERIALS
402.06	EQUIPMENT - Not Used
402.07	CONSTRUCTION
402.08	QUALITY ASSURANCE - Not Used
402.09	MEASUREMENT FOR PAYMENT
402.10	BASIS OF PAYMENT

APPENDICES

402-A	Commentary

402.01	SCOPE

This specification covers the requirements for excavating, backfilling, and compacting for the installation of storm and sanitary pipe sewer maintenance holes, storm sewer catch basins and ditch inlets, and valve chambers for watermain and forcemains.

402.01.01 Specification Significance and Use

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.

402.01.02 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.

402.02 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 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 municipal-oriented 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 206	Grading
OPSS 403	Rock Excavation for Pipelines, Utilities, and Associated Structures in Open Cut
OPSS 404	Support Systems
OPSS 490	Site Preparation for Pipelines, Utilities, and Associated Structures
OPSS 491	Preservation, Protection, and Reconstruction of Existing Facilities
OPSS 492	Site Restoration Following Installation of Pipelines, Utilities, and Associated Structures
OPSS 501	Compacting
OPSS 510	Removal
OPSS 517	Dewatering of Pipeline, Utility, and Associated Structure Excavation

Ontario Provincial Standard Specifications, Material

OPSS 1010 Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

OPSS 1359 Unshrinkable Backfill

402.03 DEFINITIONS

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

Additional Excavation means all excavation ordered in writing by the Contract Administrator beyond excavation specified in the Contract Documents.

Backfilling means the operation of filling the excavation with bedding and backfill material.

Backfill Material means approved fill material used above the bedding and below the lower of the subgrade or finished grade or original ground.

Bedding Material means the material used to support the maintenance hole, catch basin, ditch inlet, or valve chamber.

Excavation, Earth and Rock means the excavation classified as earth and rock according to OPSS 206.

Imported Material means material obtained from a source other than the Work Area.

Native Material means the material removed to form an excavation within the Work Area for return to the same or other excavation.

Over-Excavation means all excavation beyond that specified in the Contract Documents, performed without the written order of the Contract Administrator.

Structure means maintenance hole, catch basin, ditch inlet, or valve chamber.

Unshrinkable Fill means a controlled density cement treated aggregate material.

402.05 MATERIALS

402.05.01 Granular Material

Granular material shall be according to OPSS 1010.

402.05.02 Backfill Material

402.05.02.01 General

Backfill material shall be as specified in the Contract Documents.

402.05.02.02 Native and Imported Material

Native and imported material shall be material approved by the Contract Administrator. All material shall be free from frozen lumps, cinders, ashes, refuse, vegetable or organic matter, rocks, and boulders over 150 mm in any dimension, and other deleterious material.

402.05.03 Unshrinkable Fill

Unshrinkable fill shall be according to OPSS 1359.

402.07 CONSTRUCTION

402.07.01 General

Excavations shall be stable and dry, unless designated as subaqueous Work.

402.07.02 Site Preparation

Site preparation shall be according to OPSS 490.

402.07.03 Preservation and Protection of Existing Facilities

Preservation and protection of existing facilities shall be according to OPSS 491.

402.07.04 Removals

Removals shall be according to OPSS 510.

402.07.05 Dewatering

Dewatering shall be according to OPSS 517.

402.07.06 Support Systems

Support systems shall be according to OPSS 404.

402.07.07 Removal of Frozen Ground

Written permission shall be obtained from the Contract Administrator prior to starting an excavation in frozen ground. The method used for removal of frozen ground shall not cause damage to adjacent structures or Utilities.

402.07.08 Excavation

402.07.08.01 General

Excavation shall be performed to the lines, elevations, and dimensions specified in the Contract Documents plus an allowance for support systems, where required.

Rock excavation for maintenance holes, catch basins, ditch inlets, or valve chambers shall be according to OPSS 403.

402.07.08.02 Additional Excavation

Structures shall not be placed or constructed on an unsuitable foundation as may be determined by the Contract Administrator.

Unsuitable material shall be excavated and the resulting excavation shall be backfilled and compacted to obtain a suitable foundation.

402.07.08.03 Over-Excavation

Corrective measures ordered by the Contract Administrator to rectify deficiencies caused by over-excavation shall be performed. Soil that has become disturbed by construction methods or procedures shall be removed and replaced with granular material compacted to 95% maximum dry density where the excavated surface is below or beside the proposed structure.

402.07.09 Backfilling and Compacting

402.07.09.01 Bedding

A 150 mm layer of granular bedding material shall be placed on the bottom of the excavation and compacted according to OPSS 501, prior to the placing of a structure.

402.07.09.02 Backfill

Backfill material shall be placed simultaneously on all sides of the structure in layers not exceeding 300 mm in thickness, loose measurement, and compacted according to OPSS 501, prior to the placement of a subsequent layer.

Backfill material shall not commence around cast-in-place concrete structures until approval has been obtained from the Contract Administrator.

402.07.10 Additional Excavating, Backfilling, and Compacting

Additional excavating, backfilling, and compacting shall be as described in the Excavation and Backfilling and Compacting subsections.

The volume of the excavation that is in addition to the limits specified in the Contract Documents shall be determined.

402.07.11 Site Restoration

Site restoration shall be according to OPSS 492.

402.07.12 Management of Excess Material

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

402.09 MEASUREMENT FOR PAYMENT

402.09.01 Actual Measurement

402.09.01.01 Additional Excavating, Backfilling, and Compacting

Additional excavating, backfilling, and compacting shall be based on the volume of the additional excavation measured in cubic metres prior to installation of a structure.

The volume of the additional excavation shall be determined beyond the limits specified in the Contract Documents.

402.10 BASIS OF PAYMENT

402.10.01 Excavating, Backfilling, and Compacting for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

Payment at the Contract price for the appropriate tender items for the installation of maintenance holes, catch basins, ditch inlets, and valve chambers shall be full compensation for all labour, Equipment, and Material to do the work.

When the Contract contains separate items for work required by this specification, payment shall be at the Contract prices and according to the specifications for such work.

Any expenses for remedial work resulting from over-excavation shall be borne by the Contractor.

402.10.02 Additional Excavating, Backfilling, and Compacting - 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.

402.10.03 Rock Excavation for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

Payment for rock excavation for maintenance holes, catch basins, ditch inlets, and valve chambers shall be according to OPSS 403.

Appendix 402-A, November 2013

FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer may consider including soil boring data, a geotechnical report, a subsurface report, or a soils report in the tender documents.

The designer should specify the following in the Contract Documents:

- Type of backfill material. (402.05.02)
- Lines, elevations, and dimensions of structure excavation. (402.07.08.01)

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

OPSD 701.010 to 701.015	Precast Concrete Maintenance Holes, 1,200 mm to 3,600 mm in Diameter
OPSD 701.030 to 701.081	Precast Concrete Maintenance Hole Components, 1,200 mm to 3,600 mm in Diameter
OPSD 702.040 to 702.050	Precast Concrete Ditch Inlet Maintenance Hole, 1,200 mm x 1,200 mm
OPSD 703.011 to 703.015	Precast Concrete Single Inlet Flat Cap, 1,500 mm to 3,600 mm in Diameter
OPSD 703.021 to 703.024	Precast Concrete Twin Inlet Flat Cap, 1,500 mm to 3,000 mm in Diameter
OPSD 705.010 to 705.020	Precast Concrete Catch Basins
OPSD 705.030 to 705.040	Precast Concrete Ditch Inlets
OPSD 706.010 to 706.041	Precast Concrete Ditch Inlets with 1,500 mm to 3,000 mm Diameter Flat Cap
OPSD 1100.010	Cast-In-Place Chamber for Valves up to 350 mm Diameter
OPSD 1101.010	Precast Valve Chamber, 1,200 mm and 1,500 mm Diameter
OPSD 1101.012 to 1101.015	Precast Concrete Valve Chamber with Poured-In-Place Thrust Blocks, 1,800 mm x 2,400 mm
OPSD 1101.016 to 1101.019	Precast Concrete Valve Chamber with Poured-In-Place Thrust Blocks, 2,400 mm x 3,000 mm



**ONTARIO
PROVINCIAL
STANDARD
SPECIFICATION**

**METRIC
OPSS.PROV 403
NOVEMBER 2016**

(Formerly OPSS 403, November 2010)
(Formerly OPSS 515, November 2005)

Note: The PROV implemented in November 2016 replaces OPSS 403 COMMON, November 2010 with no content changes.

**CONSTRUCTION SPECIFICATION FOR
ROCK EXCAVATION FOR PIPELINES, UTILITIES,
AND ASSOCIATED STRUCTURES IN OPEN CUT**

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403.01	SCOPE
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403.04	DESIGN AND SUBMISSION REQUIREMENTS - Not Used
403.05	MATERIALS - Not Used
403.06	EQUIPMENT - Not Used
403.07	CONSTRUCTION
403.08	QUALITY ASSURANCE - Not Used
403.09	MEASUREMENT FOR PAYMENT
403.10	BASIS OF PAYMENT

APPENDICES

403-A	Commentary

403.01 SCOPE

This specification covers the rock excavation requirements for the installation of sanitary and storm pipe sewers, pipe culverts and end sections, forcemains and associated appurtenances, and watermains and associated appurtenances; underground Utilities; and maintenance holes, catch basins, ditch inlets, and valve chambers in open cut.

403.01.01 Specification Significance and Use

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.

403.01.02 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.

403.02 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 municipal-oriented 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 206	Grading
OPSS 412	Sewage Forcemain Installation in Open Cut
OPSS 441	Watermain Installation in Open Cut

403.03 DEFINITIONS

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

Associated Appurtenances means as defined in OPSS 412 and OPSS 441.

Associated Structures means a maintenance hole, catch basin, ditch inlet, or valve chamber.

Rock means rock as defined in OPSS 206.

403.07 CONSTRUCTION

403.07.01 General

Rock excavation to install sanitary and storm pipe sewers, pipe culverts and end sections, forcemains and associated appurtenances, and watermain and associated appurtenances; underground Utilities; and maintenance holes, catch basins, ditch inlets, and valve chambers in open cut shall be performed to the lines and grades specified in the Contract Documents.

403.07.02 Use of Explosives

The requirements for the use of explosives shall be as specified in the Contract Documents.

403.07.03 Management of Excess Material

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

403.09 MEASUREMENT FOR PAYMENT

403.09.01 Actual Measurement

403.09.01.01 Rock Excavation for Pipelines, Utilities and Associated Structures

Measurement shall be in cubic metres.

The volume of rock excavation for pipelines, Utilities, and associated structures shall be determined by the product of the relevant following dimensions measured in place:

a) Height

The height of rock excavation for pipelines, Utilities, and associated structures is the difference in elevation between the theoretical bottom of bedding and the lower of the top of the original rock or the top of shatter.

The top of the original rock shall be determined using one of the following methods:

- i. Elevations taken after the overburden has been removed but before rock excavation.
- ii. From rock surface elevations on both sides of the excavation after rock excavation has been completed.

b) Width

The width of rock excavation for pipelines and Utilities is the actual width of trench measured horizontally to a maximum of the specified trench width.

c) Length

The length of rock excavation for pipelines and Utilities is measured horizontally along the centreline of the trench to the outside limits of the backfill for the associated structures or to the outlet end of a pipe where it emerges from the rock.

d) Horizontal

The horizontal measurement for associated structures is the:

- i. diameter at the external surfaces of a circular structure plus 300 mm all around; or
- ii. the length and width to the external surfaces of a rectangular or square structure plus 300 mm on all sides.

Where the excavation for this item overlaps rock excavation for other items there shall be no deduction for the overlap.

The volume of boulders in an excavation shall be determined by the product of the three maximum rectilinear dimensions. Where boulders classified as rock are measured for payment, only the amount actually removed shall be considered for payment, the total volume of rock considered for payment shall not exceed the volume of excavation within the theoretical lines.

403.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

403.10 BASIS OF PAYMENT

403.10.01 Rock Excavation for Trenches and Associated Structures - 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.

Appendix 403-A, November 2010
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer may consider including soil boring data, a geotechnical report, a subsurface report, or a soils report in the tender documents.

The designer should specify the following in the Contract Documents:

- Line and grade requirements of sanitary and storm pipe sewers, pipe culverts and end sections, forcemains and associated appurtenances, and watermains and associated appurtenances; underground Utilities; and maintenance holes, catch basins, ditch inlets, and valve chambers. (403.07.01)

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.



**ONTARIO
PROVINCIAL
STANDARD
SPECIFICATION**

**METRIC
OPSS.PROV 441
NOVEMBER 2016**
(Formerly OPSS 441, November 2014)

Note: The PROV implemented in November 2016 replaces OPSS 441 COMMON, November 2014 with no content changes.

**CONSTRUCTION SPECIFICATION FOR
WATERMAIN INSTALLATION IN OPEN CUT**

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441.05	MATERIALS
441.06	EQUIPMENT - Not Used
441.07	CONSTRUCTION
441.08	QUALITY ASSURANCE - Not Used
441.09	MEASUREMENT FOR PAYMENT
441.10	BASIS OF PAYMENT

APPENDICES

441-A	Commentary

441.01 SCOPE

This specification covers the requirements for the installation of watermains, service connections, and associated appurtenances in open cut.

441.01.01 Specification Significance and Use

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.

441.01.02 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.

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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.

441.02 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 municipal-oriented 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 206	Grading
OPSS 401	Trenching, Backfilling, and Compacting
OPSS 404	Support Systems
OPSS 490	Site Preparation for Pipeline, Utilities, and Associated Structures
OPSS 491	Preservation, Protection, and Reconstruction of Existing Facilities
OPSS 492	Site Restoration Following Installation of Pipelines, Utilities, and Associated Structures
OPSS 493	Temporary Potable Water Supply Services
OPSS 510	Removal
OPSS 517	Dewatering of Pipeline, Utility, and Associated Structure Excavation
OPSS 539	Temporary Protection Systems

Ontario Provincial Standard Specifications, Material

OPSS 1004	Aggregates - Miscellaneous
OPSS 1301	Cementing Materials
OPSS 1302	Water

OPSS 1350 Concrete - Materials and Production
OPSS 1842 Pressure Polyethylene Pipe Products

CSA Standards

B64.5-11 Double Check Valve (DCVA) Backflow Preventers
[Part of B64 Series-11, Backflow Preventers and Vacuum Breakers Compendium]
B137.1-09 Polyethylene Pipe, Tubing and Fittings for Cold-Water Pressure Services
[Part of B137-09, Thermoplastic Pressure Piping Compendium]
B137.2-09 Polyvinyl Chloride (PVC) Injection-Moulded Gasketed Fittings for Pressure Applications
[Part of B137-09, Thermoplastic Pressure Piping Compendium]
B137.3-09 Rigid Polyvinyl Chloride (PVC) Pipe and Fittings for Pressure Applications
[Part of B137-09, Thermoplastic Pressure Piping Compendium]
B137.3.1-09 Molecularly Oriented Polyvinyl Chloride (PVCO) Pipe and Fittings for Pressure Applications
[Part of B137-09, Thermoplastic Pressure Piping Compendium]
B137.10-09 Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene Composite Pressure-Pipe Systems [Part of B137-09, Thermoplastic Pressure Piping Compendium]

ASTM International

A 153M-09 Zinc Coating (Hot Dip) on Iron and Steel Hardware
A 276-10 Stainless Steel Bars and Shapes
A 307-10 Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
B 88-09 Seamless Copper Water Tube
B 633-11 Electrodeposited Coatings of Zinc on Iron and Steel
B 766-86 (2008) Electrodeposited Coatings of Cadmium
C 361-11 Reinforced Concrete Low-Head Pressure Pipe
D 3139-98 (2011) Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

American Water Works Association (AWWA)

C104/A21.4-08 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
C110/A21.10-08 Ductile-Iron and Gray-Iron Fittings for Water
C111/A21.11-07 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
C151/A21.51-02 Ductile-Iron Pipe, Centrifugally Cast, for Water
C153/A21.53-06 Ductile-Iron Compact Fittings for Water Service
C200-05 Steel Water Pipe - 6 In. (150 mm) and Larger
C205-07 Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 in. (100 mm) and Larger
C206-11 Field Welding of Steel Water Pipe
C208-07 Dimensions for Fabricated Steel Water Pipe Fittings
C301-07 Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids
C302-11 Reinforced Concrete Pressure Pipe, Non-Cylinder Type
C303-08 Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type
C502-05 Dry-Barrel Fire Hydrants
C504-10 Rubber-Seated Butterfly Valves
C509-09 Resilient-Seated Gate Valves for Water Supply Service
C510-07 Double Check Valve Backflow Prevention Assembly
C800-05 Underground Service Line Valves and Fittings
C900-07 Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 in.-12 in. (100 mm - 300 mm), for Water Transmission and Distribution
C905-10 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 350 mm Through 1,200 mm (14 in. Through 48 in.) for Water Transmission and Distribution

C907-12	Injection-Molded Polyvinyl Chloride (PVC) Pressure Fittings, 4 in.-12 in. (100 mm - 300 mm), for Water Distribution
C909-09	Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 100 mm Through 600 mm (4 in. Through 24 in.), for Water Distribution

American Society of Mechanical Engineers (ASME)

B18.2.1-2010	Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)

NSF International

61-2008	Drinking Water System Components - Health Effects

441.03 DEFINITIONS

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

Associated Appurtenance means structures, devices, and appliances, other than pipe and conduit, which are used in connection with a water distribution system, such as valves, hydrants, corporation cocks, services, and thrust restraints.

Backfilling means the operation of filling a trench with bedding, cover, and backfill material, or embedment and backfill material.

End Covers means temporary cover installed at the factory over both ends of uninstalled watermain pipe to prevent the entry of contaminants during shipping and storage.

Excavation, Earth and Rock means the excavation classified as earth and rock according to OPSS 206.

Fitting means connections, appliances, and adjuncts designed to be used in connection with pipe: for example, elbows and bends to alter the direction of a pipe; tees and crosses to connect a branch with a main; plugs and caps to close an end; and bushings, diminishers, or reducers to couple two pipes of different diameters.

Service Connection means the system used to supply water from the watermain to the property line.

Service Connection Appurtenance Set means the main stop, curb stop, couplings, service box, service box support, and service saddle used in the installation of a service connection.

Watermain means an installation designed for the conveyance of water under pressure using circular pipe.

441.05 MATERIALS

441.05.01 General

The pipe size shall be according to the size specified in the Contract Documents. Pipe type and class shall be as specified in the Contract Documents.

Fittings shall be suitable for and compatible with the pipe material and class with which they are used.

All material for watermains shall be NSF/ANSI 61 compliant.

441.05.02 Ductile Iron Pipe

Ductile iron pipe shall be according to AWWA C151/A21.51.

Fittings shall be gray iron according to AWWA C110/A21.10 or ductile iron according to AWWA C110/A21.10 or AWWA C153.

Ductile iron pipe and fittings shall be cement lined according to AWWA C104/A21.4.

Rubber gaskets for push-on or mechanical joints shall be according to AWWA C111/A21.11.

441.05.03 Concrete Pressure Pipe

Concrete cylinder pipe including joints and fittings shall be according to AWWA C301 or AWWA C303.

Non-cylinder pipe and joints shall be according to AWWA C302 or ASTM C 361. Fittings shall be according to AWWA C302.

441.05.04 Polyvinyl Chloride Pipe

441.05.04.01 General

Flexible elastomeric seals for bell and spigot joints shall be according to ASTM D 3139.

Fittings for polyvinyl chloride (PVC) and molecularly oriented polyvinyl chloride (PVCO) pipe shall be either:

- a) Gray iron according to AWWA C110/A21.10.
- b) Ductile iron according to C110/A21.10 or AWWA C153 and shall be cement lined according to AWWA C104/A21.4.
- c) Injection moulded polyvinyl chloride, blue in colour and according to AWWA C907 and CSA B137.2.
- d) Prefabricated polyvinyl chloride, blue in colour and according to AWWA C905 and CSA B137.3.

441.05.04.02 Polyvinyl Chloride Pipe (PVC)

Polyvinyl chloride pipe shall be according to AWWA C900 or AWWA C905 and CSA B137.3, and shall be blue in colour and supplied complete with gaskets.

441.05.04.03 Molecularly Oriented Polyvinyl Chloride Pipe (PVCO)

Molecularly oriented polyvinyl chloride pipe shall be according to AWWA C909 and CSA B137.3.1, and shall be blue in colour and supplied complete with gaskets.

441.05.05 Polyethylene Pipe

Polyethylene pressure pipe shall be according to OPSS 1842.

Fittings shall be either:

- a) Flanged gray iron according to AWWA C110/A21.10.
- b) Flanged ductile iron according to AWWA C110/A21.10 or AWWA C153 and shall be cement lined according to AWWA C104/A21.4.

- c) Polyethylene according to OPSS 1842.
- d) Heat fusion or insert or compression type fittings according to CSA 137.1.

441.05.06 Steel Pipe

Steel pipe shall be according to AWWA C200. Fittings shall be according to AWWA C208. Steel pipe shall have a cement-mortar protective lining and coating according to AWWA C205.

441.05.07 Copper Pipe

Copper pipe for service connections shall be according to ASTM B 88 and shall be type K soft copper.

441.05.08 Composite Pipe

Crosslink polyethylene/aluminum/crosslink polyethylene composite pressure pipe for service connections shall be according to CSA B137.10.

441.05.09 Valves

441.05.09.01 General

All valves shall open by operating in a counter clockwise direction.

Valves shall be designed for a minimum cold water working pressure of 1,035 kPa.

Valve types shall be one of the following:

- a) Valves less than 75 mm shall be brass or bronze gate valves.
- b) Valves greater than or equal to 75 mm, and less than or equal to 300 mm, shall be cast or ductile iron gate valves.
- c) Valves greater than 300 mm up to and including 500 mm shall be gate or butterfly valves.
- d) Valves greater than 500 mm shall be butterfly valves.

Fasteners shall be made from material meeting the strength requirements of ASTM A 307 with dimensions according to ASME B18.2.1. Bolts, studs, and nuts shall be cadmium plated according to ASTM B 766 or zinc coated according to ASTM A 153 or ASTM B 633. Fasteners for mechanical joints shall be ductile iron according to AWWA C111/A21.11.

441.05.09.02 Service Line Valves

Valves shall be according to AWWA C800. Type, pressure class, and end connections shall be as specified in the Contract Documents.

441.05.09.03 Gate Valves

Gate valves shall be according to AWWA C509.

Stem sealing on non-rising stem valves shall use O-ring type seals that do not require adjustment.

The gate valve end configuration shall be as specified in the Contract Documents.

441.05.09.04 Butterfly Valves

Butterfly valves shall be according to AWWA C504.

Valves shall be short body flanged or mechanical-joint, class 150B.

Valve shafts shall be stainless steel and, when they project through the body, shall have seals that do not require adjustment.

A vertical operating nut shall be provided. Valves shall be provided with an external indicator showing valve position by means of a pointer operating through a 90% arc from open to close.

441.05.09.05 Air Release and Air/Vacuum Valves

Air release and air/vacuum valves shall be single acting type.

441.05.10 Hydrants

Hydrants shall be according to AWWA C502. The type shall be as specified in the Contract Documents.

441.05.11 Double Check Valve Backflow Preventers

Double check valve backflow preventers shall be according to CSA B64.5 or AWWA C510.

441.05.12 Service Connection Fittings and Appurtenances

Main stops, curb stops, couplings, service boxes, and service saddles shall be as recommended by the manufacturer of the service connection pipe.

441.05.13 Concrete

Concrete for thrust blocks and fitting and appurtenance supports shall be according to OPSS 1350 with a nominal minimum 28-Day compressive strength of 20 MPa.

441.05.14 Mortar

Mortar for joints shall be composed of one part Portland cement and three parts mortar sand, wetted with sufficient water to make the mixture plastic.

The mortar sand shall be according to OPSS 1004, the Portland cement shall be according to OPSS 1301, and the water shall be according to OPSS 1302.

441.05.15 Straps, Tie-Rods, Angles, Nuts, and Bolts

Stainless steel straps, tie-rods, angles, nuts, and bolts used with concrete thrust blocks shall be according to ASTM A 276, Type 316 stainless steel.

441.07 CONSTRUCTION

441.07.01 General

The work for the installation of watermains shall include all watermain pipe, bends, tees, fittings, and thrust restraints and the testing of the watermain system.

The interior of all pipe, fittings, and other accessories shall be kept clean and free from undesirable material at all times.

441.07.02 Site Preparation

Site preparation shall be according to OPSS 490.

441.07.03 Removals

Removals shall be according to OPSS 510.

441.07.04 Preservation and Protection of Existing Facilities

Preservation and protection of existing facilities shall be according to OPSS 491.

441.07.05 Protection Against Floatation

Damage to the pipeline due to floatation shall be prevented during construction and until completion of the works.

441.07.06 Cold Weather Work

All work shall be protected from freezing. Pipe and bedding material shall not be placed on frozen ground.

441.07.07 Transporting, Unloading, Storing, and Handling Pipe

All pipe, fittings, and gaskets that are unsound or damaged shall be rejected.

All pipe up to and including 600 mm diameter shall be delivered to the Work Area with end covers and a tamper evident seal on only the bell end. These components shall adhere sufficiently to withstand the stresses caused during shipment.

A waterproof seal is not required on the end covers.

Tamper evident seals shall display the manufacturers name or logo or both. Seals shall straddle the end cover and the pipe. Removal of the cover shall render the tamper evident seal unusable either by breaking the seal or by leaving a message such as "VOID" on the pipe. Tamper evident seals are not required for non-reusable heat shrink plastic covers or foam plugs with punch-out centres.

Pipe delivered to the construction site with damaged or missing end covers shall be field cleaned to remove all undesirable material along the entire length of the interior of the pipe and the end covers reinstalled.

Manufacturer's recommendations for transporting, unloading, storing, and handling of materials shall be followed.

441.07.08 Excavation

Excavation for the installation of watermain shall be according to OPSS 401.

441.07.09 Support Systems

Support systems shall be according to OPSS 404.

441.07.10 Dewatering

Dewatering shall be according to OPSS 517.

441.07.11 Temporary Protection Systems

The construction of temporary protection systems shall be according to OPSS 539.

When the stability, safety, or function of an existing roadway, railway, watercourse, other works, or proposed works may be impaired due to the method of operation, protection shall be provided. Protection may include sheathing, shoring, and piling when necessary to prevent damage to such works or proposed works.

441.07.12 Temporary Potable Water Supply Services

Temporary potable water supply services shall be according to OPSS 493.

441.07.13 Backfilling and Compacting

Backfilling and compacting shall be according to OPSS 401.

441.07.14 Installation of Pipe

Pipe shall be laid in a dry trench.

Pipe shall be laid within the alignment and grade tolerances specified in the Contract Documents. The barrel of each pipe shall be in contact with the shaped bed throughout its full length.

When the Owner raises or lowers the invert of a watermain by up to 150 mm, it shall not constitute a Change in the Work and no adjustment shall be made to the payment. When the invert of a watermain is raised or lowered by more than 150 mm, then this shall constitute a Change in the Work for the full extent of the change from the original grade.

Pipe shall be kept clean and dry as work progresses. A removable watertight bulkhead shall be installed at the open end of the last pipe laid whenever work is suspended.

Pipe shall not be laid until the preceding pipe joint has been completed and the pipe carefully embedded and secured in place.

441.07.15 Jointing

441.07.15.01 General

End covers shall be removed immediately prior to jointing. Joint surfaces shall be clean. Pipe ends shall be lubricated with material recommended by the pipe manufacturer.

Manufacturer's instructions for jointing pipe shall be followed.

Joints and all connections shall be made watertight.

All bolts, nuts, couplings, rubber rings, and connecting pieces shall be cleaned thoroughly before installation.

Pipe shall be aligned on centreline to previously laid pipe.

Pipe shall be pulled or pushed only by a hand-operated winch. A backhoe shall not be used for pushing pipe.

Joints shall be prevented from opening after the pipe has been laid.

441.07.15.02 Ductile Iron Pipe

Mechanical Joints:

The gland shall be positioned on the pipe with the lip extension toward the joint. The gasket shall be slipped on the pipe with the thick edge towards the gland. The spigot end shall be pushed to its seat in the bell. The gasket shall be pressed to seat it evenly around the joint.

The gland shall be positioned for bolting and the bolts shall be inserted. All nuts shall be hand tightened.

The nuts shall be tightened half a turn at a time with a calibrated torque wrench. All nuts shall be tightened uniformly to the torque specified in AWWA C111/A21.11.

Bell and Spigot Joints:

The gasket shall be placed in the groove of the bell making certain it is properly seated.

The gasket shall be lubricated.

Pipe to be joined shall be aligned and the spigot shall be carefully entered into the bell until the spigot end just makes contact with the gasket.

The entry of the spigot into the bell shall be completed by hand or by the use of a hand operated winch until the second reference mark is flush with the face of the bell.

441.07.15.03 Concrete Pressure Pipe

Bell and Spigot Joints:

A cotton or burlap diaper shall be placed around the bell end of the pipe already in place.

A rubber gasket shall be placed on the spigot end of the pipe to be laid ensuring that the stretch and volume of the gasket is equalized around the entire circumference of the pipe. The gasket and spigot shall be lubricated prior to the spigot end being inserted home into the bell end.

The pipe shall be aligned and the spigot end shall be inserted into the bell of the pipe already in place.

Steel inserts shall be placed in the joints to prevent the spigot from entering the full depth of the bell. The location of the rubber gasket shall be checked around the entire circumference of the joint. The steel insert shall be removed and the pipe pushed until the spigot enters the full depth of the socket and is retained in position.

Ensure that the diaper is carefully placed around the joint recess. Cement mortar shall be poured around the assembled joint.

441.07.15.04 Polyvinyl Chloride Pressure Pipe - PVC and PVCO

Joints shall be bell and spigot with rubber gaskets. If gaskets are supplied separately, they shall be inserted in the groove of the bell end of the pipe.

The spigot shall be lubricated. The spigot end shall be inserted and pushed into the bell up to but not beyond the depth of the stop reference mark.

441.07.15.05 Polyethylene Pressure Pipe

Polyethylene pipe 100 mm diameter and larger shall be joined by the thermal butt fusion process. Procedures recommended by the pipe manufacturer shall be followed.

Polyethylene pipe 75 mm diameter and smaller shall be joined with heat fusion or insert or compression type fittings that are recommended by the pipe manufacturer and that prevent pull-out and resist creep deformation at full test pressure.

Connections to non-polyethylene fittings and appurtenances 50 mm diameter and larger shall be made with flanged joints according to the manufacturer's recommendations. Bolts shall be tightened to the torque specified by the manufacturer for the particular size and type of stub end.

441.07.15.06 Steel Pipe

Steel pipe shall be jointed according to AWWA C200. Field welding for joints shall be according to AWWA C206.

441.07.15.07 Service Connection Pipe

Service connection pipe shall be jointed as recommended by the manufacturer.

441.07.16 Cutting of Pipe

Whenever cutting of pipe is required, the pipe shall be cut according to the recommendations of the pipe manufacturer. After cutting the pipe, the interior of the pipe shall be cleaned and the end cover replaced until the pipe is installed.

441.07.17 Change in Line and Grade

441.07.17.01 Ductile Iron Pipe

Fabricated bends shall be provided for changes in line and grade of 11.25° or more.

Deflections of less than 11.25° may be made using a series of pipe joint deflections. The manufacturer's recommendation in deflecting any single pipe joint shall not be exceeded.

441.07.17.02 Concrete Pressure Pipe

Fabricated bends, bevel adaptors, or elbows shall be used for changes in line or grade greater than 5°. Changes in line or grade less than 5° shall be made using a manufactured joint or bevel connection or may be made over several joints. The manufacturer's joint deflection recommendations shall not be exceeded.

441.07.17.03 Polyvinyl Chloride Pipe - PVC and PVCO

Polyvinyl chloride pipe joints may be deflected but shall not exceed the manufacturer's recommendations. Otherwise, fabricated bends shall be used.

441.07.17.04 Polyethylene Pipe

Use of pipe flexibility may be allowed but shall not exceed the manufacturer's recommendations.

441.07.17.05 Steel Pipe

Fabricated bends shall be used at all changes in line or grade, unless the change can be accomplished by deflections at pipe joints without exceeding the manufacturer's recommendation for deflection at pipe joints.

441.07.18 Installation of Valves and Fittings

441.07.18.01 General

The work for the installation of valves and fittings shall include the valves and couplings and valve boxes, when valve boxes are specified in the Contract Documents. Valves and fittings shall be installed in locations and be of the type specified in the Contract Documents. Valves and connecting pipe shall be aligned accurately and supported as specified in the Contract Documents. Valves and fittings do not require end covers but shall be field cleaned prior to installation.

441.07.18.02 Air Release and Air/Vacuum Valves

Air release and air/vacuum valves shall be installed at locations specified in the Contract Documents.

Each air release and air/vacuum valve shall be provided with an isolating valve.

441.07.19 Installation of Hydrant Sets

The work for the installation of hydrant sets shall include the placing of hydrants, hydrant isolating valves, hydrant leads, restraining devices, and support devices.

Hydrant sets shall be installed at locations specified in the Contract Documents.

The hydrant shall be plumb with the nozzles parallel to the edge of pavement or curb line and the pumper connection facing the roadway.

441.07.20 Installation of Service Connections

A service connection shall consist of a service connection pipe and a service connection appurtenance set and shall be installed at locations and be of the size specified in the Contract Documents.

Service connection pipe shall be installed by pressure tap connection or saddles. Service connections on plastic watermain shall be installed using service saddles or tapped couplings.

Curb stop valve boxes shall be installed vertically and flush with the final grade elevation.

441.07.21 Shutting Down or Charging Mains

At no time shall watermain be shut down or charged or valves operated without permission from the Contract Administrator.

441.07.22 Connections to Existing Watermain

The work of connecting to existing watermain shall include the removal of all plugs, caps, blow offs, and thrust blocks from an existing watermain or fitting, and the installation of the connection.

All connections to existing watermain shall be made under the supervision of the Contract Administrator.

441.07.23 Thrust Restraints

All connections, caps, and bends shall be restrained by concrete blocking and/or restrained joints as specified in the Contract Documents. Concrete for thrust blocks shall be placed against undisturbed ground. Joints and couplings shall remain free from concrete. Only restrained joint products specifically designed for use with the pipe material shall be used.

441.07.24 Hydrostatic Testing

441.07.24.01 General

Hydrostatic testing shall be conducted under the supervision of the Contract Administrator upon completion of the watermain, including services and backfilling.

A test section shall be either a section between valves or the completed watermain.

Test pressure shall be 1,035 kPa.

The test section shall be filled slowly with water and all air shall be removed from the pipeline. A 24-hour absorption period may be allowed before starting the test. The test section shall be subjected to the specified continuous test pressure for 2 hours.

441.07.24.02 Polyethylene Pipe

The test procedure shall consist of initial expansion and test phases.

During the initial expansion phase, the test section shall be pressurized to the test pressure and sufficient make-up water added each hour for 3 hours to return to test pressure. The test phase begins after the initial expansion phase.

The test phase shall be 2 hours after which a measured amount of make-up water is added to return the test pressure. If the amount of make-up water added does not exceed the value in Table 1, leakage is not indicated.

If the amount of make-up water exceeds the Table 1 value, all leaks shall be located and repaired and the test section shall be retested until a satisfactory result is obtained.

The test duration should not exceed 8 hours. If the pressure test is not completed, the test section shall be de-pressurized and allowed to relax for at least 8 hours before bringing the test section up to pressure again.

441.07.24.03 Other Pipe

A period of 24 hours shall be allowed before starting the test.

The test section shall be subject to the specified continuous test pressure for 2 hours.

The leakage is the amount of water added to the test section to maintain the specified test pressure for the test duration. The measured leakage shall be compared with the allowable leakage as calculated for the test section. The allowable leakage is 0.082 litres per millimetre of pipe diameter per kilometre of pipe for the 2-hour test period.

If the measured leakage exceeds the allowable leakage, all leaks shall be located and repaired and the test section shall be retested until a satisfactory result is obtained.

441.07.25 Flushing and Disinfecting Watermains

Flushing and disinfecting operations shall be conducted under the supervision of the Contract Administrator. The watermain shall be flushed to achieve a minimum velocity of 0.76 m/sec otherwise the watermain shall be swabbed. The Contract Administrator shall be notified at least 2 Business Days in advance of the proposed date on which flushing and disinfecting operations are to commence.

Watermains shall be flushed in a sequence approved by the Contract Administrator. The Contract Administrator may permit or require the flushing to be carried out in stages as sections of the system are completed. Flushed sections shall be protected from contamination.

After flushing is completed, water from the existing distribution system shall be allowed to flow at a controlled rate into the new pipeline. Liquid chlorine solution shall be introduced so that the chlorine is distributed throughout the section being disinfected. The chlorine shall be applied so that the chlorine concentration is 50 mg/litre minimum throughout the section. The system shall be left charged with the chlorine solution for 24 hours.

Sampling and testing for chlorine residual shall be carried out by the Contract Administrator. The chlorine residual shall be tested in the section after 24 hours. If tests indicate a chlorine residual of 25 mg/litre minimum, the section shall be flushed completely and recharged with water normal to the operation of the system. If the test does not meet the requirements, the chlorination procedure shall be repeated until satisfactory results are obtained.

Twenty-four hours after the system has been recharged, the Contract Administrator shall take samples for bacteriological tests. Samples shall be collected from every 350 m of the new watermain plus one sample from the end of each of the line and at least one sample from each branch. If there is indication of contamination, the disinfection procedure shall be repeated.

The system shall not be put into operation until approval has been given by the Contract Administrator.

441.07.26 Site Restoration

Site restoration shall be according to OPSS 492.

441.07.27 Management of Excess Material

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

All chlorinated water used for testing, flushing, or disinfecting watermains shall be disposed of safely.

The method of disposal of chlorinated water is subject to the approval of the Contract Administrator.

441.09 MEASUREMENT FOR PAYMENT

441.09.01 Actual Measurement

441.09.01.01 Watermains

Measurement of watermains shall be by length in metres along the horizontal centreline of the pipe from the point of connection to a chamber, water treatment plant, or existing watermain to a point vertically above the end of the new watermain.

441.09.01.02 Valves

For measurement purposes, a count shall be made of the number of valves installed, regardless of the type and size.

441.09.01.03 Hydrant Sets

For measurement purposes, a count shall be made of the number of hydrant sets installed, regardless of the type.

441.09.01.04 Service Connection Pipe

Measurement of service connection pipe shall be by length in metres along the horizontal centreline of the pipe from the point of connection at the watermain to a point vertically above the end of the service connection.

441.09.01.05 Service Connection Appurtenance Sets

For measurement purposes, a count shall be made of the number of service connection appurtenance sets installed.

441.09.01.06 Connections to Existing Watermains

For measurement purposes, a count shall be made of the number of connections made to existing watermains.

441.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

441.10 BASIS OF PAYMENT

- 441.10.01 Watermains - Item**
- Valves - Item**
- Hydrant Sets - Item**
- Service Connection Pipe - Item**
- Service Connection Appurtenance Sets - Item**
- Connections to Existing Watermains - 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.

TABLE 1
Test Phase Make-Up Amount for Pressure Polyethylene Pipe

Pipe Diameter mm	Make-Up Water litre/km
30	12.38
40	12.38
50	13.62
75	18.60
100	31.00
150	74.50
200	124.20
250	161.40
275	248.30
300	285.60
350	335.20
400	409.70
450	533.90
500	682.90
550	869.10
600	1,105.00
700	1,378.20
800	1,775.50
900	2,234.90
1,000	2,731.60
1,050	3,104.00
1,200	3,973.20
1,350	5,152.70
1,600	7,449.70

Appendix 441-A, November 2014
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer may consider including soil boring data, a geotechnical report, a subsurface report, or a soils report in the Tender Documents.

The designer should include the following in the Contract Documents:

- Pipe size, type, and class. (441.05.01)
- Service line valve type, pressure class, and end connections. (441.05.09.02)
- Gate valve end configuration. (441.05.09.03)
- Type of hydrants. (441.05.10)
- Alignment and grade tolerances for the pipe installation. (441.07.14)
- Valve type and location. (441.07.18.01)
- Air release and air/vacuum valve locations. (441.07.18.02)
- Location of hydrant sets. (441.07.19)
- Location and size of service connections. (441.07.20)
- Thrust restraints. (441.07.23)

The designer should determine if valve boxes are needed and, if so, they should be specified in the Contract Documents. (441.07.18.01)

Corrosion protection system provisions should be specified, if appropriate.

Tracer wire or tracer tape should be specified, if appropriate.

Under conditions of high ground water, external fluids may enter via air release and air/vacuum release valves; therefore, appropriate measures should be taken.

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Appendix 441-A

Related Ontario Provincial Standard Drawings

OPSD 1101.012	Precast Concrete Valve Chamber with Poured-In-Place Thrust Blocks, 1800 x 2400 mm, Components
OPSD 1101.013	Precast Concrete Valve Chamber with Poured-In-Place Thrust Blocks, 1800 x 2400 mm, Riser and Base
OPSD 1101.014	Precast Concrete Valve Chamber with Poured-In-Place Thrust Blocks, 1800 x 2400 mm, Thrust Blocks
OPSD 1101.015	Precast Concrete Valve Chamber with Poured-In-Place Thrust Blocks, 1800 x 2400 mm, Chimney and Cap
OPSD 1101.016	Precast Concrete Valve Chamber with Poured-In-Place Thrust Blocks, 2400 x 3000 mm, Components
OPSD 1101.017	Precast Concrete Valve Chamber with Poured-In-Place Thrust Blocks, 2400 x 3000 mm, Riser and Base
OPSD 1101.018	Precast Concrete Valve Chamber with Poured-In-Place Thrust Blocks, 2400 x 3000 mm, Thrust Blocks
OPSD 1101.019	Precast Concrete Valve Chamber with Poured-In-Place Thrust Blocks, 2400 x 3000 mm, Chimney and Cap
OPSD 1101.020	Valve Operator
OPSD 1101.030	Precast Concrete Valve Chamber With Poured-in-Place Thrust Blocks, 3000 x 3000 mm Components
OPSD 1101.031	Precast Concrete Valve Chamber With Poured-in-Place Thrust Blocks, 3000 x 3000 mm Riser and Base
OPSD 1101.032	Precast Concrete Valve Chamber With Poured-in-Place Thrust Blocks, 3000 x 3000 mm Thrust Blocks
OPSD 1101.033	Precast Concrete Valve Chamber With Poured-in-Place Thrust Blocks, 3000 x 3000 mm Chimney and Cap
OPSD 1101.040	Precast Concrete Valve Chamber With Poured-in-Place Thrust Blocks, 3600 x 3000 mm Components
OPSD 1101.041	Precast Concrete Valve Chamber With Poured-in-Place Thrust Blocks, 3600 x 3000 mm Riser and Base
OPSD 1101.042	Precast Concrete Valve Chamber With Poured-in-Place Thrust Blocks, 3600 x 3000 mm Thrust Blocks
OPSD 1101.043	Precast Concrete Valve Chamber With Poured-in-Place Thrust Blocks, 3600 x 3000 mm Chimney and Cap
OPSD 1103.010	Concrete Thrust Blocks for Tees, Plugs, and Horizontal Bends
OPSD 1103.020	Concrete Thrust Blocks for Vertical Bends
OPSD 1104.010	Water Service Connection, 19 and 25 mm Diameter Sizes
OPSD 1104.020	Water Service Connection, 32, 38, and 50 mm Diameter Sizes
OPSD 1104.030	25 mm Blow Off Installation
OPSD 1105.010	Hydrant Installation
OPSD 1107.010	Piping Layout for Water Meters 50 mm and Smaller in Chambers
OPSD 1107.020	Piping Layout for Water Meters 75 to 250 mm in Chambers with By-Pass
OPSD 1107.030	Piping Layout for Water Meters in Building with By-Pass
OPSD 1108.010	Cast-In-Place Water Meter Chamber for 75 to 250 mm Meters
OPSD 1109.010	Cathodic Protection for Metallic Watermain Systems
OPSD 1109.011	Cathodic Protection for PVC Watermain Systems
OPSD 1109.012	Cathodic Protection off Existing Metallic Watermains, Exposed Service or Pipe Method
OPSD 1109.013	Anode Installation Over Pipe Method for Existing Metallic Watermains
OPSD 1109.014	Horizontal Anode Bank at Service
OPSD 1109.015	Vertical Anode Bank at Service
OPSD 1109.025	Waterproofing of Splices



CONSTRUCTION SPECIFICATION FOR DEWATERING

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517-A	Commentary

517.01 SCOPE

This specification covers the requirements for the design, operation, and removal of a dewatering or temporary flow passage system to control water during construction, and the control of the water prior to discharge to the natural environment and sewer systems.

517.01.01 Specification Significance and Use

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

517.01.02 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.

517.02 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.

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

Ontario Provincial Standard Specifications, Construction

OPSS 404	Support Systems
OPSS 492	Site Restoration Following Installation of Pipelines, Utilities, and Associated Structures
OPSS 510	Removal
OPSS 539	Temporary Protection Systems
OPSS 805	Temporary Erosion and Sediment Control Measures

517.03 DEFINITIONS

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

Automatic Transfer Switch means an electrical device that transfers power supply to a backup power source when there is an outage of the primary power source.

Cofferdam means as defined in OPSS 539.

Cut-Off Wall means a below grade wall that restricts groundwater flow and/or supports excavations, typically using soil-bentonite or cement-bentonite.

Design Flow Rate means the volume of water per unit of time expected to flow into the area of construction during or after the design storm event, and may include groundwater discharge.

Design Storm Return Period means the average number of years based upon probability, between the occurrences of a storm event of a certain severity or greater.

Dewatering System means the components required to control water to permit construction work to proceed under specified conditions, and may include a groundwater control system, impermeable barriers, pumps, and/or equipment to carry out unwatering.

Groundwater Control System means sump pumps, oversized excavations with perimeter ditches, deep wells or well points or other systems used to lower the groundwater table.

Plug means an impervious, natural, or constructed drainage work that blocks water.

Sediment means soil particles detached from an earth surface by erosion.

Sediment Control Measure means a measure to remove sediment from water prior to discharge to the natural environment and sewer systems.

Temporary Flow Control Device means a material or a group of materials that are used to control water flow into and out of a temporary flow passage system and can include a plug.

Temporary Flow Passage System means temporary flow control devices, channels, pipes, and other materials used to convey or divert water past an area under construction.

Unwatering means the removal of ponded or flowing surface water.

Vegetated Discharge Area means a sloped, open area of land with existing vegetation suitable to prevent erosion.

Waterbody means as any permanent or intermittent, natural or constructed body of water including lakes, ponds, wetlands and watercourses, but does not include sewage works as defined in the Ontario Water Resources Act.

Watercourse means a stream, creek, river, or channel including ditches, in which the flow of water is permanent, intermittent, or temporary.

517.04 DESIGN AND SUBMISSION REQUIREMENTS

517.04.01 Design Requirements

A dewatering or temporary flow passage system shall be designed to control water at the locations specified in the Contract Documents and at any other location where a system is necessary to complete the work. The design of the system shall be sufficient to permit the work at each location to be carried out as specified in the Contract Documents.

The design shall meet the requirements of the Contract Documents, and where a waterbody is present, shall include channel and inlet and outlet protection measures as required to protect the environment in the event of system failure or the design flow rate being exceeded.

The design shall not include the use of embankments and/or structures in public use, either existing or to be constructed as part of the Work, to control or stop water flow, unless approved by the Contract Administrator.

The design shall not result in displacement or damage to property, buildings, structures, utilities and other facilities adjacent to the Working Area, including from drawdown related settlement or other groundwater related effects.

The system shall be designed to prevent soil loss or erosion where water is removed, pumped, or discharged. The system shall be designed to prevent basal heave or instability.

Where the system involves the taking of water from a waterbody, the design shall maintain the flow of water and the natural functions of the waterbody upstream and downstream of the work area, and shall not interfere with other uses of the water.

Temporary flow passage systems shall be designed, as a minimum, for a 2 year design storm return period or the period specified in the Contract Documents, and groundwater discharge. A longer return period shall be used when determined appropriate for the work.

Temporary diversion channels that are part of a temporary flow passage system design shall include provision for fish passage during low flows.

517.04.02 Submission Requirements

The submission of Working Drawings is only required for the dewatering system item and temporary flow passage system item locations specified in the Contract Documents. Other locations requiring a system do not require the submission of Working Drawings.

Three (3) sets of Working Drawings shall be submitted to the Contract Administrator at least 7 Days prior to commencement of the dewatering system installation, for information purposes only. Prior to submission of Working Drawings, the seals and signatures of a design Engineer and a design-checking Engineer shall be affixed on the Working Drawings verifying that the drawings are consistent with the Contract Documents.

One person shall not perform both the design Engineer and design-checking Engineer roles for a system.

Where multi-discipline engineering work is depicted on the same Working Drawing and the design or design-checking Engineer or both are unable to seal and sign the Working Drawing for all aspects of the work, the drawing shall be sealed and signed by as many additional design and design-checking Engineers as necessary.

The following information and details shall be shown on the Working Drawings, where applicable:

a) Plans, Elevations, and Details

- i. Type of system.
- ii. Design calculations demonstrating adequacy of the system and equipment.
- iii. Design flow rate(s).
- iv. Plan location, description, and dimensions of system components, including dams, cofferdams, cut-off walls, temporary channels, pipes, culverts, sewers, groundwater control systems employing wells and/or well points, sedimentation basins, tanks, pumps, power supply, and standby equipment.
- v. Method of management of pumped water and plan location of all dewatering discharge points.
- vi. Profile drawings shall extend through and immediately beyond the limits of the system.
- vii. Water elevations upstream and downstream of the system at design flow rate.
- viii. Dam height or crest elevation, cofferdam depth and tip elevation, cutoff wall depth or base elevation, pipe invert elevations, depths of wells and wellpoints, pump intake elevation, and sedimentation basin depth or base elevation.
- ix. Plan location, elevation, and dimensions of environmental protection measures.
- x. Pipe type, size, and length, pump capacity, and tank capacity.
- xi. Material and construction standards to be used for the work.
- xii. Method for establishing and monitoring construction site groundwater levels.
- xiii. Criteria and method of removal of the system.

b) Procedures for the system construction, operation, and maintenance, including daily start-up sequence where applicable, and operation shut down.

- c) Procedures for the removal of the system, including the removal sequence, and well decommissioning.
- d) Stand-by power or pumping system requirements and the use of automatic transfer switching, when required to protect the environment and the Work.
- e) A copy of the Permit to Take Water issued by the Ministry of the Environment and Climate Change or confirmation of registration of water taking for construction dewatering, if a permit or registration is required by provincial regulation.
- f) When applicable, a copy of the water taking report and discharge plan required by provincial regulation.
- g) A copy of any necessary permits for the discharge of water to a sanitary sewer, or stormwater sewer system, stormwater pond, or other facility.

517.04.03 Preconstruction Survey

When a groundwater control system by wells or a well point system will be used, a condition survey of property and structures that may be affected by the work shall be carried out. The condition survey shall include the location and condition of adjacent properties, buildings, underground structures, water wells, Utilities, and structures, within the preconstruction survey distance specified in the Contract Documents from the groundwater control system. In addition, all water wells used as a supply of drinking water and located within the preconstruction survey distance specified in the Contract Documents from the groundwater control system shall be tested for compliance with Ontario Drinking Water Quality Standards.

Water wells within the preconstruction survey distance can be located using the website <https://www.ontario.ca/environment-and-energy/map-well-records> or its successor site.

Copies of the condition survey and water quality test results shall be submitted to the Contract Administrator prior to the operation of the groundwater control system.

517.07 CONSTRUCTION

517.07.01 General

Dewatering systems and temporary flow passage systems shall be constructed and operated according to the Working Drawings, where applicable.

When required, support systems shall be according to OPSS 404, and temporary protection systems shall be according to OPSS 539.

Temporary erosion and sediment control measures, including to control the discharge of water, shall be according to OPSS 805. Measures not specified in OPSS 805 shall be according to the Working Drawings. Temporary erosion and sediment control measures and cover material to protect exposed soils, as required by the Working Drawings, shall be installed as soon as is practical.

Stranded fish shall be managed as specified in the Contract Documents.

Unwatering shall be carried out as necessary.

Water suspected of being contaminated as indicated by visual or olfactory observations shall be reported to the Contract Administrator.

517.07.02 Dewatering System

The dewatering system shall be continuously operational to control buoyancy forces until such forces can be resisted by backfill and structure self-weight, to keep excavations stable, to avoid erosion impacts from the release of accumulated water, and to keep the work area in the condition required to complete the associated work as specified in the Contract Documents.

The dewatering shall be discontinued in a manner that does not disturb any structure, pipeline, or flow channel. Operation of the dewatering system shall be shut down according to the procedures specified in the Working Drawings, where applicable.

517.07.03 Temporary Flow Passage System

517.07.03.01 General

Installation and removal of temporary flow passage systems shall be according to this subsection, and the Working Drawings if applicable.

The temporary flow passage system shall be revised or realigned as required by construction staging.

When a temporary flow passage system is to remain operational through a seasonal shutdown period, the Contractor shall be responsible for any maintenance or repair costs due to the temporary flow passage system during the seasonal shutdown period.

517.07.03.02 Activation

517.07.03.02.01 Outside of a Waterbody

Temporary flow passage systems outside of a waterbody shall be activated according to the following sequential steps:

- a) The temporary flow passage system shall be constructed in its entirety, with upstream and downstream plugs separating the original waterbody channel and the temporary flow passage system remaining in place.
- b) The downstream plug shall be opened to allow water into the temporary flow passage system and water pressure shall be allowed to equalize between the original waterbody channel and the temporary flow passage system.
- c) The upstream plug shall be opened to allow water to flow through both the original waterbody channel and the temporary flow passage system.
- d) A plug shall be installed in the original waterbody channel, at the inflow confluence of the original waterbody channel and the temporary flow passage system, to fully divert the water to flow through the temporary flow passage system.
- e) A plug shall be installed in the original waterbody channel, at the outflow confluence of the temporary flow passage system and the original waterbody channel, to prevent backflow into the original waterbody channel.

517.07.03.02.02 Within a Waterbody

Temporary flow passage systems within a waterbody shall be activated according to the following sequential steps:

- a) An upstream temporary flow control device shall be installed to divert water flow into the temporary flow passage system.

- b) A plug shall be installed in the original waterbody, at the inflow confluence of the original waterbody channel and the temporary flow passage system, to fully divert the water to flow through the temporary flow passage system.
- b) A plug shall be installed in the original waterbody, at the outflow confluence of the temporary flow passage system and the original waterbody, to prevent backflow into the original waterbody channel.

517.07.04 Discharge of Water

Water from dewatering and unwatering operations shall be directed to a sediment control measure and/or a vegetated discharge area 30 m away from waterbodies or as far away as practicable from the top of the bank of any waterbody, prior to discharge to the natural environment.

Equipment and materials shall not be used or stored in vegetated discharge areas.

The discharge of water to the natural environment shall not be directed across pavements, sidewalks, curb and gutter or similar hard surfaces except through appurtenances as specified in the Contract Documents.

517.07.05 Monitoring

The Contract Administrator shall be notified of any complaints and any action taken or proposed to be taken in response to complaints.

Daily external visual monitoring of the surrounding area and property and structures on the preconstruction survey, if applicable, for impacts such as settlement and erosion shall be completed. Any observed impacts shall be immediately reported to the Contract Administrator. When public safety, the environment, or property is impacted or potentially impacted, the design Engineer shall, without delay, make a full assessment and direct changes to the system to eliminate impacts or potential impacts. Any changes shall be documented according to the System Amendments subsection.

When a groundwater control system is observed to negatively impact water supplies obtained from any adequate sources that were in use prior to groundwater control system operation, then water shall be supplied to the affected water users. The water shall be equivalent in quantity and quality to the normal water takings of the users. Supply shall continue until the negative impacts on the water supplies are removed, or until Contract Completion, whichever occurs first.

517.07.06 System Amendments

When displacement or damage to embankments and/or structures, or property adjacent to the Working Area, occurs due to the operation of the system, or soil loss or erosion occurs where water is removed, pumped, or discharged, the dewatering or temporary flow passage system design shall be amended to stop the displacement, damage, soil loss, or erosion.

When Working Drawings are required for the work, amendments shall be submitted to the Contract Administrator within two Business Days of the system being amended, on revised Working Drawings bearing the seal and signature of the design Engineer and design-checking Engineer.

517.07.07 Temporary Flow Passage System Deactivation

517.07.07.01 Outside of a Waterbody

Deactivation of temporary flow passage systems outside of a waterbody shall be according to the following sequential steps:

- a) The downstream plug in the original waterbody channel shall be opened to allow water into the original waterbody channel and water pressure shall be allowed to equalize between the original waterbody channel and the temporary flow passage system.
- b) The upstream plug in the original waterbody channel shall be opened to allow water to flow through both the original waterbody channel and the temporary flow passage system.
- c) A plug shall be installed at the inflow confluence of the original waterbody channel and the temporary flow passage system, to fully divert the water to flow through the original waterbody channel.
- d) A plug shall be installed at the outflow confluence of the original waterbody channel and the temporary flow passage system, to prevent backflow into the temporary flow passage system.

517.07.02 Within a Waterbody

Deactivation of temporary flow passage systems within a waterbody shall be according to the following sequential steps:

- a) The downstream plug shall be removed.
- b) The upstream plug shall be removed.

517.07.08 Removal

Dewatering and temporary flow passage system components shall be removed when no longer required. Removal of system components shall be according to the procedures specified on the Working Drawings, where applicable, and as specified in the Contract Documents.

Removal of temporary drainage work shall be according to OPSS 510.

Environmental protection measures and cut-off walls shall be removed, unless approved otherwise by the Contract Administrator.

Sedimentation basins and other excavations shall be backfilled with the original soil excavated, unless approved otherwise by the Contract Administrator. All disturbed areas shall be restored to an equivalent or better condition than existed prior to the commencement of construction.

Site restoration shall be according to OPSS 492.

517.07.09 Management of Excess Material

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

517.10 BASIS OF PAYMENT

517.10.01 Dewatering System – Item Temporary Flow Passage System - 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.

Progress payment for the above tender items shall be based on the following percentages of the Contract price:

- a) 40% for system installation,

- b) 40% for system operation, prorated over the duration of the system operation, and
- c) 20% for system removal.

When the system is passive and does not require active operation of pumps or other equipment or ongoing maintenance, the 40% prorated payment for system operation shall be paid after system installation.

When the Contract does not contain separate tender item(s) for dewatering system or temporary flow passage system; or when dewatering is required outside the specified limits of the dewatering system or temporary flow passage system tender items, the Contract price for the items directly associated with the required dewatering shall include full compensation for all labour, Equipment, and Material to do the work.

Appendix 517-A, November 2010
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.



**ONTARIO
PROVINCIAL
STANDARD
SPECIFICATION**

**METRIC
OPSS.PROV 518
NOVEMBER 2016**
(Formerly OPSS 518, November 2011)

Note: The PROV implemented in November 2016 replaces OPSS 518 COMMON, November 2011 with no content changes.

**CONSTRUCTION SPECIFICATION FOR
CONTROL OF WATER FROM DEWATERING OPERATIONS**

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518.10	BASIS OF PAYMENT

APPENDICES

518-A	Commentary

518.01 SCOPE

This specification covers the requirements for the control of uncontaminated water from dewatering operations to ensure that the water quality meets acceptable limits prior to discharge.

518.01.01 Specification Significance and Use

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.

518.01.02 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.

518.02 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 municipal-oriented 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 805 Temporary Erosion and Sediment Control Measures

Federal Government Publication

Fisheries Act, R.S., 1985 c. F-14

518.03 DEFINITIONS

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

Dewatering Operation means pumping, baling, temporary ditching, or vacuum removal of uncontaminated groundwater, rain water, melt water, surface run-off, water pipe leakage from excavations and trenches or within sheeted cofferdams to improve the soil stability or for other construction purposes.

Natural Attenuation Area means a dry flat-grassed meadow or open area with existing vegetation that is not subject to erosion.

Sediment means solid material, both mineral and organic, that is in suspension; is being transported; or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth surface.

Sediment Control Device means a settling pond, excavated sediment trap or basin, dewatering trap, or temporary sediment control measure according to OPSS 805.

Uncontaminated Water means any water that does not contain any deleterious substances or class of substances as defined under Section 34(1) of the Fisheries Act, and will not degrade the quality of the receiving water.

518.07 CONSTRUCTION

518.07.01 Disposal of Water

Water shall be disposed of so as not to be injurious to public health or safety, property, the environment, fisheries, or any part of the work completed or under construction. Dewatering operations shall be directed to a sediment control device or natural attenuation area prior to discharge to watercourses. If a natural attenuation area is used, a minimum 15 m setback shall be maintained from the receiving watercourse. When water is discharged to a watercourse, the water discharged shall be done in a manner that does not cause erosion or other damage to adjacent lands.

When required, a permit issued by the Ministry of the Environment (MOE) for taking water from a groundwater source shall be obtained.

518.07.02 Surface Drainage

Gutters shall be kept clear at all times for surface drainage. The flow of water shall not be directed across or over pavements or sidewalks, except through approved pipes or properly designed and constructed methods.

To protect against adverse impacts resulting from erosion and sedimentation, surface drainage from dewatering operations shall be intercepted and controlled using properly designed filtering or impoundment methods or both.

518.07.03 Settling Ponds and Sediment Traps or Basins

Settling ponds and sediment traps or basins shall be designed, constructed, and maintained according to OPSS 805 and as specified in the Contract Documents.

518.07.04 Temporary Erosion and Sediment Control Measures

The installation, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 805 and as specified in the Contract Documents.

518.07.05 Management of Excess Material

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

518.10**BASIS OF PAYMENT**

Payment at the Contract price for the appropriate tender items associated with dewatering shall include full compensation for all labour, Equipment, and Material to do the work.

When the Contract contains separate items for work required by this specification, payment shall be at the Contract prices and according to the specifications for such work.

Appendix 518-A, November 2011
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should be aware that this specification is only for uncontaminated water sources.

The designer should specify the following in the Contract Documents:

- Construction requirements for settling ponds and sediment basins. (518.07.03)
- Types of erosion and sediment control measures. (518.07.04)

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

OPSD 219.100	Light-Duty Straw Bale Barrier
OPSD 219.110	Light-Duty Silt Fence Barrier
OPSD 219.130	Heavy-Duty Silt Fence Barrier
OPSD 219.150	Sandbag Barrier
OPSD 219.180	Straw Bale Flow Check Dam
OPSD 219.190	Silt Fence Flow Check Dam
OPSD 219.200	Sandbag Flow Check Dam
OPSD 219.210	Rock Flow Check Dam, V-Ditch
OPSD 219.211	Rock Flow Check Dam, Flat Bottom Ditch
OPSD 219.220	Excavated Sediment Trap in Ditch
OPSD 219.230	Chute for Excavated Sediment Trap
OPSD 219.231	Berm Barrier
OPSD 219.240	Dewatering Trap
OPSD 219.260	Turbidity Curtain
OPSD 219.261	Turbidity Curtain, Seam Detail



CONSTRUCTION SPECIFICATION FOR REMOVAL OF ELECTRICAL EQUIPMENT AND MATERIALS

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610.09	MEASUREMENT FOR PAYMENT - Not Used
610.10	BASIS OF PAYMENT

APPENDICES

610-A	Commentary

610.01 SCOPE

This specification covers the requirements for demolition, salvage, and removal, either completely or partially, of electrical equipment and materials.

610.01.01 Specification Significance and Use

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

610.01.02 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.

610.02 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.

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

Ontario Provincial Standard Specifications, Construction

OPSS 492	Site Restoration Following Installation of Pipes, Utilities, and Associated Structures
OPSS 510	Removal

610.04 DESIGN AND SUBMISSION REQUIREMENTS

610.04.01 Submission Requirements

610.04.01.01 Operations Plans

An operations plan shall be submitted to the Contract Administrator a minimum of 3 weeks prior to the commencement of polychlorinated biphenyl (PCB) related activities. The plan shall describe the overall approach to the work and include the following:

- a) Operational methodologies.
- b) Work area delineation and security details.
- c) Environmental impact management, such as spill prevention and containment and emergency response plan.
- d) Contamination control.

- e) Equipment and area decontamination procedures.
- f) Ontario Ministry of the Environment and Climate Change (MOECC) Compliance Approval numbers as applicable for transportation and transfer facilities.

PCB wastes and PCB related wastes to be moved to a transfer facility shall be included in the operations plan with details regarding their eventual transport to a disposal facility for destruction.

610.07 CONSTRUCTION

610.07.01 General

General requirements for electrical work shall be as specified in the Contract Documents.

Demolition, salvage, and removal of electrical equipment and materials shall be as specified in the Contract Documents.

The Contractor shall acquire all releases and agreements necessary to do the work.

610.07.02 Timing of Work

Existing electrical systems required to continue in-service shall remain functional during construction operations until new or modified systems are operational.

610.07.03 Removal

Removal of non-electrical material and objects required for the removal of electrical equipment and material shall be according to OPSS 510.

Electrical concrete structures shall be removed to a minimum of 1.0 m below finished grade.

Where partial removal of pavement, sidewalk, curb and gutter, or other structures is required for removal of electrical equipment, the broken edges of the object to remain in place shall be squared up and trimmed along straight lines at a minimum distance of 300 mm from any area disturbed by removal operations.

Steel reinforcement, conduits, ducts, wires, and debris associated with the removed portions of such structures shall be removed for disposal.

610.07.04 Demolition

Demolition of concrete, brick, timber, and masonry structures, including pole footings, equipment pads, concrete poles, and substation buildings shall be carried out in such a manner and with such equipment as not to disturb adjacent pavement, Utilities, other works, or electrical equipment and material to remain in place and with such care as to leave material designated to be salvaged in an undamaged condition.

610.07.05 Luminaires

Prior to removing luminaires, all lamps and glass shall be removed.

610.07.06 Cables and Conduits

Underground cables shall be completely removed and conduit systems shall be cut back to a depth of 600 mm below finished grade and abandoned in place.

610.07.07 Transformers

Transformers containing PCBs, including all internal components, and all PCB related wastes shall be removed and managed as subject waste as specified in the Contract Documents.

Transformers not containing PCBs shall be removed, salvaged, and transported to storage sites specified in the Contract Documents.

610.07.08 Temporary Installations

Equipment and materials supplied by the Contractor for use with temporary installations shall be removed. Equipment and materials supplied by the Owner for use with temporary installations shall be removed and salvaged as specified in the Contract Documents.

610.07.09 Salvage of Equipment

610.07.09.01 Damages

Prior to removal operations, the Contract Administrator shall be notified of any equipment that is broken or deteriorated to the point where salvage is not practical.

Equipment and materials damaged through improper handling or through loss after removal shall be repaired or replaced at no additional cost to the Owner.

610.07.09.02 Packaging of Electrical Equipment and Materials

Electrical equipment and materials that has been removed shall be packed for protection against damage.

All equipment or material in excess of 100 kg shall be securely mounted on wooden pallets suitable for handling by forklift trucks.

610.07.09.03 Shipping of Salvaged Electrical Equipment and Materials

All salvaged equipment and materials shall be loaded, transported, and unloaded at the sites specified in the Contract Documents.

Delivery to any Owner unloading sites shall be made between 09:00 and 15:30, local time. The Contract Administrator shall be notified 3 Business Days in advance of delivery to the Owner's unloading sites.

610.07.10 Quality Control

610.07.10.01 Pre-Removal Testing and Inspection

Components specified for removal shall be inspected prior to removal. If the components are to be salvaged for reuse within the Working Area or for storage at the Owner's premises, the Contractor shall make a list of any imperfections of those components and shall submit the list to the Contract Administrator 3 Business Days prior to the commencement of removal.

610.07.10.02 Proof of Performance Testing and Inspection

The removal work shall be inspected to ensure that all electrical removals have been carried out and that all components requiring disposal at approved sites have been completed so that no such materials remain on the Owner's lands.

610.07.11 Site Restoration

Site restoration shall be according to OPSS 492.

610.07.12 Management of Excess Material

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

610.10 BASIS OF PAYMENT

610.10.01 Removal of Electrical Equipment - 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.

Work required to salvage and transport liquid type transformers shall be administered as a Change in the Work.

Appendix 610-A, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here

Related Ontario Provincial Standard Drawings

No information provided here.



**CONSTRUCTION SPECIFICATION FOR
INSTALLATION OF SECTIONAL STEEL
HIGH MAST LIGHTING POLES**

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630-A	Commentary

630.01	SCOPE

This specification covers the requirements for the installation of sectional steel high mast lighting poles complete with raising and lowering equipment, including mechanical and electrical components.

630.01.01 Specification Significance and Use

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

630.01.02 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.

630.02 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.

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

Ontario Provincial Standard Specifications, Material

OPSS 2471	Sectional Steel High Mast Lighting Poles
OPSS 2476	Raising and Lowering Equipment for High Mast Lighting Poles

CSA Standards

S6-14	Canadian Highway Bridge Design Code

630.03 DEFINITIONS

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

Certificate of Conformance means a document issued by the Quality Verification Engineer confirming that the specified components of the Work are in general conformance with the requirements of the Contract Documents.

Quality Verification Engineer (QVE) means an Engineer retained by the Contractor qualified to provide the services specified in the Contract Documents.

630.04 DESIGN AND SUBMISSION REQUIREMENTS

630.04.01 Submission Requirements

630.04.01.01 Assembly of Sectional Steel High Mast Lighting Poles

Installation drawings, calculations, and procedures shall be submitted to the Contract Administrator at least 14 Days prior to the commencement of scheduled start of pole assembly for approval. An Engineer shall affix his or her seal and signature on the installation drawings, calculations, and procedures verifying that they are consistent with the Contract Documents and sound engineering practices.

These installation drawings, calculations, and procedures shall include all details of equipment to be used in jacking the sections together and lifting the assembled pole, including placing and securing it on the anchorage assembly.

630.04.01.02 Training Certificate

A certificate of training from the manufacturer of the high mast lighting raising and lowering equipment for each person who will be doing the installation work shall be submitted to the Contract Administrator. The certificates shall be submitted 14 Days prior to the commencement of the installation work, and the work shall not proceed until the certificates are accepted by the Contract Administrator. Training certificates that are 5 years old or more shall not be accepted.

The training certificate shall state that the manufacturer certifies that the individual has successfully completed training in the following areas:

- a) Assembly of the pole sections.
- b) Assembly of the raising and lowering equipment.
- c) Operation of the raising and lowering equipment.
- d) Installation of high mast poles and lighting equipment.
- e) Levelling of the luminaire ring assembly.
- f) Inspection of high mast poles and lighting equipment.
- g) Maintenance and repair techniques for sectional steel high mast lighting equipment.
- h) Safety procedures.

The training certificate shall be dated and signed by officers of the manufacturer and shall indicate the dates that the training was provided.

630.05 MATERIALS

630.05.01 Sectional Steel High Mast Lighting Poles

Sectional steel high mast lighting poles shall be according to OPSS 2471 and as specified in the Contract Documents.

630.05.02 Raising and Lowering Equipment

Raising and lowering equipment shall be according to OPSS 2476.

630.07 CONSTRUCTION

630.07.01 General

General requirements for electrical work shall be as specified in the Contract Documents.

630.07.01.01 Ordering Sectional Steel High Mast Lighting Poles and Raising and Lowering Equipment

Immediately following the award of the Contract, the high mast lighting poles and the raising and lowering equipment shall be ordered, as required for this Contract. All necessary measures shall be taken to ensure sectional steel high mast lighting poles and the raising and lowering equipment are 100% compatible and fully functional.

Verification of the delivery dates of the high mast lighting poles and the raising and lowering equipment shall be obtained from the suppliers and submitted to the Contract Administrator within 72 hours after the award of the Contract.

Timely and accurate communication shall be maintained with both the Owner and the suppliers regarding the delivery, schedules, and requirements for the high mast lighting poles and the raising and lowering equipment.

Delivery and off-loading of the sectional steel high mast lighting poles and the raising and lowering equipment shall be completed in a timely and efficient manner.

630.07.02 Sectional Steel High Mast Lighting Poles and Equipment

630.07.02.01 Assembly of Sectional Steel High Mast Lighting Poles

The lifting equipment used in contact with the pole sections shall be non-abrasive in nature.

Sectional steel high mast lighting poles shall be assembled so that all sections for individual poles are matched as fabricated. The completed sectional steel high mast lighting pole shall be according to the overall tolerances specified in the Contract Documents.

630.07.02.02 Raising and Lowering Equipment

The raising and lowering equipment and the mechanical and electrical components shall be installed according to the manufacturer's specifications and recommendations.

The raising and lowering equipment manufacturer shall be present during the equipment installation to ensure proper assembly procedures and commissioning.

630.07.02.03 Pole Installation

At least 14 Days prior to the start of pole installation, the Contract Administrator shall be informed, in writing, of the pending operation.

The anchorage setting templates shall be removed prior to installation of lighting poles.

The pole shall be installed plumb, with the base plate positioned and the door orientated as specified in the Contract Documents. The pole shall have adequate support during installation. The pole shall not be considered self-supporting until all fasteners in the base are tightened by the turn-of-nut method according to CSA S6.

A 12 mm square, welded, 19 AWG galvanized steel metal mesh shall be placed around the outside circumference of the anchor bolt circle, between the pole base plate and the footing after pole installation is completed.

The orientation of the high mast lighting pole shall be as specified in the Contract Documents.

630.07.02.04 High Mast Lighting Equipment

High mast lighting equipment shall be installed as specified in the Contract Documents.

630.07.03 Quality Control

630.07.03.01 Pre-Installation Testing and Inspection

The pre-installation testing and inspection of the high mast lighting pole complete with raising and lowering equipment, including mechanical and electrical components, shall be according to manufacturer's specification and the Contract Documents.

A letter of compliance from the manufacturer of the sectional steel high mast lighting pole equipment, certifying that the sectional steel high mast lighting pole equipment is according to the Contract Documents shall be submitted to the Contract Administrator by the Contractor.

Testing on the torque limiter shall be conducted on the internal drive raising and lowering equipment and on the portable power drill for the external drive raising and lowering equipment unit. The Contractor shall ensure that the torque limiter is set and functions according to the manufacturer's recommendations. The cord connecting the control to each raising and lowering motor or portable power drill shall be a minimum length of 13 m.

630.07.03.02 Proof of Performance Testing and Inspection

The ring assembly, including luminaires, and the raising and lowering equipment shall be fully raised, latched, unlatched, and fully lowered a minimum of five times for each installed sectional steel high mast lighting pole. After each raising and lowering sequence, every piece of the raising and lowering equipment shall be inspected to ensure that all components are functioning properly and are not damaged. The cables inside the pole shall be inspected. Twisted cables shall be untwisted prior to each subsequent raising and lowering sequence.

The following shall be inspected:

- a) Winch gear and housing.
- b) Winch cable.
- c) Supporting cables.
- d) Power cable.
- e) Ring assembly.
- f) Latching system.

If problems or deficiencies occur during the testing, the test shall be stopped and the problem or deficiency corrected. Once the problem or deficiency has been corrected, the testing process of the pole and associated material shall be repeated in full.

Each ring assembly and supporting cable shall be inspected and adjusted to ensure that the ring is level.

630.07.03.02.01 Certificate of Conformance

A Certificate of Conformance shall be submitted to the Contract Administrator upon completion of the work. The Quality Verification Engineer shall affix his or her seal and signature to the completed Certificate of Conformance confirming the following:

- a) All of the high mast equipment at each high mast pole was tested and inspected.
- b) The high mast lighting raising and lowering equipment is in general conformance with the requirements of the Contract Documents.
- c) Each sectional steel high mast lighting pole has been installed plumb with the base plate positioned as specified in the Contract Documents.
- d) Each sectional steel high mast lighting pole and raising and lowering equipment passed the proof of performance testing and inspection.
- e) The torque limiter has been fully tested and verified to be fully functional according to the manufacturer's recommendations and the Contract Documents.
- f) The sectional steel high mast lighting pole jacking and installation procedures have been carried out according to the installation drawings, calculations, and procedures.
- g) At the end of the testing at each sectional steel high mast lighting pole, the ring assembly has been levelled, raised to the top of the pole, and fully and properly docked and latched to the head frame assembly at the top of the pole.

630.07.04 Document Submission

The service manual for the high mast lighting equipment shall document in detail the installation and operation of the high mast lighting equipment and components. It shall include clear and detailed illustrations indicating layouts of controls, displays, schematic and wiring diagrams, and other information required to correctly operate a fully assembled and operational high mast lighting unit, as well as the maintenance and service aspects of individual components.

The service manual for the high mast lighting equipment shall include part numbers and settings and options of installation and operation. The manual shall provide sections that completely describe the theory of operation using block diagrams, wiring and schematic diagrams, diagnostic and repair procedures, assembly instructions and drawings, component layout drawings, and acceptable manufacturers and suppliers of miscellaneous component parts.

Each manual for the high mast lighting equipment shall detail all major assembling, adjusting, and aligning procedures and identify all acceptable tolerances or variances. Manuals shall also include:

- a) Detailed specifications of major components.
- b) Copies of the Working Drawings specified in OPSS 2471 and OPSS 2476 reduced to 8½ x 11" paper format.
- c) Component warranty certificates.
- d) Operating instructions.
- e) All other relevant documents or drawings.

630.07.05 Management of Excess Material

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

630.08 QUALITY ASSURANCE

The Owner may make random inspections of individual high mast lighting poles, visually check for proper assembly with related equipment, and witness the raising and lowering of the ring assembly.

630.09 MEASUREMENT FOR PAYMENT

630.09.01 Actual Measurement

**630.09.01.01 25 m Sectional Steel High Mast Lighting Poles and Equipment
30 m Sectional Steel High Mast Lighting Poles and Equipment
35 m Sectional Steel High Mast Lighting Poles and Equipment
40 m Sectional Steel High Mast Lighting Poles and Equipment
45 m Sectional Steel High Mast Lighting Poles and Equipment**

For measurement purposes, a count shall be made of the number of each size of sectional steel high mast lighting poles and equipment installed.

630.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clause under Actual Measurement.

630.10 BASIS OF PAYMENT

**630.10.01 25 m Sectional Steel High Mast Lighting Poles and Equipment - Item
30 m Sectional Steel High Mast Lighting Poles and Equipment - Item
35 m Sectional Steel High Mast Lighting Poles and Equipment - Item
40 m Sectional Steel High Mast Lighting Poles and Equipment - Item
45 m Sectional Steel High Mast Lighting Poles and Equipment - 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.

Progress payments shall be based on the following percentages of the Contract price for milestones accepted by the Contract Administrator:

- a) 35% for delivery of all high mast lighting poles and equipment
- b) 5% for certificate of training
- c) 20% for installation of all high mast lighting poles and equipment
- d) 40% for completed and signed Certificate of Conformance for all High Mast Lighting Poles and Equipment

Appendix 630-A, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.



CONSTRUCTION SPECIFICATION FOR TEMPORARY TRAFFIC CONTROL DEVICES

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706-A	Commentary

706.01	SCOPE

This specification covers the requirements for the use of temporary traffic control devices during construction.

706.01.01 Specification Significance and Use

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

706.01.02 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.

706.02 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.

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

Ontario Provincial Standard Specifications, Construction

OPSS 703 Permanent Small Signs and Support Systems

Ontario Provincial Standard Specifications, Material

OPSS 2001 Signs

Ontario Ministry of Transportation Publications

Ontario Traffic Manual (OTM):
Book 7 – Temporary Conditions (Office and Field Editions)

Designated Sources for Materials (DSM)

706.03 DEFINITIONS

Temporary Traffic Control Signs means all traffic control signs and associated devices identified in OTM Book 7, including vehicles and sign trailers required to support signs and equipment to supply sign lighting; but excludes highway number markers.

Small Sign means small sign as defined in OPSS 703.

706.04 DESIGN AND SUBMISSION REQUIREMENTS

A copy of the traffic control plan shall be submitted to the Contract Administrator at the pre-work meeting.

706.05 MATERIALS

706.05.01 Retroreflective Sheeting

Retroreflective sheeting shall be according to OPSS 2001.

706.05.02 Automated Flagger Assistance Devices

Automated flagger assistance devices (AFAD) shall be according to OTM Book 7.

706.05.03 Temporary Traffic Control Signs

Temporary traffic control signs shall be according to OTM Book 7.

706.05.04 Portable Variable Message Signs

Portable variable message signs (PVMS) shall be supplied from a source named on the ministry's DSM.

706.05.04.01 Modem

Modem requirements for PVMS shall be as specified in the Contract Documents.

706.07 CONSTRUCTION

706.07.01 Temporary Traffic Control Signs

706.07.01.01 General

The work of temporary traffic control signs shall include:

- a) Installation and relocation according to OTM Book 7 unless otherwise specified in the Contract Documents.
- b) Temporarily relocating, modifying as required, and reinstalling existing small signs.
- c) Installing and removing contract information signs.
- d) Installing and removing Speed Fines Doubled (TC-90) signs.

Messaging for all temporary traffic control signs shall be according to OTM Book 7 unless otherwise specified in the Contract Documents.

When a Contract is in a designated bilingual area, bilingual temporary traffic control signs shall be installed. If a bilingual temporary traffic control sign is not available, then the French temporary traffic control sign shall be installed. A French Construction Zone Begins sign (Rb-90AF) and a French Construction Zone Ends sign (Rb-90BF) shall be installed next to the corresponding English Rb-90A and Rb-90B signs. All other French temporary traffic control signs shall be installed 150 m downstream from the English sign.

Temporary traffic control signs shall be installed before work affecting traffic begins, remain operational throughout the duration of the operation requiring signs and be removed upon completion of the operation.

Prior to seasonal shutdown, temporary traffic control signs shall be reviewed and signs that are not required during the seasonal shutdown period shall be removed. At the end of the seasonal shutdown period, the removed signs shall be reinstalled as required.

The condition of the temporary traffic control signs shall meet the quality replacement guidelines specified in OTM Book 7 for the duration of the Work. Signs that do not meet the guidelines shall be removed and replaced.

706.07.01.02 Existing Small Signs

Any existing small signs, excluding Tourism-Oriented Directional Signing and Logo Sign Program signs, removed to accommodate construction shall be kept operational by placement on a temporary support. Temporarily relocated existing small signs shall be kept at the same height, offset and approximate location from traffic as before relocation. All existing small signs shall be reinstalled, at or as close as possible to the original location, according to OPSS 703 upon completion of the Work.

Temporary modifications to existing small signs shall be according to OTM Book 7 unless otherwise specified in the Contract Documents.

706.07.01.03 Contract Information Signs

Contract information signs shall be installed according to OTM Book 7 and removed upon completion of the Work. Contract information signs shall be either a TC-81 sign or an Owner supplied contract information sign.

Owner supplied contract information signs shall be picked up at the location specified in the Contract Documents. The Contractor shall arrange for the pickup of the signs. At Contract Completion, Owner supplied contract information signs shall be returned to the Owner at a location specified by the Contract Administrator.

706.07.02 Road Closing/Restriction Notice Sign (TC-64)

Road closing/restriction notice (TC-64) signs shall be installed and relocated at locations specified in the Contract Documents. Timing requirements for TC-64 signs shall be as specified in OTM Book 7.

The Contract Administrator shall be notified when the Contractor's operations results in changes to the TC-64 sign message details (i.e. dates, times, etc.).

706.07.03 Automated Flagger Assistance Devices

AFAD shall be installed, relocated and removed at locations as specified in the Contract Documents.

If the closure extends across an entrance or side road, a traffic control person shall also be present to direct traffic with a stop/slow paddle according to OTM Book 7.

706.07.04 Portable Variable Message Sign

Installation, including the construction of a temporary base, relocation, and messaging on the PVMS shall be as specified in the Contract Documents. The exact location of the PVMS shall be proposed by the Contractor and shall meet the following criteria:

- a) Maximizes visibility for motorists without impacting safety in accordance with the ministry's clear zone requirements.
- b) Installed on a level surface with adequate bearing capacity to support the weight of the PVMS and temporary base materials.

The Contract Administrator shall approve the location of the PVMS prior to it being deployed. The Contractor Administrator shall be notified at least 2 Business days in advance regarding the delivery, relocation, and removal of PVMS within the construction work zone.

Modem installation, testing, and decommissioning for the PVMS shall be as specified in the Contract Documents.

The PVMS control box shall be secured from entry by unauthorized personnel. There shall be security measures or devices in place to prevent message tampering of the sign.

All PVMS and any temporary base shall be removed upon completion of the Work.

706.07.04.01 Maintenance of Portable Variable Message Sign

Maintenance shall be performed for the continuous operation of the PVMS, as required, throughout the duration of the Contract. Daily inspection of the PVMS shall be conducted to ensure that the PVMS meets the following maintenance requirements:

- a) PVMS sign face is aimed with the sign sight tube to the center of the approach roadway approximately 200m upstream of the sign to ensure maximum visibility.
- b) Solar panels are tilted and rotated to face south.
- c) All pixels and LEDs in the sign face remain operational.
- d) Sign is elevated to its maximum height with the locking pin in place; sign face is to be regularly cleaned from dirt, road salt or debris that may obstruct the visibility of the sign.
- e) Batteries are replaced as needed to ensure that battery levels are maintained per the supplier's operational requirements.
- f) Modems and other remote communications equipment remain operational.

Immediate repairs shall be required whenever there is a failure or cessation of the operation of any component or components of the PVMS. The Contract Administrator shall be notified immediately each time repair work is performed on a PVMS.

706.07.05 Management of Excess Materials

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

706.09 MEASUREMENT FOR PAYMENT

706.09.01 Actual Measurement

706.09.01.01 Automated Flagger Assistance Devices

For measurement purposes, a count shall be made of the number of AFAD installed.

706.09.01.02 Portable Variable Message Sign (Temporary)

For measurement purposes, a count shall be made of the number of PVMS installed.

706.09.01.03 Portable Variable Message Sign, Relocation

For measurement purposes, a count shall be made of the number of PVMS relocated.

PVMS that are temporarily surplus for intermediate stages but will be required later shall be paid as one relocation for the combined moves into and out of the site storage, including any off-site storage required due to space restrictions.

706.09.01.04 Road Closing/Restriction Notice Signs (TC-64)

For measurement purposes, a count shall be made of the number of TC-64 signs installed.

706.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clause under Actual Measurement.

706.10 BASIS OF PAYMENT

**706.10.01 Automated Flagger Assistance Devices – Item
Portable Variable Message Sign (Temporary) – Item
Portable Variable Message Sign, Relocation - Item**

Payment at the Contract price for the above item shall be full compensation for all labour, Equipment, and Material to do the work.

706.10.02 Temporary Traffic Control Signs - Item

Payment at the Contract price for the above item shall be full compensation for all labour, Equipment, and Material to do the work.

For progress payment, fifty percent of the Contract price shall be paid upon the supply and installation of the complete initial traffic control plan. The balance will be prorated over the balance of the Contract Time.

Reinstallation of temporary traffic control signs after seasonal shutdown shall be at no additional cost to the Owner.

706.10.03 Road Closing/Restriction Notice Signs (TC-64) - Item

Payment at the Contract price for the above item shall be full compensation for all labour, Equipment, and Material to do the work.

Changes to the TC-64 sign message details (i.e. dates, times, etc.) required as a result of the Contractor's operations shall be completed at no additional cost to the Owner.

Progress payments shall be made as follows: 60% of the unit price per sign upon installation;
 20% of the unit price per sign upon relocation;
 20% of the unit price per sign upon removal.

If no relocation is required:

60% of the unit price per sign upon installation;
40% of the unit price per sign upon removal.

On each occasion when the Contractor fails to install the TC-64 signs according to the requirements of this specification, or fails to remove the TC-64 signs within two hours of re-opening of the affected roadway, a payment reduction of \$2,000.00 shall be assessed. A further payment reduction of \$2,000.00 per Day, or part thereof, with no maximum payment reduction, shall be assessed until such time as the TC-64 signs are removed.

706.10.04 Removals and Replacements

The removal and replacement of defective workmanship or materials shall be at no additional cost to the Owner.

Appendix 706-A, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.



CONSTRUCTION SPECIFICATION FOR PORTABLE TEMPORARY TRAFFIC SIGNALS

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708.10	BASIS OF PAYMENT

APPENDICES

708-A	Commentary

708.01	SCOPE

This specification covers the requirements for the installation, operation and maintenance of portable temporary traffic signals.

708.01.01 Specification Significance and Use

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

708.01.02 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.

708.02 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.

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

Ontario Ministry of Transportation Publications

Designated Sources for Materials (DSM)

Ontario Traffic Manual (OTM):
Book 7, Temporary Conditions
Book 12, Traffic Signals

708.03 DEFINITIONS

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

Portable Temporary Traffic Signals (PTTS) means two traffic control signal heads mounted onto a movable trailer.

708.05 MATERIALS

708.05.01 Portable Temporary Traffic Signals

Portable temporary traffic signals shall be supplied from a source named on the ministry's DSM.

The traffic control signal heads shall have a minimum vertical mounting height of 5 metres for both the primary and secondary signal heads.

The primary and secondary signal heads shall be separated by a minimum of 3.0 metres measured laterally.

The signal heads shall be reversible on the trailer's boom.

Highway yellow backboards shall be used on each signal head.

All signal lenses shall comply with the Institute of Transportation Engineers interim/final specifications for incandescent or light emitting diode lamps for chromaticity and luminous intensity.

708.05.02 Temporary Illumination

Temporary illumination shall be provided for all PTTS installations being used at night. Temporary illumination shall meet the following requirements:

- a) A minimum of one luminaire shall be mounted over each PTTS trailer.
- b) Each luminaire shall have a minimum light output of 22,000 lumens.
- c) Each luminaire shall be mounted a minimum of 9 metres vertically above the roadway surface.
- d) The temporary illumination shall be powered by generator or line power.
- e) Temporary illumination shall be on from dusk until dawn. If the temporary illumination has a photo controller, then the temporary illumination shall be switched on when ambient light levels are at 16 Lux and lower and switched off when ambient light levels are at 50 Lux and higher.

708.07 CONSTRUCTION

708.07.01 General

PTTS and its temporary illumination shall be installed and relocated at the locations specified in the Contract Documents, or on the signed legal drawing (PHM-125). PTTS shall be installed on a level and stable surface that allows for on-site maintenance and service of the units.

The PTTS shall be positioned to prevent displacement or damage by weather, maintenance activities, vehicle impact or vandalism.

The Contract Administrator shall be given a minimum of 24-hour notice prior to the activation of the PTTS. The PTTS shall be activated in the presence of the Contract Administrator.

708.07.02 Operational Constraints

Operation of PTTS shall be permitted between April 1st and November 30th of each calendar year. The operation of PTTS outside of this period shall not be permitted unless otherwise specified in the Contract Documents. If PTTS are permitted outside of this period, the PTTS shall be configured with environmental controls to permit operation at any temperature.

When not in use, the PTTS shall be removed or the traffic control signal heads covered or turned up and/or away from the roadway.

708.07.03 Operational Capabilities

708.07.03.01 Portable Traffic Control Signals

The installation and operation of portable temporary traffic signals shall be according to the OTM Book 7 and the traffic control signal head display criteria specified in OTM Book 12.

PTTS shall have the following operational capabilities:

- a) Pre-timed signal operations where the green time, the amber clearance, and the all red times can be manually input to the controller.
- b) Fully actuated operation using a variety of detection devices including loops, microwave, video or non-loop in-pavement detection equipment that will:
 - i) Place a call for a green indication when red or amber is being displayed.
 - ii) Extend the green indication from a minimum to a maximum green time by a user selectable amount each time a vehicle is detected during the green display (extension time).
- c) Rest in red or the last phase served. The user must be able to select this mode through software input on a construction site.
- d) The user must be able to manually enter a minimum green time, a maximum green time, and an extension time for actuated operations.
- e) All timing intervals are capable of being set in increments of one second.
- f) Default mode – flashing red shall display in both directions (at both master and local trailers) at the same time.
- g) Manual mode – shall allow an operator to interrupt the other modes and return to the previous mode when finished.
- h) Default mode warning system – the PTTS shall have the email, text messaging or cell/satellite paging warning system activated and monitored, to advise the Owner/operator and/or Contractor when the signals have gone into the “default mode”.
- i) Be able to communicate between the master and local units through either radio or hardwire with conflict monitoring enabled to ensure malfunctions are identified. The units shall be set up so that if communications are lost, both units will revert to “default mode” operation.
- j) All conflicts must be recorded in an error log with the exact date and time of the occurrence. The error log must be retrievable by the Owner.

708.07.03.02 Trailer Unit

Each PTTS trailer unit shall have the following operational capabilities:

- a) Be able to operate as either a master or local.
- b) Be interconnected by either hardwire or radio.

708.07.03.03 Controller

Each controller shall have the following operational capabilities:

- a) Be capable of providing variable all red clearance intervals between 0 – 600 seconds.
- b) Have circuitry that detects low voltage and prevents the occurrence of an unsafe (conflicting) signal indication. In the event of low voltage the signal must default to a flashing all red.
- c) Must be password protected or have other security devices in place to prevent program tampering.
- d) Provide a red flash cycle that is flashed continuously at a rate of 50 – 60 times per minute with a 50% duty cycle.
- e) If a radio interconnection is used then the system must have a mobile license from Industry Canada.

708.07.03.04 Power Supply

The PTTS shall be powered by one or more of the following methods:

- a) Generator
- b) Solar power
- c) Electrical line power

If a generator is being used to power the PTTS and temporary illumination, suitable housing and sound reduction measures shall be installed to enclose the generator and reduce external noise levels to less than 45 dBA measured at a distance of 7 metres from the generator. The housing shall provide sufficient ventilation to prevent overheating and permit exhausting of any hazardous fumes.

The PTTS shall have a battery backup with a battery capacity sufficient to operate the system for a minimum of 14 days without recharging.

The power supply and other electronic controls shall be completely inaccessible to unauthorized personnel and protected by a sturdy, lockable metal enclosure.

708.07.04 Traffic Signal Control Programming and Timing

A technical expert knowledgeable in the operation of the PTTS shall be at the site to provide assistance during the initial set-up of the unit and shall remain on site until the unit is operating to the satisfaction of the Contract Administrator.

The traffic signal timing as specified in the Contract Documents shall be programmed into the traffic signal controller.

The controller shall be set up by performing all programming, setting all timing controls, switch settings and conflict monitoring.

708.07.05 Temporary Traffic Signals Supplied by Owner

Where the Owner supplies the PTTS, the PTTS shall be picked up and transported from the Owner's premises as specified in the Contract Documents. Once the PTTS is placed into operation, the operation, and maintenance of the PTTS shall be completed at no additional cost to the Owner.

PTTS shall be returned to the Owner's premises or to an alternate site specified by the Contract Administrator within 7 Days of being taken out of operation.

708.07.06 Maintenance of Portable Temporary Traffic Signals

Routine, non-routine and emergency maintenance work required for continuous and proper operation of the PTTS shall be performed as specified in the Contract Documents.

A technical expert shall be available on-call 24 hours a day, 7 days a week, to troubleshoot any PTTS problems on site and perform all work required to restore the PTTS to full operation.

When directed by the Contract Administrator, the traffic signal operation shall be manually overridden to reduce or eliminate queuing traffic.

A logbook shall be maintained and kept with the PTTS or at a location agreed upon with the Owner. The logbook shall record any fieldwork performed on the PTTS system, including the replacement of any hardware, changes to the software, or changes to the configuration, phasing, or timing parameters. The time and date of each entry in the logbook shall be signed by the individual making the entry.

708.09 MEASUREMENT FOR PAYMENT

708.09.01 Portable Temporary Traffic Signals

For measurement purposes, a count shall be made of the number of PTTS installed. Each PTTS shall be counted only once, regardless of the number of times it is relocated.

708.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clause under Actual Measurement.

708.10 BASIS OF PAYMENT

708.10.01 Portable Temporary Traffic Signals - 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, including all relocations of the PTTS.

Site visits by the technical expert required to restore the PTTS to full operation shall be at no additional cost to the Owner.

Appendix 708-A, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.



CONSTRUCTION SPECIFICATION FOR PRESTRESSED CONCRETE - PRECAST GIRDERS

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909.01 SCOPE

This specification covers the construction requirements for fabrication, delivery, and installation of precast prestressed concrete girders with steel reinforcement.

909.01.01 Specification Significance and Use

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

909.01.02 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.

909.02 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.

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

Ontario Provincial Standard Specifications, Construction

OPSS 905	Steel Reinforcement for Concrete
OPSS 910	Stressing Systems for Post Tensioning
OPSS 919	Formwork and Falsework
OPSS 929	Abrasive Blast Cleaning - Concrete Construction

Ontario Provincial Standard Specifications, Material

OPSS 1002	Aggregates - Concrete
OPSS 1213	Hot Applied Rubberized Asphalt Waterproofing Membrane
OPSS 1302	Water
OPSS 1350	Concrete - Materials and Production
OPSS 1440	Steel Reinforcement for Concrete

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:

LS-407	Method of Test for Compressive Strength of Moulded Cylinders
LS-426	Method of Test for Compressive Strength of High Performance Concrete Cylinders
LS-432	Method of Test for Microscopical Determination of Air Void System Parameters in Hardened Concrete
LS-446	Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration – For Precast Girders

Structural Manual

MTO Form:
PH-CC-322 Concrete Construction Report

CSA Standards

A23.2-3C	Making and Curing Concrete Compression and Flexural Test Specimens *
A23.2-1D	Moulds for Forming Concrete Test Cylinders Vertically *
A23.2-9C	Compressive Strength of Cylindrical Concrete Specimens*
A23.2-14C	Obtaining and Testing Drilled Cores for Compressive Strength Testing*
A23.4-09	Precast Concrete Material and Construction
G40.20/G40.21-04	General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
G189-1966 (R2003)	Sprayed Metal Coatings for Atmospheric Corrosion Protection
CAN/CSA S6-14	Canadian Highway Bridge Design Code
W47.1-09	Certification of Companies for Fusion Welding of Steel Structures
W59-03 (R2008)	Welded Steel Construction (Metal Arc Welding)
W186-03 (R2007)	Welding of Reinforcing Bars in Reinforced Concrete Construction

* [Part of A23.1-14/A23.2-14 - Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete]

ASTM International

A 153-09	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
B 633-07	Electrodeposited Coatings of Zinc on Iron and Steel
C 171-07	Sheet Materials for Curing Concrete
C 403-08	Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance

American Association of State and Highway Transportation Officials (AASHTO)

M182-05 (2009) Burlap Cloth made from Jute or Kenaf and Cotton Mats

909.03 DEFINITIONS

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

Bed means the assembly consisting of platform, forms and end blocks in which the girders are cast.

Bughole means a small regular or irregular cavity resulting from entrapment of air bubbles in the surface of formed concrete during placement and consolidation.

Cold Joint means a joint or discontinuity resulting from a delay in placement of sufficient duration to preclude intermingling and bonding of the concrete.

Cold Weather means when the air temperature to which the girder is exposed is at or below 5 °C, or when the air temperature to which the girder is exposed is at or is likely to fall below 5 °C within 96 hours after completion of concrete placement. Temperature refers to shade temperature.

Design Proposal means a submission of proposed changes, when engineering design is required.

Laitance means a layer of weak and nondurable material on the surface of the concrete containing cement and fines from aggregates, brought by bleeding water to the top surface concrete.

Lot means all girders produced during a one-week period (seven consecutive days); or, if more than 4 girders are produced in seven consecutive days, a lot means every 4 girders produced consecutively. Girders of the same lot shall be manufactured by the same supplier, made from the same concrete mix design, for the same ministry Contract, and be of the same cross-section and type of precast concrete girder.

Girder Type means a girder differentiated by its cross-section shape such as box girder type (solid or voided), I-girder type (such as Nebraska University (NU) and Canadian Precast Prestressed Concrete Institute (CPCI)), or T-girder type.

Indoor Precast Concrete Plant means a building, which is a permanent structure, providing protection from sun, wind, and rain and which is temperature controlled, such that the temperature does not fall below 15 °C or exceed 30 °C.

Post-Tensioning means a method of prestressing in which tendons are tensioned after the concrete has reached a predetermined strength.

Pour Line means a visible delineation between two placements of concrete where the concrete from each placement is well-bonded to the other.

Precaster means the party who produces the girders.

Prestressed Concrete means reinforced concrete in which internal stresses have been initially introduced so that subsequent stresses resulting from dead load and superimposed loads are counteracted to a desired degree. This may be accomplished by pretensioning or post-tensioning.

Pretensioning means a method of prestressing in which strands are tensioned before the concrete is placed.

Repair Proposal means a submission when repairs to the girders are required.

Strand means a group of wires laid helically over a central core-wire.

Sweep means the lateral deviation from straightness of a girder with respect to its design centre line.

Tendon means a high strength steel element consisting of one or more wires, strands or bars; used to impart prestress to the concrete.

909.04 DESIGN AND SUBMISSION REQUIREMENTS

909.04.01 Design Requirements

909.04.01.01 General

The design shall be according to CAN/CSA S6 and the Structural Manual.

909.04.01.02 Permissible Changes from the Contract Drawings

909.04.01.02.01 General

Changes from the Contract Drawings are permitted and may be implemented by the precaster, without prior approval from the Owner, provided they meet the requirements of this specification.

909.04.01.02.02 Prestressing of Girders

The prestressing strand pattern may be adjusted to suit production requirements provided all changes meet the original design strength without adversely affecting other components of the structure. If the centre of gravity of the strands at the interior hold down closest to mid-span is within ± 10 mm of the original design, then one or more of the following adjustments shall be permitted provided that both the serviceability and ultimate limit states capacities are not adversely affected:

- a) Provide additional strands with a lower jacking stress provided the total prestress force is within $\pm 2\%$ of the original design.
- b) Use of imperial strand spacing in lieu of metric, where 25 mm = 1" and 50 mm = 2".
- c) Addition of one hold-down per end is added towards the girder end at the same spacing as the original design.
- d) One less hold-down per end when the hold-down closest to mid-span is deleted.
- e) Increase or decrease the number of strands in each hold-down group.
- f) Increase of vertical strand spacing between hold-down points from 25 mm up to 50 mm.

909.04.01.02.03 Reinforcing of Girders

The stirrup projection may be adjusted from that shown on the original design, based on details such as the predicted camber, provided it meets the deck embedment range indicated elsewhere in the Contract Documents.

Spacing of stirrups around blockouts for diaphragms may be adjusted, provided the minimum spacing requirements of CAN/CSA S6 are satisfied, and up to two stirrups may be added in order to maintain the total reinforcement requirements.

909.04.01.02.04 Other Design Details

Details limited to those below may be adjusted to suit production requirements, provided all changes meet the original design without adversely affecting other components of the structure:

- a) Dowel holes and inserts may be adjusted vertically within ± 75 mm from the location shown on the original design to avoid any conflict with strands.
- b) Undercut dimensions may be adjusted to accommodate the predicted camber.
- c) Additional pockets and hardware for temporary bracing may be added.
- d) Additional temporary post-tensioning or pre-tensioning for shipping and handling may be added provided they do not adversely affect the girders at any stage.

The production length of the girder may be adjusted to account for elastic shortening.

909.04.01.03 Temporary Bracing

Temporary bracing shall be installed at all substructure locations for I-girders at the time of installation to maintain stability.

Temporary bracing for girders shall be designed according to CAN/CSA S6 using a wind load specific for the location and having a return period of 10 years if the girders are to be permanently connected within the same construction season. If the girders are not to be permanently connected within the same construction season, subject to the Owner's approval, the return period to be used in the design shall be 25 years.

In no case shall temporary bracing be less than the minimum requirements specified in the Contract Documents.

909.04.02 Submission Requirements

909.04.02.01 Working Drawings

Three sets of fabrication Working Drawings, including supporting documentation, shall be submitted to the Contract Administrator at least 7 Days prior to commencement of fabrication of the girders, for information purposes only. Prior to making a submission, the design Engineer and the design-checking Engineer shall affix their seals and signatures on the Working Drawings verifying that the drawings are consistent with the Contract Documents.

When other authorities are involved in the approval of the design or construction of a highway structure, the fabrication Working Drawings submission shall be at least 5 weeks prior to commencement of the work and one additional copy of the submission shall be provided for each authority. The requirements of each authority and the requirements of the Owner as specified in the Contract Documents shall be satisfied prior to commencement of the work.

The Working Drawings shall include the following information:

- a) Girder details.
- b) Prestressing reinforcing steel size, grade, location, and jacking force as required by the design.
- c) Hold-down locations and forces.
- d) Reinforcing steel schedules.
- e) Lifting point locations.
- f) Details and location of all temporary supports.
- g) Strand release sequence.
- h) Any changes to the Contract Drawings made according to the Permissible Changes from the Contract Drawings clause.
- i) All other applicable details.

The supporting documents shall include the following information:

- j) A letter signed and sealed by an Engineer listing all permitted changes made along with supporting calculations. The letter shall state that the changes have not adversely affected the girder capacities.

- k) Handling and installation procedures, including calculations and lifting point locations.
- l) Details of bracing installed to provide adequate support and stability to the girder during construction.

909.04.02.02 Concrete Mix Design

The Contractor shall be responsible for the concrete mix design and shall submit the concrete mix design to the Contract Administrator according to the Mix Design clause of OPSS 1350.

909.04.02.03 Concrete Plant Certification

The certificate verifying compliance of the plant with the certification requirements of the Canadian Standards Association (CSA) or CPCI, under the category Group B, Bridges as either subcategory B4 (Prestressed Deflected Strand Bridge Members) or subcategory B3 (Prestressed Straight Strand Bridge Members), as required for the work, shall be submitted to the Contract Administrator with the concrete mix design submission.

Copies of precast plant certification audit reports of CPCI or CSA, or both as applicable, and related documentation shall be submitted to the Owner upon request.

Documentation verifying certification of the concrete production facility by the Ready Mixed Concrete Association of Ontario shall be submitted when concrete is supplied by a ready-mixed concrete supplier.

909.04.02.04 Control of Concrete Temperature

One week prior to the commencement of fabricating the girders, a description of the method for monitoring and effectively controlling the temperature of the concrete shall be submitted to the Contract Administrator, for information purposes only. The description shall include the method of controlling the concrete temperature during the curing and protection period.

909.04.02.05 Precast Report

A precast report shall be submitted to the Contract Administrator for each shipment of girders, prior to shipping the girders. The report shall contain the following information:

- a) List of girders in the shipment, including their ID number, lot number, and description.
- b) The mill certificates for the strands, along with the elongation calculations based on the actual material properties specified in the mill certificate of the strands used in the work.
- c) Record of the jacking force, elongations, and corrections.
- d) Temperature records for formwork and steel at the time of concrete placement.
- e) Temperature control records, including location of thermocouple wires.
- f) Record of inspection of moist curing.
- g) Summary of material test results for plastic concrete: air content, slump, and concrete temperature.
- h) Summary of material test results for hardened concrete: transfer strength, confirmation of the projected 28-Day compressive strength. If test results are not available at the time of shipping, they may be submitted within 4 Business Days following completion of testing.
- i) Summary of all measurements and inspections required by this specification, including the concrete cover, crack measurement summary, tolerances, and surveys for geometric control.

- j) Documentation confirming that all repairable defects have been identified, evaluated, and repaired as detailed in the Repair of Defects and Deficiencies Repairable by Standard Methods clause.
- k) A letter from the Quality Verification Engineer (QVE), giving the Contractor permission to proceed with the work. The letter shall state that the QVE has conducted an interim inspection and verified that the fabrication of girders and required testing have been carried out in general conformance with the sealed and signed Working Drawings, supporting documents, and Contract Documents.
- l) When steam curing is used, test results indicating that time of initial set was determined, unless standard delay periods are used, according to the Steam Curing and Other Application of Heat clause.

909.04.02.06 Design Proposals

Five copies of the design proposal shall be submitted to the Contract Administrator for acceptance. The design proposals shall bear the seal and signature of the design Engineer and the design checking Engineer. The Contractor shall not proceed with the proposed changes until the design proposal has been accepted by the Contract Administrator.

The Contract Administrator shall provide a response within 10 Business Days of receiving the proposal.

909.05 MATERIALS

909.05.01 Bearing Plate

The bearing plate shall be according to CSA G40.20/G40.21, Grade 300W or greater.

Anchor studs shall be a headed type and be according to CSA W59 and shall be welded to the bearing plates prior to galvanizing.

All surfaces shall be hot dipped galvanized according to ASTM A153 or shall be zinc metallized according to CSA G189.

909.05.02 Burlap

Burlap shall be according to AASHTO M182, Class 4, and shall be free from substances that are deleterious to concrete. The burlap shall have no tears or holes.

909.05.03 Concrete

Concrete materials shall be according to the Materials section of OPSS 1350 with the following additions and amendments:

- a) Compressive strength shall be as specified in the Contract Documents.
- b) The air void system in hardened concrete when tested according to LS-432 shall be:
 - i. Air Content: 3.0% minimum
 - ii. Spacing Factor: 0.200 mm maximum
- c) Rapid chloride permeability of concrete containing silica fume at 28 to 32 Days shall be equal to or less than 1,000 coulombs and rapid chloride permeability of all other concrete at 28 Days shall be equal to or less than 2,500 coulombs.

- d) Aggregates shall be according to OPSS 1002. The nominal maximum size of coarse aggregate shall be 19.0 mm, except when a smaller nominal size is required in order to meet the requirements of CAN/CSA S6.
- e) Slag aggregate shall not be used.
- f) Superplasticizer may be added to the mix at time of batching for all types of concrete.

When self-consolidating concrete (SCC) is proposed to be used, it shall be subject to Owner approval prior to use. Where accepted for use, SCC shall be according to the Owner's requirements for self-consolidating concrete. A copy of the non-standard Special Provision can be obtained from the Materials Engineering and Research Office, Concrete Section.

909.05.04 Concrete Sealers

Concrete sealers shall be from the Owner's list of acceptable sealers.

909.05.05 Elastomeric Coating

Elastomeric coating shall be according to OPSS 1213.

909.05.06 Formwork

Formwork shall be fabricated steel, except for box girders of non-standard width for which wood forms may be used. All formwork shall be according to OPSS 919 and CAN/CSA A23.4. Forms shall be fabricated to meet the dimensional tolerances and finishes specified in the Contract Documents.

909.05.07 Hardware

All hardware shall be non-corroding or be galvanized according to ASTM A153.

The hold down device may be black steel; however, the surfaces of the hold down device located within 40 mm of the concrete surface shall be chromate coated over an electrodeposited coating of zinc according to ASTM B 633.

909.05.08 Moisture Vapour Barrier

The moisture vapour barrier shall be a white opaque polyethylene film according to ASTM C171 and shall not be less than 100 µm thick.

909.05.09 Post-Tensioning Material

Post-tensioning material, including grout, shall be according to OPSS 910.

909.05.10 Proprietary Patching Materials

Proprietary patching materials shall be from the Owner's List of Concrete Patching Materials. The list of proprietary patching materials shall be obtained from the Contract Administrator.

909.05.11 Steel Reinforcement

Steel reinforcement shall be according to OPSS 1440.

909.05.12 Water

Water used for curing, fog-misting, and steam curing of concrete, including presoaking of material for moist curing, shall be according to OPSS 1302.

909.06 EQUIPMENT

909.06.01 Chipping Hammers

Chipping hammers shall have a maximum weight of 9.0 kg and a maximum piston stroke of 102 mm. All hammers shall have the manufacturer's name and model number engraved on them by the manufacturer. All information must be legible.

909.06.02 Pretensioning and Post-Tensioning

Pretensioning equipment shall be according to CSA A23.4. Post-tensioning equipment shall be according to OPSS 910.

909.06.03 Thermocouples and Dataloggers

Thermocouples and associated instrumentation shall have an accuracy of ± 1.5 °C, shall record temperatures at time intervals not exceeding 15 minutes and shall display the temperature.

909.07 CONSTRUCTION

909.07.01 General

The Contract Administrator shall be notified in writing at least 7 Days prior to commencement of fabrication.

Each girder shall be identified with a unique number and the date of casting within 24 hours of stripping forms. The information shall be marked on the girders and shall remain exposed and visible throughout the duration of construction. When the information is stencilled, indelible ink or paint shall be used.

909.07.02 Precast Plant Certification

Girders shall be fabricated by a plant certified by CSA or by CPCI under the category Group B, Bridges, as either subcategory B4 (Prestressed Deflected Strand Bridge Members) or subcategory B3 (Prestressed Straight Strand Bridge Members), as required for the work.

909.07.03 Pretensioning

Strands shall not be tensioned in the deflected position, unless the hold-down device used permits free movement of the strand and the use of the device has been tested by its manufacturer to ensure that the final stress along the full length of the strand is uniform.

909.07.03.01 Strand Splicing

Strands shall not be spliced within the concrete girder.

909.07.04 Welding

Welding of steel hardware, including shear studs, shall be according to CSA W59 and shall be performed by a qualified welder working for a company certified by the Canadian Welding Bureau according to CSA W47.1.

Welding of reinforcing steel bars shall be according to CSA W186 and performed by a qualified welder working for a company certified by the Canadian Welding Bureau according to CSA W186.

Welding within 3 m of the prestressing steel is not permitted unless the prestressing steel is fully encased in concrete that has reached the transfer strength specified in the Contract Documents. Welding equipment shall not use any components of the prestressing system or any component in contact with the prestressing system as an electrical ground.

909.07.05 Steel Reinforcement

The placement of steel reinforcement shall be according to OPSS 905, with the exception and/or addition of the placing tolerances listed below:

- a) Vertical position of prestressing strands: + 5/-10 mm
- b) Length of debond on prestressing strands: ± 50 mm
- c) Projection of positive moment connection reinforcing steel at girder ends: ± 25 mm
- d) Stirrup spacing: ± 15 mm when spacing is 100 mm or less
 ± 25 mm when spacing is greater than 100 mm
 ± 30 mm when spacing is 300 mm or greater

Under no circumstances shall reinforcement be inserted into plastic concrete.

909.07.06 Placing of Sheaths and Anchorages

When girders are to be post-tensioned, the sheaths and anchorages shall be placed according to OPSS 905 except that the placing tolerances shall be ± 5 mm at splice points and ± 10 mm elsewhere.

909.07.07 Production of Concrete

Production of concrete shall be according to the General, Temperature Control, Mixing Time and Mixing Rate, and Delivery sub-sections in OPSS 1350.

When there are multiple batches of concrete in a single ready-mix truck, hopper or other container, discharge times shall be measured from the time of introduction of water to cement for the first batch of concrete in the truck. Discharge of all concrete in the truck shall be completed within 1.5 hours, except when the air temperature exceeds 28 °C and the concrete temperature exceeds 25 °C, the discharge shall be completed within 1 hour.

909.07.08 Placing of Concrete

909.07.08.01 General

The method of transporting, placing, and consolidating the concrete shall be such as to prevent segregation.

Devices for placing and transporting concrete shall not be supported by the steel reinforcement.

Concrete shall be deposited within 0.5 m of the top of the reinforcement and 2.5 m horizontally of its final position.

Concrete shall be placed at a steady rate, such that a monolithic concrete is obtained without the formation of cold joints or pour lines.

When there is an interruption in placing concrete greater than 20 minutes, the top of the formwork shall be covered with wet burlap to maintain 100% relative humidity above the concrete. The Contract Administrator shall be notified of any interruption resulting in a cold joint. A proposal for remedial action shall be submitted to the Contract Administrator for approval by the Owner.

909.07.08.02 Concrete Placing Restrictions

All surfaces against which concrete is to be placed shall be free of standing water. Fresh concrete shall be protected from contact with rain or snow.

All debris shall be removed from the area where concrete is to be placed.

Ice and snow shall be removed from the area where concrete is to be placed. Deicing chemicals shall not be used. Any surface against which concrete is placed, including any existing concrete, steel reinforcement, structural steel, forms, or other surfaces shall be at a minimum temperature of 5 °C immediately prior to commencement of placing concrete.

The average temperature of the formwork, steel reinforcement or any other material against which concrete is to be placed shall not exceed 30.0°C, with no individual temperature exceeding 35.0 °C, and the maximum difference between the highest and lowest temperature measurement shall not exceed 10.0 °C. Average temperature shall be based on the average of a set of 10 temperature measurements, evenly spaced, along the formwork, steel reinforcement or other material against which concrete is to be placed. For formwork, five temperature measurements shall be made on each side of the formwork.

Temperature measurements shall be taken no more than 10 minutes prior to concrete placement, for each girder. Temperature measurements shall be made with a contact thermometer with an accuracy of ± 1 °C. Temperature measurements shall be recorded and included in the precast report.

909.07.09 Consolidation

Internal or external vibrators or both shall be used to thoroughly consolidate concrete, within 15 minutes of placing.

Concrete shall be thoroughly consolidated around all steel reinforcement.

Each layer of concrete shall be vibrated. Vibrators shall extend into the previous layer to produce a homogenous mixture at the layer interface and prevent the formation of pour lines or cold joints.

Vibration shall not be used to make the concrete flow or to spread the concrete more than 1.5 m from the point of deposit.

909.07.10 Concrete Finishing

The top surface of the girders, against which new concrete is to be placed, shall be intentionally roughened while the concrete is sufficiently plastic so that the depth of the indentations is at least 5 mm and the spacing is not greater than 15 mm.

All concrete surfaces against which new concrete is to be placed shall be clean, sound, and free from any loose particles and laitance.

The following surfaces shall be abrasive blast cleaned according to OPSS 929, prior to shipping the girders:

- a) Top portion of girders containing laitance.
- b) The portion of the sides and end of the girder against which new concrete is to be placed.

909.07.11 Control of Temperature

909.07.11.01 General

All necessary actions shall be taken to maintain temperatures within the specified limits. During the moist curing, moisture retention, and protection periods, the following temperature requirements shall be met:

- a) The concrete temperature shall not exceed 70.0 °C.
- b) The concrete temperature shall not fall below 10.0 °C before the concrete has reached 75% of the specified 28-Day compressive strength.
- c) The temperature difference, as measured between thermocouples at the following locations, shall not exceed 20 °C:
 - i) Internal concrete temperature and the corresponding surface concrete temperature.
 - ii) Internal concrete temperatures at different locations within the girder.
- d) The maximum cooling rate of concrete shall not exceed 15.0 °C per hour until the concrete is not more than 20.0 °C above the air temperature. Air temperature is temperature next to the concrete, within the curing enclosure.

909.07.11.02 Temperature Monitoring and Records

The concrete and air temperatures during the curing period and, if applicable, cold weather protection period shall be monitored and recorded. Thermocouples and dataloggers shall be used to measure and record temperatures for each girder produced.

Thermocouple wires shall be installed prior to placing concrete according to Table 3. Thermocouples for monitoring air temperature shall measure air temperature adjacent to the girder. Thermocouples used to monitor the surface concrete temperature shall be imbedded in the concrete within 5 mm of the surface. Thermocouples to monitor maximum internal temperature shall be placed at the locations where the concrete is expected to reach the highest temperature, according to Table 3.

Recording of concrete and air temperatures shall begin at the start of placement. The temperatures shall be recorded automatically at time intervals not exceeding 15 minutes until the end of the curing period and, if applicable, the end of the cold weather protection period. The dataloggers shall be left in place until the end of the monitoring period.

The Contract Administrator and any other Owner's representatives shall be provided access to verify temperature readings. If the datalogger does not have a digital display that allows the Contract Administrator to verify temperature, the Contractor shall provide the Contract Administrator with the necessary instruments to allow the Contract Administrator to verify thermocouple function and readings.

The temperature monitoring and recording system shall provide unalterable records of temperature during the recording period. Prior to use on the Contract, the temperature monitoring and recording system shall be confirmed, in writing, to be acceptable to the Owner.

A record of temperatures shall be prepared for each Day during the temperature monitoring period.

The record of temperatures, including a graphical plot of temperature versus time, shall be submitted to the Contract Administrator in the precast report. The format of the temperature plot shall be acceptable to the Owner.

909.07.12 Curing

909.07.12.01 General

Moist curing shall continue throughout the duration of the moist curing period. The moist curing period shall be 48 hours followed by a 48-hour moisture retention period, except for concrete containing silica fume which shall have a moist curing period of 7 Days.

Moist curing of exposed surfaces shall be applied within 2 to 4 m of concrete placement, except for girders produced in an indoor precast concrete plant and not containing silica fume; for such girders, exposed surfaces may be covered with moisture vapour barrier between concrete placement and concrete finishing, for the shortest practical time period and in no cases exceeding 40 minutes.

For all girders, after formwork is removed, formed surfaces shall be moist cured for the remainder of the 48-hour moist curing period, and no less than 24 hours.

909.07.12.02 Moist Curing

Moist curing shall be sufficient to keep all surfaces of the precast girder in a continuously wet condition, with no dry areas, by applying one or a combination of the following methods:

- a) Curing with Burlap and Water
- b) Curing with Water Mist
- c) Steam Curing
- d) Immersion

Records of moist curing shall be maintained and submitted according to the Precast Report clause.

Girders whose surfaces have not been kept in a continuously wet condition shall be rejected and replaced; the Contractor may submit a proposal for remediation subject to the approval of the Owner.

909.07.12.02.01 Curing with Burlap and Water

Burlap shall be pre-soaked by immersing it in water for a period of at least 24 hours immediately prior to placing. Two layers of burlap shall be applied to the surface of the concrete. Burlap strips shall overlap 150 mm.

The burlap shall be maintained in a continuously wet condition throughout the curing period by means of a soaker hose. The soaker hose shall be turned on as soon as possible, when running water will not cause damage to the concrete surface. The burlap shall be covered with a layer of moisture vapour barrier within 3 hours of placing of the concrete, in a manner that shall prevent deformation of the surface of the concrete.

Air flow in the space between the burlap and the girder shall be prevented.

Water shall not be allowed to drip, flow or puddle on the concrete surface until the concrete has hardened sufficiently to resist damage.

909.07.12.02.02 Steam Curing and Other Application of Heat

Application of steam may be used.

The girder shall be heated evenly. Steam, heat or forced air shall not be directed on the concrete, forms or reinforcing steel. There shall be free circulation of steam, heat and forced air around the top, sides, and ends of the girder. Concrete surfaces shall not be exposed to combustion gases during the curing cycle.

There shall be a delay period prior to application of steam or heat above 30 °C, as follows:

- a) Delay period of four hours after completion of concrete placement if the mix does not contain a retarder.
- b) Delay period of six hours after completion of concrete placement if the mix contains a retarder.

A shorter delay period may be used if it has been demonstrated to the satisfaction of the Owner that initial set occurs earlier. Time of initial set shall be demonstrated by testing according to ASTM C403, using the same mix design, mixing equipment, concrete temperature, and ambient temperature as when producing the girders. Time of initial set testing shall be done in the presence of the Contract Administrator or the Owner's representative. Time of initial set testing shall be done before production. Demonstration of the time of initial set according to ASTM C403 may be required up to two times per year, upon request by the Contract Administrator.

909.07.12.03 Moisture Retention

After completion of the moist curing period, girder surfaces shall be completely covered by moisture vapour barrier to protect girders from moisture loss for a period of 48 hours.

Alternatively, moist curing methods may be continued during this period.

909.07.13 Cold Weather Protection Period

If cold weather conditions are present at the end of the curing period and moisture retention period, the girders shall be provided with protection from cold weather and moisture loss for an additional 24 hours, prior to exposure to cold weather conditions. Protection shall be extended beyond 24 hours if required to meet the requirements in the Control of Temperature subsection.

909.07.14 Exposure

During moist curing, moisture retention and cold weather protection periods, the girder may be exposed for a maximum total period of 1 hour per day for the purposes of formwork removal, release of strands at transfer strength, removal from the bed, filling of bug holes, inspection or relocation within the plant, except for indoor precast concrete plants, where the exposure period shall not exceed 2 hours per day.

During the exposure period:

- a) The requirements in the Control of Temperature subsection do not apply.
- b) There shall be no more than 3 consecutive thermocouple measurements of surface temperature below 10 °C, and none below 5 °C, when measured at 15 minute intervals at locations according to Table 3.

On the first day only of the moist curing period, the moist curing requirements do not apply during the 1-hour exposure period, or 2-hour exposure period for indoor plants, except for concrete containing silica fume, where continuous moist curing shall be applied throughout the exposure period.

909.07.15 Transfer of Prestressing Force

The prestressing force shall not be transferred to the girders until the transfer strength specified in the Contract Documents has been reached. The prestressing force shall be transferred according to the strand release sequence specified on the Working Drawings.

909.07.16 Treatment at Ends of Girders

The prestressing strands at ends of girders that are to be encased in concrete shall be cut off 25 mm beyond the ends of the beams. The prestressing strands at the end of girders that are not to be encased in concrete shall be cut back to recess the cable 25 mm from the end of girder. The recess shall be cleaned, filled with a proprietary patching material, and the ends of the girders coated with elastomeric coating.

909.07.17 Surface Finish

909.07.17.01 General

Concrete surfaces shall not be treated with cement slurry or paste.

Bugholes with a depth less than or equal to 5 mm and a maximum dimension at the surface of 50 mm do not require repair.

Surface defects and deficiencies with dimensions according to Table 2 are repairable by standard methods according to Table 2.

A repair proposal shall be submitted to the Contract Administrator to repair surface defects and deficiencies with dimensions greater than those listed in Table 2.

909.07.17.02 Exposed Surfaces

The appearance of the concrete and repairs shall be uniform in colour, pattern, and texture when viewed from a distance of 15 m. Care shall be taken to select material, including proprietary patching materials, to achieve uniformity of colour and appearance.

All projections, such as fins and bulges, and all blemishes, such as stains and rust marks, shall be removed.

909.07.18 Sampling and Testing of Plastic Concrete

Sampling and testing of the plastic concrete for slump, air content, and temperature shall be according to OPSS 1350. The results of these tests shall be recorded. The minimum frequency of testing shall be as follows:

- a) For concrete supplied by an external concrete supplier and delivered by a ready-mix truck, once for each of the first three trucks, until satisfactory control is established, and then once every third truck.
- b) For batches of concrete produced at the precast plant and transported by a ready-mix truck, once for each of the first three trucks, until satisfactory control is established, and then once every third truck
- c) For batches of concrete produced at the precast plant, and not delivered by a truck, once for each of the first five batches of concrete, until satisfactory control is established, and then once every fifth batch.

Satisfactory control is established when three or five consecutive tests of concrete, as specified above, are within the specified requirements, without adjustments. If any adjustments are required or conducted, testing shall continue until three or five consecutive tests, as specified above, meet the requirements with no adjustments. Satisfactory control shall be established each Day.

Testing of plastic concrete shall be carried out as close as possible to the location of discharge of concrete into the formwork.

Sampling and testing of slump, air content, and temperature of plastic concrete, and casting of cylinders for determination of compressive strength shall be carried out by a person holding either of the following certifications:

- a) CCIL Certified Concrete Testing Technician, or
- b) ACI Concrete Field Testing Technician, Grade 1.

The person shall have a valid original card issued by the certifying agency in his or her possession at all times.

909.07.19 Transfer Strength

Prior to transfer of the prestressing force, it shall be demonstrated that the transfer strength specified in the Contract Documents has been achieved. The Contractor, when requested by the Owner, shall participate in standard cylinder correlation strength testing programs conducted by the Owner.

909.07.20 Concrete Cover Measurement

The Contractor shall carry out, at the precaster's facility, a cover meter survey on all girders until satisfactory control is established. For each type, design and size of girder, satisfactory control shall be established when three consecutive girders of the same design are within the specified tolerances. After satisfactory control has been established, testing shall be carried out on every fifth girder. If testing indicates that cover measurements for a girder do not meet the tolerances specified in Table 1, testing shall resume on each girder until satisfactory control is re-established.

Readings shall be taken at locations 600 mm from both ends, at mid-span, and at intervals not exceeding 5 metres along the length of the girder.

For I-girders, readings shall be taken at each location, as detailed below:

- a) Top of web, both sides.
- b) Bottom of web, both sides.
- c) Mid-height of each side of bottom flange for CPCI-Girders, and on top of each side of bottom flange, 150 mm from the edge of the flange for NU girders.
- d) Underside of girder, located at 150 mm from both edges of flange.

For box girders, readings shall be taken at each location, as detailed below:

- a) Top of web, exterior sides.
- b) Bottom of web, exterior sides.
- c) Underside of girder, located at 400 mm from both edges of flange.

909.07.21 Dimensional Measurements

The Contractor shall carry out measurements on each girder to determine compliance with tolerance requirements. Girders shall meet the tolerances specified in Table 1.

909.07.22 Access for Quality Assurance

Electrical power, scaffolding, protection from the weather, and unhindered access for inspection and testing of all fabrication, delivery, and installation of girders shall be provided to the Contract Administrator or Owner's representative.

For the purposes of cover meter and dimensional measurements, all debris and obstructions shall be removed.

909.07.23 Delivery

The Contract Administrator shall be notified in writing 3 Business Days prior to delivery of the girders.

Delivery shall include transportation and storage of the girders. Transportation and storage of the girders shall be according to CAN/CSA A23.4. The delivery shall include loading of the girders, transportation, unloading, and storage at the storage site.

Girders shall be loaded for shipping in such a manner that they can be transported and unloaded at their destination without being damaged or exposed to stresses for which they were not designed.

Girders shall be handled and transported with their webs in a vertical plane, and the points of support during loading and unloading, lifting, storing, and transporting shall be according to the Working Drawings.

Girders, when stored, shall be stored in such a manner to avoid excessive stress or other damage.

Advertising by means of removable signing shall be permitted on girders only while in transit to the storage site. Any permanent markings on a surface that would be visible after installation shall not be permitted.

909.07.24 Installation

The Contract Administrator shall be notified in writing of the installation date at least 3 Business Days prior to the commencement of field installation operations. Installation shall be according to the Working Drawings.

The work shall consist of installation and stabilization of the girders during construction. Girders shall be lifted and placed in a manner to ensure they are not overstressed, unstable, or unsafe at any time.

A copy of the Working Drawings shall be kept on the site during installation of the girders.

The installation tolerance of girders shall be ± 15 mm on the bearing in both the longitudinal and transverse directions.

For box girders placed side-by-side, accumulated tolerance differences shall be distributed equally along the width of the structure. The maximum accumulated increase or decrease in total width of the girders shall not exceed 70 mm with 35 mm maximum on either side.

The forces resulting from the lifting devices acting on the girders shall not be inclined to the vertical at an angle greater than 30 degrees. All lifting devices for girders shall be removed or cut off to maintain the specified cover prior to placement of concrete in the deck.

I-girders and other girders that may experience stability problems during construction shall be braced individually by attaching each end to the substructure, as a minimum, immediately upon installation and according to the Working Drawings.

909.07.25 Repair of Defects and Deficiencies Repairable by Standard Methods

Any individual girder having one or more of the defects and deficiencies identified in Table 2 shall be repaired according to the repair method specified. Such repairs do not require proposals or Owner approval. Where more than one of the defects or deficiencies listed in Table 2, excluding bugholes, are located in the same area in the girder, a repair proposal shall be submitted. All causes, preventative actions, and corrective actions, including repair methods and materials used, shall be documented and submitted in the precast report.

909.07.25.01 Assessment of Repair

When defects or deficiencies occur, at the discretion of the design Engineer, a visual inspection may be conducted or other measures required, such as cores to be taken to assess the effectiveness of the repairs.

The filling of core holes shall be according to OPSS 1350.

909.07.26 Certificate of Conformance

Within 5 Business Days of installing all the girders within a stage, a Certificate of Conformance sealed and signed by a Quality Verification Engineer shall be submitted to the Contract Administrator. The Certificate shall identify the girders and state that the work has been carried out in general conformance with the signed and sealed documents, which include the Working Drawings, supporting documents, and Contract Documents.

909.07.27 Material Sampling for Acceptance Testing

909.07.27.01 Sampling of Steel Reinforcement

Samples of steel reinforcement shall be provided to the Owner according to OPSS 905 when requested.

If required, samples shall be delivered to:

Head, Concrete Section
Ontario Ministry of Transportation
145 Sir William Hearst Avenue, Room 15
Downsview, Ontario, M3M 0B6

909.07.27.02 Sampling of Water, Admixtures, and Cementing Materials

When requested by the Owner, samples of all cementing materials, admixtures, and water shall be obtained and delivered for testing by the Owner. If required, samples of admixtures and water shall be delivered to the Regional Quality Assurance laboratory and samples of cementing materials shall be delivered to:

Head, Concrete Section
Ontario Ministry of Transportation
145 Sir William Hearst Avenue, Room 15
Downsview, Ontario, M3M 0B6

909.07.27.03 Sampling of Hardened Concrete for Acceptance Testing

909.07.27.03.01 General

Test specimens shall consist of cylinders cast from plastic concrete for determination of compressive strength and cores removed from completed girders for determination of air void system parameters of hardened concrete and rapid chloride permeability. Test specimens shall be delivered to the designated laboratory for testing by the Owner.

Girders shall be sampled on a lot basis according to Table 4 of this specification.

909.07.27.03.02 Cylinders for 28-Day Compressive Strength Testing

Sets of cylinders, as defined in Table 4, shall be cast for 28-Day compressive strength testing by the Owner.

All concrete test cylinders shall be cast in new, single-use moulds conforming to the requirements of CSA A23.2-1D and made of plastic, with a lid. The lids shall be chemically and physically compatible with the concrete and shall provide watertight closure for the moulds.

Concrete test cylinders shall be cast, cured, and transported to the designated laboratory according to CSA A23.2-3C with the exception that cylinders shall be cured with the girder prior to delivery to the laboratory. Cylinders shall be delivered to the laboratory for demoulding.

Test information shall be recorded on MTO form PH-CC 322. A copy of the form shall be submitted with each set of the concrete cylinders along with a transmittal form and the Form A of the concrete mix design for the girder.

909.07.27.03.03 Coring

The number of cores removed from a girder shall be according to Table 4.

Cores shall be removed at the plant or on site when the girder is between 7 to 10 Days of age. Cores shall be removed in the presence of the Contract Administrator or Owner's representative. The girder from which core samples shall be taken shall be randomly selected from the lot by the Contract Administrator.

Coring shall be carried out according to CSA A23.2-14C. Cores shall not contain reinforcement or other embedded material. A covermeter capable of detecting the type(s) of reinforcing materials in the girder shall be used to establish the location of reinforcement and other embedded material prior to coring.

Cores shall be taken from locations selected by the Contract Administrator as follows:

- a) For I-girders, cores shall be from the middle quarter of the girder length, in the upper half of the web, outside of the flange area.
- b) For box girders, cores shall be taken at random locations of the top slab.

The Contract number, lot number, and girder identification number shall be marked legibly on each core with durable ink. Each core shall be placed in a plastic bag, sealed to prevent loss of moisture, fitted with a security tag by the Contract Administrator. Cores shall be transported to the designated laboratory within 24 hours of coring with a transmittal form and the Form A of the concrete mix design for the girder. Cores shall be transported in a manner to avoid damage.

The core holes shall be filled, within 3 Days, according to the Filling of Core Holes subsection of OPSS 1350, with concrete or a proprietary patching material from the Owner's pre-qualified products list.

Concrete used to patch core holes shall have comparable properties to that of the concrete used in the girder.

909.07.28 Management of Excess Material

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

909.08 QUALITY ASSURANCE

909.08.01 General

The acceptance of girders shall be according to the requirements of this specification, including satisfactory completion of all repairs, if applicable. Girders not meeting the requirements of the Contract Documents shall be deemed unacceptable and shall not be included in the Work.

Acceptance for compressive strength, air void system parameters, and rapid chloride permeability shall be on a lot basis. Lot size, of the lesser of either 7 consecutive Days' production or 4 consecutively produced girders, shall be confirmed with the Contract Administrator prior to commencing production.

For Contracts requiring high-volume production, the use of a larger lot size may be proposed, up to a maximum of 20 girders per lot produced over no more than 7 consecutive Days, and shall be subject to the approval of the Owner. The established lot size shall remain consistent for the duration of the Contract

909.08.02 Lot Size and Samples for Compressive Strength, Air Void System, and Rapid Chloride Permeability

Acceptance of 28-Day compressive strength shall be based on testing of cylinders.

Acceptance testing of air void system and rapid chloride permeability shall be performed on cores removed from the girders. Testing of cores for air void system shall commence when the sample is delivered to the designated laboratory.

The sample type and size, and number of samples per lot shall be according to Table 4.

909.08.03 Acceptance of Concrete Compressive Strength

Compressive strength of cylinders, for acceptance, shall be determined according to LS-426 for concrete with silica fume and high strength concrete, and according to LS-407 for all other concrete.

909.08.03.01 Basis of Acceptance

28-Day compressive strength of a lot shall be considered acceptable when it meets all of the following:

- a) The average of the set of three cylinder compressive strengths shall be equal to or greater than the specified 28-Day compressive strength.
- b) No individual cylinder test shall be more than 4.0 MPa below the specified 28-Day compressive strength.

Unacceptable lots shall be rejected and replaced.

Test results shall be forwarded to the Contractor as they become available.

909.08.03.02**Referee Testing of Compressive Strength**

Referee testing of compressive strength may only be invoked by the Contractor within 5 Business Days of receipt of the acceptance test result.

Referee testing of compressive strength shall be carried out on a set of three cores taken by the Contractor from the girder which the acceptance cylinders represent. The Contractor shall remove the cores in the presence of the Contract Administrator. The cores shall be 100 mm in diameter and 220 mm long or full depth, whichever is less. The core extraction shall be according to the Coring subsection of this specification, with the exception that if the girders have not been delivered to the construction site, coring shall take place at the precast plant in the presence of the Contract Administrator. Referee cores shall be obtained and transported to the referee laboratory designated by the Owner within 3 Business Days of invoking referee testing.

The referee laboratory shall be designated by the Owner based on the applicable roster and cores shall be tested according to CSA A 23.2-9C on moisture conditioned cores.

Referee test results shall be forwarded to the Contractor as they become available.

If the difference between the referee test result and the acceptance test result is less than the confirmation value, the acceptance test result is confirmed, and the acceptance test result shall be used in the determination of acceptance of the lot. If the difference between the referee test result and the acceptance test result is greater than the confirmation value, the acceptance test result is not confirmed, and the acceptance test result shall be disregarded and the referee test result shall replace the acceptance test result in the acceptance requirements of this specification. The confirmation value for confirming the acceptance test result shall be the greater of 10% of the specified strength or 10% of the strength of the acceptance cores, expressed to one decimal place.

The cost of referee testing of compressive strength shall be according to OPSS 1350.

909.08.04**Acceptance of Air Void System in Hardened Concrete**

Testing of air void system shall be according to LS-432. One half of the sample shall be tested to determine the acceptability of the lot. The other half of the sample shall be retained by the Owner for audit purposes.

Test results shall be forwarded to the Contractor as they become available.

For a lot to be considered acceptable, the sample shall have a minimum air content of 3.0% and a spacing factor of 0.200 mm or less. Acceptable lots shall be subject to full payment.

Lots with samples with a spacing factor greater than 0.200 mm and less than or equal to 0.250 mm shall be considered unacceptable and shall be repaired according to Table 2.

Lots with samples with a spacing factor more than 0.250 mm or air content less than 3.0 % shall be rejected and replaced.

909.08.04.01**Referee Testing of Air Void System in Hardened Concrete**

Referee testing of air void system parameters shall be according to OPSS 1350.

909.08.05**Acceptance of Rapid Chloride Permeability**

Cores shall be tested for rapid chloride permeability according to LS-446. Three 50-mm long test specimens shall be prepared for each core:

- a) One specimen shall be tested immediately after the core is delivered to the laboratory. Results shall be provided to the Contractor for information purposes as they become available.
- b) Two specimens shall be tested between 28 and 32 Days of age to determine acceptance of the lot. The acceptance test result for the lot shall be the average of the two 50-mm long samples tested between 28 and 32 Days of age. The test result shall be used to determine the acceptance of the lot.

Lots with rapid chloride permeability less than 2,500 coulombs are considered acceptable. Lots with a rapid chloride permeability result greater than 2,500 coulombs and less than or equal to 3,500 coulombs shall be considered unacceptable but with the agreement of the Owner may be permitted to remain in the Work with a payment adjustment. The payment adjustment shall be calculated according to the Basis of Payment section.

Lots with rapid chloride permeability results exceeding 3,500 coulombs shall be rejected and replaced.

For concrete lots containing silica fume, rapid chloride permeability less than 1,000 coulombs are considered acceptable. Lots containing silica fume with a rapid chloride permeability result greater than 1,000 coulombs and less than or equal to 2,000 coulombs shall be considered unacceptable but, with the agreement of the Owner, may be permitted to remain in the Work with a payment adjustment. The payment adjustment shall be calculated according to the Basis of Payment section.

Lots containing silica fume with rapid chloride permeability results exceeding 2,000 coulombs shall be rejected and replaced.

Test results shall be forwarded to the Contractor as they become available.

909.08.05.01 Referee Testing of Rapid Chloride Permeability

Referee testing of rapid chloride permeability may only be invoked by the Contractor within 5 Business Days of receipt of the acceptance test result.

Referee testing for rapid chloride permeability shall be carried out on a new core taken by the Contractor from the same girder from which the acceptance sample was obtained. A core for referee testing shall be removed in the presence of the Contract Administrator, for each disputed lot, at a location no more than 1 meter from the location from which the disputed acceptance core was removed. The core shall be 100 mm in diameter and 220 mm long or full depth, whichever is less. The core extraction shall be according to the Coring subsection of this specification. Referee cores shall be obtained and transported to the referee laboratory designated by the Owner within 3 Business Days of invoking referee testing.

The referee laboratory shall be designated by the Owner based on the applicable roster and cores shall be tested by that laboratory.

Referee test results shall be forwarded to the Contractor as they become available.

When the referee result is greater than the acceptance test result or no more than 200 coulombs below the acceptance test result, the acceptance test result is then confirmed and shall remain valid. When the referee test result for the lot is more than 200 coulombs below the acceptance test result, the acceptance test result is then not confirmed, and the referee test result shall replace the acceptance test result in the acceptance requirements of this specification.

The cost of referee testing of rapid chloride permeability for all concrete shall be according to OPSS 1350 Acceptance of Rapid Chloride Permeability for Silica Fume Overlays and High Performance Concrete.

909.08.06 Acceptance of Water, Admixtures, and Cementing Materials

Acceptance of water, admixtures and cementing materials shall be according to OPSS 1350.

909.08.07 Acceptance of Concrete Temperature

Girders that meet the temperature requirements of this specification during production, the curing period, and, if applicable, the cold weather protection period, are considered acceptable. Girders that do not meet one or more of the temperature requirements of this specification are considered unacceptable and shall be rejected and replaced.

Each girder for which the highest temperature has been maintained below 65.0 °C during the moist curing, moisture retention, and protection periods and which meets all other requirements of the Contract Documents shall be eligible for a payment bonus. The bonus shall be \$1,000 for each girder, up to a maximum of \$10,000 in total for all of the girders in a single structure. A girder which is rejectable or fails to fully meet the requirements of the Contract Documents shall not be eligible for a bonus.

909.08.08 Acceptance of Surface Finish

All girders meeting the surface finish requirements of this specification shall be considered acceptable. A proposal may be submitted by the Contractor for unacceptable surface finish, according to the All Other Defects and Deficiencies section of this specification, subject to the approval of the Owner.

909.08.09 Dimensional Verification and Concrete Cover Measurements

The Contract Administrator shall carry out measurements to confirm compliance with the requirements of Table 1.

If a girder fails to meet the requirements specified in Table 1,

- a) It shall be rejected and replaced, and
- b) A consultant shall be retained by the Owner, at the Contractor's expense, to verify all other girders are within the tolerances of Table 1.

If a girder fails to meet the dimensional tolerances in Table 1, it shall be rejected and replaced; the Contractor may submit a proposal for remediation or for use of the girder, subject to the approval of the Owner.

909.08.10 Defects and Deficiencies

909.08.10.01 General

Defects and deficiencies are classified as follows:

- a) Defects and deficiencies repairable by standard methods.
- b) Defects and deficiencies causing rejection.
- c) All other defects and deficiencies.

909.08.10.02 Defects and Deficiencies Repairable by Standard Methods

Any individual girder having one or more of the defects and deficiencies listed in Table 2 shall be deemed unacceptable and the girder shall be repaired according to Table 2. When more than one of the defects or

deficiencies listed in Table 2 is located in the same area in the girder, the Contractor shall be required to submit a repair proposal for acceptance according to the All Other Defects and Deficiencies clause.

909.08.10.03 Defects and Deficiencies Causing Rejection

A girder having any one of the following defects and deficiencies shall be rejected and replaced:

- a) If concrete temperature exceeds 70 °C at any time during the curing period.
- b) For I-girders, if there is honeycombing, voids, cavities, spalls, delaminations, or cracks in the concrete within a bearing surface area defined by the contact area of the bearing plus 30 mm on all sides, except when the bearing area of the girder is fully encased in concrete.
- c) For box girders, if there is honeycombing, voids, cavities, spalls, or delaminations in the concrete within a bearing surface area defined by the contact area of the bearing plus 30 mm on all sides, except when the bearing area of the girder is fully encased in concrete.
- d) If there is a crack in the bottom flange that extends through to the opposite face, unless the entire crack is located at the end of the girder and will be fully encased in concrete.
- e) If breakage of strand wires exceeds the limit permitted in CAN/CSA A23.4.
- f) If the sweep of the girder on site and in position without any intermediate bracing is in excess of 1.5 mm/m length of girder.
- g) If cover does not meet specified requirements except as indicated in the All Other Defects and Deficiencies section of this specification.

909.08.10.04 All Other Defects and Deficiencies

The Contractor shall submit a proposal for repair or remediation to the Contract Administrator for acceptance, when,

- a) A girder has defects or deficiencies that are not identified as rejectable or included in Table 2 in the list of defects and deficiencies repairable by standard methods; or
- b) More than one of the defects or deficiencies listed in Table 2, except for bugholes, are located in the same area in the girder; or
- c) Three occurrences of the same defect are present in the girder; or
- d) There is the presence of pour lines or cold joints; or
- e) Unacceptable surface finish; or
- f) The compressive strength of the lot is lower than specified, but not lower than 4 MPa below the specified strength; or
- g) Dimensional tolerances of the girder do not meet the requirements of this specification; or
- h) Failure to maintain moist curing has occurred.

The repair proposal, signed and sealed by an Engineer, shall include, as a minimum,

- a) Description of the girder and identification of the defects or deficiencies.

- b) Detailed sketches, width, length, depths, location, and nature and frequency of any defects.
- c) Assessment of any impact of the repaired defects on durability, structural adequacy, and integrity of the girder or on the structure.
- d) A detailed repair plan, including material, method, and equipment to be used.
- e) Verification that the repair plan complies with the applicable standards for the type of work.
- f) All relevant supporting information, including material test results, field measurements and observations, production records, photographs, and structural analysis calculations used for determining that the performance and function originally expected from the girder shall be met.
- g) Causes of the defect and corrective action to be taken to prevent recurrence of the defect in future production, delivery, or installation.

If the repair proposal is deemed acceptable, the girder shall be repaired according to the proposal. The Contractor shall not carry out any repairs without the prior acceptance of the proposal by the Contract Administrator. If the repair proposal is deemed unacceptable, the girders shall be rejected and replaced.

In addition, the repair proposal shall be signed and stamped by an Engineer, including, as a minimum, assessment of any impact on the durability, structural adequacy, and integrity of the girder or on the structure, of either low or high cover, and submitted to the Contract Administrator for acceptance, when,

- a) Low cover at soffit of girders at locations other than bearing cutouts: any cover readings less than 40 mm and greater than 35 mm.
- b) High cover at soffit of girders at locations other than bearing cutouts: any cover readings less than 70 mm and greater than 60 mm.
- c) High cover at all locations other than between bearing cutouts on soffit of girders: any cover readings less than 55 mm and greater than 45 mm.

For low cover at all locations except girder soffits between bearing cutouts, the girder may be sealed for cover readings between -5 mm and -10 mm of the specified cover, according to Table 2 of this specification.

If the Engineer's assessment is deemed acceptable by the Contract Administrator, the girders shall be accepted according to the Engineer's assessment. If deemed unacceptable, the girders shall be rejected and replaced.

909.10 BASIS OF PAYMENT

909.10.01 Prestressed Concrete Girders (Type) Fabrication - Item Prestressed Concrete Girders Containing Silica Fume (Type) Fabrication - 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.

Rejected girders shall be replaced at no additional cost to the Owner.

Girders stored at the precaster's premises or at some other location away from the Working Area shall be paid for when the Contractor obtains a lease from the property owner that names the Owner as the

tenant. The Owner shall provide the form of lease for this purpose that specifies a payment of \$10.00 for the term of the lease. The Contractor shall retain full responsibility for the girders.

909.10.02 Payment Adjustment for Rapid Chloride Permeability

The payment adjustment shall be calculated based on individual lots and applied as follows:

$$\text{Payment adjustment} = \text{lot quantity} \times (\text{C}-2500)/5$$

Where:

Payment adjustment	=	payment adjustment of a lot (\$)
C	=	rapid chloride permeability of a lot (coulombs)
Lot quantity	=	volume of concrete in a lot (m ³) (calculated based on plan dimension)

The payment adjustment for concrete containing silica fume shall be calculated based on individual lots and applied as follows:

$$\text{Payment adjustment} = \text{lot quantity} \times (\text{C}-1000)/5$$

Where:

Payment adjustment	=	payment adjustment of a lot (\$)
C	=	rapid chloride permeability of a lot (coulombs)
Lot quantity	=	volume of concrete in a lot (m ³) (calculated based on plan dimension)

909.10.03 Prestressed Concrete Girders (Type) Delivery - Item
Prestressed Concrete Girders Containing Silica Fume (Type) Delivery
- 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.

909.10.04 Prestressed Concrete Girders (Type) Installation - Item
Prestressed Concrete Girders Containing Silica Fume (Type) Installation
- 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.

TABLE 1
Tolerances

Item	Tolerances
Length: Straight-line measurement taken horizontally at the mid-height of girder	± 1.0 mm/m; not to exceed ± 25 mm maximum
Overall Depth	± 8 mm for depths up to 600 mm ± 12 mm for depths over 600 mm
Flange Depth and Web Width for Girders Without Voids	Flange depth ± 5 mm Web width -5/+10 mm
Flange Depth and Web Width for Girders With Voids	Flange depth ± 10 mm Web width ± 10 mm
Width: Flanges and Box Girders	± 10 mm
Sweep: I-girders, spaced box girders, and spaced hollow slab girders	1 mm/m length of girder.
Abutting box and hollow slab girders	± 10 mm
Squareness and Plumbness	1 in 200 maximum
Camber Difference: Between adjacent girders spaced apart	25 mm
Between adjacent girders placed side-by-side	15 mm
Hold-Down Position Along Length	± 300 mm
Void and Diaphragm Position Along Length	± 25 mm
Concrete Cover Over Steel Reinforcement	Unless otherwise specified in the Contract Documents, the tolerance for concrete cover over steel reinforcement shall be -5/+15 mm
Stirrup Projection	-10/+15 mm

TABLE 2
Defects and Deficiencies Repairable by Standard Methods

Repairable Defects and Deficiencies	Condition	Repair Method
Bugholes	Bugholes with depth greater than 5 mm and all dimensions at the surface not exceeding 25 mm, or depth less than or equal to 5 mm and any dimension at the surface greater than 50 mm and not exceeding 100 mm.	a) Prior to filling bugholes, surfaces shall be blasted with high pressure water to remove any weak or loose material. b) Bugholes shall be filled with a proprietary patching material placed and cured according to the manufacturer's instructions.
Honeycombing, Voids, Cavities, Spalls, and Delaminations	Any area less than an equivalent area of 300 x 300 mm with no reinforcing steel or strand exposed. Cumulative total area of this type of repair shall not exceed 10 % of each face of the girder.	a) Square all sides of the repair area. b) Saw cut perimeter of removal area to a depth of 10 mm or to the depth of reinforcing steel or strands, whichever is less. c) Remove all loose concrete using a chipping hammer or hand tools. d) Insert corrosion resistant wire mesh and anchors. e) Abrasive blast-clean all concrete surfaces to be patched according to OPSS 929. f) Remove all dust and loose material from the prepared surface by using compressed air. g) Moisten area to be repaired. h) Fill repair area with concrete or a proprietary patching material. i) Cure concrete according to moist curing requirements of this specification. Cure proprietary patching material according to the manufacturer's recommendations.
Low Cover (all girder surfaces except girder soffits between bearing cutouts)	Low cover readings between -5 mm and -10 mm of the specified cover.	The entire surface of the girder shall be sealed, with an acceptable sealer, except areas against which new concrete is to be placed or in contact with bearings. Where sealing of an exterior girder is required all exterior girders in the same line of girders shall be sealed for consistency of appearance.
Air Void System Parameters	Any lot with spacing factor greater than 0.200 mm, but less than or equal to 0.250 mm.	The entire surface of all the girders of the lot shall be sealed, with an acceptable sealer, except areas against which new concrete is to be placed or in contact with bearings. Where sealing of an exterior girder is required, all exterior girders in the same line of girders shall be sealed for consistency of appearance.
Sweep	Sweep greater than 1.0 mm /m length but less than or equal to 1.5 mm/m length.	Push or pull the girders to within tolerance. Girders that can be brought into tolerance and maintained at that position without visible signs of distress shall be accepted. Girders greater than or equal to 1,900 mm in depth shall be pulled or pushed at both the top and bottom flange.

TABLE 3
Concrete and Air Temperature Measurements

Temperature	Location of Thermocouple for Concrete and Ambient Temperature
Internal	• I-Girders: - o Centroid of bottom flange at mid-span (1), for maximum temperature - o Middle of web, 1 m from each end of the girder (2) • Box Girders: - o Mid-depth at the centroid of solid section at each end of the girder (2), for maximum temperature - o Middle of bottom slab at mid-span (1)
Surface	• For each internal thermocouple above, a corresponding thermocouple shall be installed at the closest adjacent concrete surface. This thermocouple shall be imbedded in the concrete within 5 mm of the surface of the concrete (3)
Air Temperature	• Air temperature next to the concrete within the enclosure at each end of the girder (2)
Note: Number of thermocouples shown above in parentheses, total for each girders = 8	

TABLE 4
Sampling for Acceptance Testing

Element Type	Sample Type and Size	Number of Samples per Lot
Prestressed Precast Girders	Cylinders 100 mm diameter and 200 mm long	One set of 3 cylinders for 28-Day compressive strength. The girder for which the cylinders shall be cast shall be randomly selected from the Lot. (for acceptance testing)
	Cores* 100 mm diameter 220 mm long or full depth, whichever is less	One set of 2 cores, for acceptance testing of air void system parameters (1) and rapid chloride permeability (1).

* Cores to be taken from a single girder in the Lot

Appendix 909-A, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here

Related Ontario Provincial Standard Drawings

No information provided here.



**CONSTRUCTION SPECIFICATION FOR DECK JOINT ASSEMBLIES,
PREFORMED SEALS, JOINT FILLERS, JOINT SEALS, JOINT SEALING
COMPOUNDS, AND WATERSTOPS - STRUCTURES**

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920-A	Commentary

920.01	SCOPE

This specification covers the requirements for the installation and modification of deck joint assemblies and the placing of preformed seals, joint fillers, joint seals, joint sealing compounds, and waterstops.

920.01.01 Specification Significance and Use

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

920.01.02 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.

920.02 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.

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

Ontario Provincial Standard Specifications, Construction

OPSS 501	Compacting
OPSS 904	Concrete Structures
OPSS 914	Waterproofing Bridge Decks with Hot Applied Asphalt Membrane
OPSS 928	Structure Rehabilitation-Concrete Removal
OPSS 929	Abrasive Blast Cleaning - Concrete Construction
OPSS 930	Structure Rehabilitation-Concrete Patches, Refacing, and Overlays

Ontario Provincial Standard Specifications, Material

OPSS 1010	Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1204	Polyvinyl Chloride Waterstops
OPSS 1210	Deck Joint Assemblies
OPSS 1212	Hot Poured Rubberized Asphalt Joint Sealing Compound
OPSS 1302	Water
OPSS 1308	Joint Filler In Concrete
OPSS 1350	Concrete - Materials and Production

Ontario Ministry of Transportation Publications

Laboratory Testing Manual:

LS-407 Method of Test for Compressive Strength of Moulded Cylinders

LS-433 Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration

ASTM International

D 1056-14 Standard Specification for Flexible Cellular Materials, Sponge or Expanded Rubber

920.03 DEFINITIONS

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

Armouring Angle means the expansion joint angle at the gap.

Bearing means a structural device that transmits load while permitting translation or rotation or both.

Blockout means a cavity created to permit the installation of deck joint assemblies.

Certificate of Conformance means a document issued by the Quality Verification Engineer confirming that the specified components of the Work are in general conformance with the requirements of the Contract Documents.

Elastomer means a compound containing virgin polychloroprene (neoprene).

Joint Seal means ethyl vinyl acetate foam.

Joint Sealing Compound means a hot applied material, which is not preformed, used to seal a joint.

Nosing Angle means the angle that forms the outside edges of the blockout.

Preformed Seal means an extruded elastomer that, when retained in recesses in the deck joint assembly, prevents the passage of water and other materials.

Product Drawings means drawings prepared by the manufacturer that have been approved by the Owner for use with the product.

Quality Verification Engineer (QVE) means an Engineer retained by the Contractor qualified to provide the services specified in the Contract Documents.

Trial Installation means an installation designated by the Owner for the purpose of proving the performance of a particular joint system.

Upturn means an upward vertical change in direction of the seal at the gutter lines.

920.04 DESIGN AND SUBMISSION REQUIREMENTS

920.04.01 Submission Requirements

920.04.01.01 Notice of Manufacturer

Within 30 Days of the Contract award, the name and address of the manufacturer of the deck joint assembly shall be submitted in writing to the Contract Administrator.

920.04.01.02 Deck Joint Assembly Working Drawings

920.04.01.02.01 General

Prior to commencement of fabrication of the deck joint assembly, 1 hardcopy set and 1 electronic PDF copy of deck joint assembly Working Drawings, shall be submitted to the Contract Administrator for information purposes only. An Engineer shall affix his or her seal and signature on the Working Drawings verifying that the drawings are consistent with the Contract Documents and product drawings.

A sealed and signed copy of these drawings shall be kept at the manufacturing plant during the joint assembly fabrication and at the site prior to and during installation of the deck joint assembly.

920.04.01.02.02 Modular Expansion Joints

In addition to the general requirements for modular expansion joints, the deck joint assembly Working Drawings shall also bear the seal and signature of a design-checking Engineer. The deck joint assembly manufacturer shall submit the approved product drawings along with the Working Drawings.

The product drawings shall specify all material properties, dimensions, connection attachments, injection hose system, splices, fasteners and accessories, and the individual alphanumeric identification numbers. The product drawings for modular joints shall bear the seal and signature of an Engineer.

920.04.01.02.03 Drawing Content

The deck joint assembly Working Drawings shall clearly indicate the following:

- a) Material properties.
- b) Dimensions.
- c) Connection attachments.
- d) Injection hose system components and name of approved injection company.
- e) Shop, field, and stage construction splices.
- f) Fasteners and accessories.
- g) Installation details.
- h) Individual alphanumeric identification number for each stage of installation.
- i) Handling procedures including lifting points.
- j) Manufacturer's installation procedure
- k) Turn-of-nut procedure specified in the Contract Documents for achieving the required bolt pretension.
- l) For modular joints, the stiffness of the mechanism shall be shown on the Working Drawings.

920.04.01.02.04 Deck Joint Assembly Modification

In addition to the requirements of the previous clause, where a deck joint assembly is to be placed over an existing joint, the deck joint assembly Working Drawings shall show all connection details between the new and the existing deck joint assemblies.

920.04.01.03 Field Dimensions

Prior to the commencement of fabrication of the deck joint assembly, a drawing showing the actual joint dimensions at the existing deck joint assembly locations shall be submitted to the Contract Administrator.

920.04.01.04 Cold Weather Protection for Epoxy Injection

One week prior to the commencement of epoxy injection of the deck joint assembly in cold weather, a description of the method to be used to control the concrete temperature shall be submitted to the Contract Administrator. The submission shall be accompanied by samples of insulation when requested by the Contract Administrator. The description shall contain the following information:

- a) Weather conditions for which the description applies.
- b) Type of insulation, metric R value, and number of layers to be used.
- c) Description of housing and heating.
- d) Method of protection employed to effectively maintain the concrete temperature above 5 °C in the expansion joint blockout during the injection and continuously for a period of 48 hours after epoxy injection.

920.04.01.05 Interim Inspection After Fabrication of Expansion Joints

Upon completion of fabrication and prior to delivery, the Quality Verification Engineer shall conduct an interim inspection of the work to verify that the fabrication of the expansion joint has been carried out according to the deck joint assembly Working Drawings and Contract Documents and issue written permission to proceed. A copy of the permission to proceed shall be submitted to the Contract Administrator for information purposes.

920.04.01.06 Concrete Mix Design

A mix design shall be submitted according to OPSS 1350 for concrete in deck joint assemblies.

920.05 MATERIALS

920.05.01 Anti-seize Compound

Anti-seize compound shall be according to OPSS 1210.

920.05.02 Concrete

Concrete in which the deck joint assemblies are embedded shall be according to the Materials section of OPSS 1350 with the following additions:

- a) The nominal maximum size of coarse aggregate for concrete shall be 13.2 mm.

- b) The concrete shall have an initial slump of 40 mm $\pm$ 20 mm. This slump shall be increased when required by the addition of the superplasticizer at the site according to the written instructions of the superplasticizer manufacturer. The tolerance on measurement of concrete slump after addition of superplasticizer shall be $\pm$ 30 mm and the maximum slump including tolerance shall not exceed 180 mm.
- c) The rapid chloride permeability of hardened concrete at 28 to 32 days shall be less than or equal to 2,500 coulombs.

920.05.03 Deck Joint Assemblies

Deck joint assemblies shall be according to OPSS 1210.

920.05.04 Granular A

Granular A shall be according to OPSS 1010.

920.05.05 Joint Fillers

Joint fillers shall be according to OPSS 1308.

920.05.06 Joint Seals and Joint Sealing Compounds

Joint seals shall be according to ASTM D 1056 for ethyl vinyl acetate foam. The top surface of the ethyl vinyl acetate foam shall be embossed with the manufacturer's name and product identification.

Joint sealing compounds shall be according to OPSS 1212.

920.05.07 Lubricant

The lubricant shall be water soluble, non-adhesive, and non-staining. Lubricants used between the steel components and preformed seals shall not be deleterious to the joint materials or the surrounding concrete.

920.05.08 Preformed Seals

Preformed seals shall be according to OPSS 1210. Preformed seals older than two years at the time of installation shall not be used.

920.05.09 Water

Water used for curing shall be according to OPSS 1302.

920.05.10 Waterstops

Waterstops shall be according to OPSS 1204.

920.07 CONSTRUCTION

920.07.01 Operational Constraints

During construction, joints shall be protected from chloride ingress during winter weather, extending from November 1 to April 15, by the installation of a temporary joint seal meeting the requirements of this specification.

920.07.02 Installation of Deck Joint Assemblies

920.07.02.01 General

Concrete work shall be according to OPSS 904, except as specified herein.

The plastic concrete shall be sampled and tested for slump, plastic air content and temperature according to the Materials Sampling and Testing section of OPSS 1350.

Deck joint assemblies shall be installed according to the deck joint assembly Working Drawings.

Any damage to the galvanic corrosion protection coating system, including surface areas of field welds, shall be repaired with 2 coats of brush applied zinc-rich touch-up coating applied according to the coating manufacturer's recommendations.

The threaded portion of the bolts and the underside of bolt heads shall be liberally coated with anti-seize compound immediately prior to installation.

The bolts that have been fully tensioned and require removal after final installation shall not be reused to fasten the clamping bars.

For modular expansion joint installations, the manufacturer's representative shall be present on site during the installation to ensure proper installation.

920.07.02.01.01 Traffic Restrictions

Traffic, including construction traffic, shall not be permitted on any part of each stage of the deck joint assembly until all of the following conditions are met:

- a) Concrete has attained a minimum compressive strength of 25 MPa. Early strength determination of concrete compressive strength shall be according to OPSS 904.
- b) Epoxy injection has been completed.
- c) Epoxy has cured for a minimum of 24 hours.
- d) For cold weather, epoxy has cured for 48 hours after epoxy injection or the curing time as specified in the manufacturer's data sheet, whichever is longer.
- e) For Type A joints, the clamping bars have been installed.

920.07.02.02 Protection

The deck joint assembly shall be lifted by nylon slings placed at the lifting points indicated on the deck joint assembly Working Drawings.

During storage, the deck joint assembly shall be protected from dirt and deleterious materials and stored so that distortion cannot occur. The deck joint assembly shall be supported on wood blocking spaced a maximum of 2 m apart.

Preformed seals storage and handling requirements shall be according to the manufacturer's recommendations.

920.07.02.03 Splicing

The location and number of field and stage construction splices and method of splicing of metal components shall be as detailed on the deck joint assembly Working Drawings. Field splicing of modular joints shall not be permitted. For new construction, where the length of the expansion joint is greater than 15 m and a splice is required, a splice shall be located at a lane demarcation line near the centreline of the structure.

The preformed seal shall be continuous with no splices.

920.07.02.04 Placing

The deck joint assemblies shall be placed after the asphalt paving operation has been completed.

A blockout shall be formed for the deck joint assembly during concrete construction of the deck, ballast wall, and barrier or parapet wall. When new barrier or parapet walls are to be constructed, bulkheads shall be used to form blockouts in the barrier or parapet wall for the deck joint assemblies. 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. The removal of concrete required to prepare the blockout shall be carried out prior to the paving operation.

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 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 edges of the blockout shall be accurately marked and the markings shall be visible after paving so that the joint location can be accurately identified. The paving operation shall be continuous over the area, which includes the deck, approach slabs, and 20 m beyond the end of each approach slab. Transverse joints in the asphalt pavement shall not be permitted.

When bridge deck waterproofing and asphalt paving are part of this Contract, all material used to fill the blockout shall be removed within 10 Days of asphalt being placed, as follows:

- a) The new asphalt pavement shall be saw cut full depth at the limits of the blockout.

- b) The asphalt from the blockout areas shall be removed and temporary wood angles with a minimum thickness of 19 mm shall be placed to protect the saw cut asphalt edges for the full depth of asphalt.
- c) 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.
- d) Asphalt residue shall be cleaned from the steel reinforcement.

Before placing the steel reinforcement, and not more than 48 hours prior to placement of concrete in the blockout, the concrete faces of the blockout shall be abrasive blast cleaned according to OPSS 929. After completion of this work, 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 the concrete in the blockout, the top setting devices shall be adjusted to give the specified setting width required by the deck joint assembly Working Drawings. The setting devices shall then 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 at least 100 mm below the top of the end dams and the spacing shall be at approximately 500 mm centres.

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.

After concrete placement, the 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 the 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 immediately filled 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.

920.07.02.05 Concrete Curing

Curing shall be according to OPSS 904 with the exception that the moist curing period shall be 7 Days.

920.07.02.06 Epoxy Injection

920.07.02.06.01 General

Epoxy shall be injected into the injection hose system once concrete in the expansion joint blockouts has reached a minimum compressive strength of 25 MPa and curing of concrete has been completed. Early strength determination of concrete compressive strength shall be according to OPSS 904.

The epoxy shall be kept at a temperature of 20 °C ± 5 °C prior to its use.

920.07.02.05.02 Injection Method

Only the supplier of the expansion joint system or an agent approved by the supplier shall inject the epoxy used in the injection hose system.

Epoxy shall be mixed and pressure injected according to the manufacturer's specifications.

Injection shall start at the injection fitting at one end of a 2 m section of hose to initially fill the hose and continue until the epoxy discharges from the other injection fitting of the same section. Injection shall then alternate at both fittings of the same section until the epoxy emanates from the voids in the concrete or at the interface between the steel angles and concrete or both. The injection fittings shall then be plugged.

The above procedure shall be repeated in each section of hose until the full length of the expansion joint system has been filled with epoxy. The top surface of the blockout shall be thoroughly cleaned to remove any excess epoxy prior to hardening.

After the epoxy has set, all adapters and injection fittings shall be removed and the ends of each hose shall be filled with epoxy.

The deck joint assembly shall be checked for voids remaining under the angles. Holes shall be drilled in angles where voids are detected and voids and boltholes shall be filled with epoxy.

920.07.02.05.03 Cold Weather Epoxy Injection Requirements

Epoxy injection shall not be performed without protection when the ambient air temperature is below 5 °C or is likely to fall below 5 °C within 48 hours immediately following the epoxy injection.

When the epoxy injection is to be performed under cold weather conditions, the temperature of the concrete in the expansion joint blockout shall be a minimum of 5 °C prior to the commencement of the injection. The temperature shall be maintained at a minimum of 5 °C for a period of 48 hours after injection or the curing time as specified in the manufacturer's data sheet.

920.07.03 Modification of Deck Joint Assemblies

920.07.03.01 General

The requirements of the Installation of Deck Joint Assemblies subsection apply to the Modification of Deck Joint Assemblies subsection.

Before installation of a new deck joint assembly and new steel reinforcement, the existing steel reinforcement, structural steel, and existing concrete against which new concrete is to be placed shall be abrasive blast cleaned according to OPSS 929.

Where a new joint assembly is to be welded to existing hardware, the surface of the existing hardware that is going to be in contact with the new joint assembly shall be abrasive blast cleaned according to OPSS 929.

920.07.03.02 Drilling and Preparation of Holes

The edge of drilled holes shall not be permitted within 70 mm of a concrete edge.

Holes for dowels or anchor bolts embedded in epoxy shall be impact drilled. The holes shall be cleaned of all deleterious material by air blasting and shall be dry when the epoxy is placed.

920.07.04 Repair of Existing Deck Joints

Repair of existing deck joint assemblies shall be according to the Installation of Deck Joint Assemblies and the Modification of Deck Joint Assemblies subsections and as specified in the Contract Documents.

When required, repairs to existing concrete within the blockout shall be as directed by the Contract Administrator. Concrete removal and repairs shall be according to OPSS 928 and OPSS 930.

920.07.05 Field Installation of Preformed Seals and Bolted Components

Preformed seals shall be installed with lubricant in one continuous piece.

Prior to installation of the preformed seal, all steel surfaces in contact with the preformed seal shall be cleaned and the gap completely clear for its full length and width to the depth of the bearing seat. The preformed seal and bolted components shall be installed according to the deck joint assembly Working Drawings. Adhesives and sealants shall not be used.

920.07.06 Placing Joint Fillers and Waterstops

Joint fillers and waterstops shall be firmly fixed in position before any concrete is placed so that their final position in the concrete remains as shown in the Contract Documents and are true to line and grade.

Field splicing of waterstops shall be by heat fusion.

920.07.07 Placing Joint Seals and Joint Sealing Compounds

920.07.07.01 Preparation of Joint

Concrete at all joints shall be sound, clean, dry, and free of all dust, debris, and deleterious material.

The joint face shall be true to line such that the joint seal shall bear on the joint face fully and uniformly.

920.07.07.02 Placing Joint Seals

Gaps forming longitudinal joints between structures shall be sealed with a joint seal installed with the laminations horizontal.

Prior to installation of the joint seal, the joint recess shall be abrasive blast cleaned and air blasted according to OPSS 929 to remove laitance and deleterious material.

Adhesive shall be applied liberally to both vertical sides of the joint seal and to both vertical faces of the joint recess. Excess adhesive shall be removed immediately.

The joint seal shall be installed such that it remains below the level of the concrete surface when fully compressed.

The joint seals shall not be field spliced.

920.07.07.03 Placing Hot Poured Rubberized Asphalt Joint Sealing Compounds

Hot poured rubberized asphalt joint sealing compound shall be installed according to OPSS 914 except that the temperature of the air and the materials that is going to be in contact with the sealing compound shall be 2 °C or greater at the time of installation.

920.07.08 Trial Installations

Only deck joint assemblies pre-approved for trial installation by the Owner shall be used. The installation procedures shall be according to the manufacturer's detailed instructions, the Contract Documents, and this specification.

920.07.09 Corrective Work for Initial Acceptance

All defects or deficiencies identified in the Criteria for Initial Acceptance of the Deck Joint Assembly subsection shall be repaired according to the requirements of this specification and to the satisfaction of the Contract Administrator.

920.07.10 Sampling for Quality Assurance Testing

920.07.10.01 Preformed Seal

Preformed seal samples shall be taken by the Contractor from the extra length of preformed seal supplied for each joint delivered to the Working Area.

The Contractor shall cut the extra 1 metre length of preformed seal, supplied according to OPSS 1210, in the presence of the Contract Administrator.

From time of sampling and through shipping, the seal shall be stored at a temperature between 10 and 50 °C and shall not be exposed to ultraviolet rays. The seal shall be placed in an opaque container or bag in the presence of the Contract Administrator and sealed and labeled immediately. The label shall have the fabrication company name, seal type, Contract number, lot, and location clearly marked.

The seal shall be delivered by the Contractor to:

Head, Concrete Section
145 Sir William Hearst Avenue, Room 15
Downsview, Ontario, M3M 0B6

920.07.10.02 Concrete Compressive Strength, Air Void System and Rapid Chloride Permeability

The Contractor shall cast, cure and transport acceptance cylinders for compressive strength, air void system and rapid chloride permeability testing by the Owner according to the Materials Sampling and Testing section of OPSS 1350 with the following exceptions and additions:

- a) A lot shall be all the concrete placed in the expansion joints in one bridge in one day.
- b) One set of three 100 mm diameter x 200 mm long cylinders shall be cast for acceptance testing of 28-Day compressive strength for each lot. Every time a set of acceptance cylinders is cast, a second set of cylinders shall be cast for referee testing purposes.
- c) One 100 mm diameter x 200 mm long cylinder shall be cast for evaluation of air void system parameters for each lot.
- d) One 100 mm diameter x 200 mm long cylinder shall be cast for acceptance testing of rapid chloride permeability for each lot. Every time an acceptance cylinder is cast, a second cylinder shall be cast for referee testing purposes.

920.07.11 Expansion Joint Water Test Preparation

The Contractor shall prepare the Expansion Joint Water Test for evaluation by the Contract Administrator, as follows.

The air, concrete, and deck joint assembly temperature shall be 2 °C or higher at time of testing. The water test and any related corrective work shall be completed prior to any seasonal shutdowns. Where this is not feasible, a proposal detailing an alternative solution shall be submitted to the Contractor Administrator for approval.

After the epoxy has set and before acceptance, the joint shall be water tested over its entire length where there are no upturns. Where there are upturns, the joint shall be tested between the gutter lines. The water shall be continuously ponded for a minimum of 1 hour, maintaining a minimum depth of 25 mm along the tested length and a minimum depth of 100 mm above the deck joint assembly at the gutter lines. For superelevated decks, only the lower gutter line requires the testing at a depth of 100 mm. The width shall extend 50 mm beyond the concrete dams on both sides of the deck joint assembly. When the staging of traffic is required, the joint shall be tested in overlapping sections.

For expansion joints installed at the ends of approach slabs, the expansion joint water test shall not be required.

920.07.12 Certificate of Conformance Upon Completion of the Work

Upon completion of installation of expansion joints, a Certificate of Conformance sealed and signed by a Quality Verification Engineer shall be submitted to the Contract Administrator. The Certificate of Conformance shall state that the work is in general conformance with the requirements of the Contract Documents.

920.07.13 Management of Excess Materials

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

920.08 QUALITY ASSURANCE

920.08.01 Acceptance of the Preformed Seal

Each preformed seal sample shall be tested according to Table 1 of OPSS 1210 by the Owner. Preformed seals shall be acceptable if the sample tested meets the requirements of OPSS 1210. Unacceptable preformed seals shall be removed and replaced at the Contractor's expense. Preformed seals with a date of manufacture of more than two years earlier than the date of sampling shall not be accepted.

A defective seal constitutes grounds for rejection of other seals from the same lot identified by the marking on the seal, within the same Contract.

920.08.01.01 Retesting

The Contractor may request, in writing, retesting of any sample within five Business Days of receiving notification of rejection of the seal. The results of the retest shall be used for acceptance determination and shall be binding on both parties. If the retesting results in rejection of the seal, the Contractor shall bear the cost of the retesting. If the retesting results in the material passing all test criteria, the retesting charge shall be paid by the Owner.

920.08.02 Acceptance of Concrete Compressive Strength

Compressive strength shall be determined according to LS-407.

The compressive strength result of a lot shall be the average of the set of 3 acceptance cylinders made from the lot, rounded to one decimal place.

The individual test results shall be forwarded to the Contractor, as they become available.

Concrete compressive strength for the lot shall be considered acceptable when it meets all of the following:

- a) The average compressive strength tests shall be equal to or greater than the specified strength.
- b) No individual strength test shall be more than 4.0 MPa below the specified strength.

Unacceptable lots shall be removed and replaced.

The Contractor may submit an alternative remedy in writing for the Owner's consideration for unacceptable concrete.

920.08.02.01 Referee Testing

Referee testing and referee testing cost for concrete compressive strength shall be according to OPSS 1350.

920.08.03 Acceptance of Air Void System in Hardened Concrete

Acceptance of air void system, including referee testing, shall be according to OPSS 1350 with the following exceptions:

- a) The lot size shall be according to this specification.
- b) One cylinder is tested per lot rather than cores. All references to cores in the Acceptance of Air Void System in Hardened Concrete of OPSS 1350 are replaced by cylinder.

920.08.04 Acceptance of Rapid Chloride Permeability

The cylinder representing the lot shall be tested for rapid chloride permeability according to LS-433. Acceptance testing shall be carried out at 28 to 32 Days. Two 50 mm long samples shall be cut from one of the cylinders representing a lot and tested to determine the acceptance of the lot. The other cylinder shall be retained for referee testing.

Individual test results shall be forwarded to the Contractor, as they become available.

Acceptance of rapid chloride permeability shall be based on the average of result obtained on the cylinder representing the lot. Lots with an average value of rapid chloride permeability less than or equal to 2,500 coulombs are acceptable. Lots with an average value of rapid chloride permeability exceeding 2,500 coulombs and less than or equal to 3,500 coulombs shall be accepted with a payment adjustment. Lots with rapid chloride permeability value exceeding 3,500 coulombs shall be considered unacceptable. Unacceptable concrete shall be removed and replaced at the Contractor's expense.

For the purpose of calculating the payment adjustment, the Contract Administrator shall determine the quantity of concrete in the lots using the dimensions as specified in the Contract Documents.

The payment adjustment shall be calculated and applied as follows:

$$Pa = (C-2500)/5$$

Where:

Pa = payment adjustment in \$/m³

C = average rapid chloride permeability of a lot, coulombs

$$\text{Payment reduction per lot} = \text{lot quantity (m}^3\text{)} \times Pa$$

920.08.04.01 Referee Testing

Referee testing and referee testing cost for rapid chloride permeability shall be according to the procedure used for high performance concrete in OPSS 1350 with the exception that referee testing is done on the reserved cylinder for the lot rather than the reserved core.

920.08.05 Acceptance of Expansion Joint Water Test

The deck joint assembly shall be acceptable if there is no leakage of water. Leakage of water through the deck joint assembly during this test, including the interface between the preformed seal and the seal retainers, concrete to steel interfaces, and the concrete construction joints, shall constitute failure of the deck joint assembly.

If such failure occurs, the deck joint assembly is to be repaired or replaced and the water test repeated. The method of repair shall be submitted in writing to the Contract Administrator for review prior to commencement of repair work.

920.08.06 Acceptance of Deck Joint Assembly

On completion of the deck joint assembly installation, the assembly shall be free of the following defects or deficiencies:

- a) Defective preformed seals.
- b) Cracks wider than 0.3 mm and voids in concrete end dams.
- c) Defective coating.
- d) Seal not completely held in retainer.
- e) Turn-of-nut procedure for bolt installation not followed.
- f) Defective, loose, or missing structural components and welds.
- g) A line parallel to the centreline of the structure joining the tops of all steel components of the deck joint assembly that deviates from a line parallel to the pavement profile between nosing angles by more than 3 mm, at any location along the length of the expansion joint.
- h) For modular joints, at any location along the length of the deck joint assembly, the relative difference in the opening between the steel retainers exceeds the narrowest width by 6 mm. This dimension shall be measured at the level of the road surface, perpendicular to the centreline of the expansion joint, and at the inner faces of the retainers.

- i) Any portion of the deck joint assembly is extending above the finished road surface.
- j) For expansion joints installed at the ends of approach slabs, joints will be accepted based on visual acceptance by the Contract Administrator to verify seal integrity and retention.

920.10 BASIS OF PAYMENT

**920.10.01 Deck Joint Assemblies, Installation - Item
Deck Joint Assemblies, Modification - 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.

920.10.02 Repair of Existing Deck Joints - 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.

When the repairs are not specified in the Contract Documents, payment for the cost of repairing existing deck joints and of repairing concrete prior to the installation of deck joint assemblies or preformed seals in existing structures shall be administered as a Change in the Work.

920.10.03 Repairs of Defects and Deficiencies

Repair of defects or deficiencies identified during the inspection for acceptance of deck joint assemblies shall be completed with no additional cost to the Owner.

920.10.04 Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds, and Waterstops

Payment for the tender items in which preformed seals, joint fillers, joint seals, joint sealing compounds, and waterstops are placed shall include full compensation for all labour, Equipment, and Material to do the work of placing these materials.

Appendix 920-A, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.



CONSTRUCTION SPECIFICATION FOR INSTALLATION OF BEARINGS

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922-A	Commentary

922.01	SCOPE

This specification covers the construction requirements for the installation of bearings.

922.01.01 Specification Significance and Use

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

922.01.02 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.

922.02 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.

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

Ontario Provincial Standard Specifications, Material

OPSS 1202	Bearings - Elastomeric Plain and Steel Laminated
OPSS 1203	Bearings - Rotational and Sliding Surface

CSA Standards

A3004-C2	Test Method for Determination of Compressive Strengths*
	* Part of A3000 Cementitious Materials Compendium

922.03 DEFINITIONS

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

Anchor means a device employed to secure a bearing to the structure or to restrict movement of the structure or both.

Bearing means a structural device that transmits load while permitting translation or rotation or both.

Certificate of Conformance means a document issued by the Quality Verification Engineer confirming that the specified components of the Work are in general conformance with the requirements of the Contract Documents.

Product Drawings means drawings prepared by the manufacturer that have been approved by the Owner for use with the product.

Quality Verification Engineer (QVE) means an Engineer retained by the Contractor qualified to provide the services specified in the Contract Documents.

Superstructure means all parts of a bridge above the bearings.

922.04 DESIGN AND SUBMISSION REQUIREMENTS

922.04.01 Submission Requirements

922.04.01.01 Layout and Installation Drawings

922.04.01.01.01 General

At least 1 week prior to commencement of bearing installation, 1 hardcopy and 1 electronic PDF copy of bearing layout and installation Working Drawings shall be submitted to the Contract Administrator for information purposes only. An Engineer's seal and signature shall be affixed on the layout and installation Working Drawings verifying that the Working Drawings are consistent with the Contract Documents.

A copy of the Working Drawings shall be kept on site prior to and during the installation of the bearings.

922.04.01.01.02 Elastomeric Bearings

The layout and installation drawings for elastomeric bearings shall clearly indicate the following:

- a) Bearing layout and orientation.
- b) Dimensions and details of the bearings.
- c) Details of the top or bottom plate, or both, including anchorages or dowels or both.
- d) Installation details.
- e) Load resistance at serviceability and ultimate limit states, including maximum compressive permanent and total loads.
- f) Individual alphanumeric identification of each bearing.

922.04.01.01.03 Rotational and Sliding Surface Bearings

The layout and installation drawings for rotational and sliding surface bearings shall clearly indicate the following:

- a) Bearing layout and orientation.
- b) Top and bottom plate details, including anchorages.
- c) Installation details.
- d) Method of attachment of bearings to the top and bottom plates.
- e) Bearing identification letter and numbers.

922.04.01.02**Jacking**

When jacking of the superstructure is specified in the Contract Documents, 1 hardcopy and 1 electronic PDF copy of the jacking Working Drawings shall be submitted to the Contract Administrator at least 1 week prior to commencement of jacking, for information purposes only. The submission shall include the method and location, type, and capacity of jacks to be used; the type and location of the gauges; and the calibration certificates for both the jacks and gauges. An Engineer shall affix his or her seal and signature on the jacking drawings verifying that the drawings are consistent with the Contract Documents and sound engineering practices.

When the Contractor proposes a change to the jacking specified in the Contract Documents, a Change Proposal shall be submitted to the Contract Administrator at least 3 weeks prior to commencement of jacking, for approval. The submission shall include the method and location, type, and capacity of jacks to be used; the type and location of the gauges; and the calibration certificates for both the jacks and gauges and, where necessary, the details of support for the jacks. Proposals shall bear the seals and signatures of the design and checking Engineers.

When jacking is not specified in the Contract Documents, 1 hardcopy and 1 electronic PDF copy of the jacking proposal drawings and calculations shall be submitted to the Contract Administrator at least 3 weeks prior to the commencement of jacking, for approval. The submission shall include the method and location, type, and capacity of jacks to be used; the type and location of the gauges; and the calibration certificates for both the jacks and gauges and, where necessary, the details of support for the jacks. Proposals shall bear the seals and signatures of the design and checking Engineers.

A copy of each jacking proposal drawing will be returned to the Contractor as one of the following:

- a) Stamped with the wording that allows for permission to construct. In this case, work can commence on receipt of the drawing by the Contractor.
- b) Stamped with the wording that allows for permission to construct as noted. In this case, work can start on receipt of the drawings by the Contractor. The drawings shall be updated as noted and shall be sealed and signed by an Engineer stating the drawings have been revised according to the noted comments.
- c) Showing only required changes. In this case, the drawings shall be updated as required and the submission process repeated.

When another authority is involved with the Contract, all submissions shall be made at least 5 weeks prior to the commencement of work.

A copy of the jacking drawings or the approved jacking proposal drawings shall be kept on site prior to and during the jacking operation.

922.05**MATERIALS****922.05.01****Bearings**

Bearings shall be according to OPSS 1202 or OPSS 1203 and as specified in the Contract Documents.

922.05.02 Grout

Grout for installation of rotational and sliding surface bearings or anchors shall be cement based, non-shrink, non-staining, and approved by the Owner. Grout shall have a minimum 7-Day compressive strength of 35 MPa.

922.07 CONSTRUCTION

922.07.01 General

The bearings shall be protected from damage, distortion, excessive heat, and deleterious matter during the handling, transportation, storage, and installation.

The bearings shall not be disassembled by the Contractor without the permission of the bearing supplier. The bearing supplier's representative shall be present during disassembly and reassembly.

Upon completion of the structure, the top and bottom surfaces of the bearings shall be in full contact with the structure.

Grouting operations shall be according to the manufacturer's recommendations, except that the temperature of the air, concrete, and bearings shall not be less than 10 °C at the time of grouting and shall be maintained at not less than 10 °C for a minimum of 96 hours after grout is placed.

Where pintles are specified in the Contract Documents, they shall engage the steel plate of the bearings through the entire thickness of that plate.

When elastomeric bearings are replaced on an existing structure, the top and bottom of the bearings shall be in full contact with the structure. Work required to achieve full contact shall be as specified in the Contract Documents. If the work as specified in the Contract Documents does not achieve full contact of the bearings, the Contract Administrator shall be notified and the work shall proceed only when directed.

922.07.02 Bearing Seats

The bearing seats shall be finished level and to an elevation established from the Contract Documents.

For elastomeric bearings, the finish of the concrete surface shall be smooth and not vary more than 1 mm along a straightedge placed in any direction across an area that extends at least 25 mm beyond the outside limits of the bearing. For other types of bearings, deviation along the straightedge shall not vary more than 3 mm.

Any concrete surface area prepared by grinding shall not allow water to pond in the area. For elastomeric bearings, the bearing seat areas prepared by grinding shall be intentionally roughened such that the surface has an equivalent to trowel finish. All surface areas shall be inspected and deemed acceptable by the Contract Administrator prior to installation of bearings.

922.07.03 Alignment

The longitudinal and transverse centrelines of the bearings shall be installed within ± 3 mm of the position specified in the Contract Documents. The centreline of the bearing along the direction of movement shall be parallel to the direction of movement of the bridge at that bearing location.

922.07.04 Installation of Anchors

The diameter, length, and material of the anchor and the diameter and depth of the anchor hole shall be as specified in the Contract Documents.

For pier caps, coring for installation of bearing anchors is not permitted.

Where coring of the bearing seats to receive anchors is specified in the Contract Documents, care shall be taken to ensure that the coring is done without damaging or cutting the steel reinforcement. Where permitted, coring shall not commence earlier than 3 weeks prior to bearing installation. In lieu of coring, the holes may be formed.

The holes shall be protected against entry of moisture and shall be completely filled with grout, when the anchors are installed.

922.07.05 Grouting

Where the anchors for rotational and sliding surface bearings require core drilling or preformed holes, the bearings shall be bedded over their entire area on grout that does not contain any voids. The use of permanent shims to achieve the theoretical elevation at the top of the bearing shall not be allowed.

The thickness of the grout bedding for rotational and sliding surface bearings shall be 12 mm $\pm$ 3 mm. The substrate shall be roughened by bushhammering, cleaned, and prewetted prior to grouting. Transfer of superstructure load to the bearings shall not be allowed until the grout has reached a minimum strength of 30 MPa.

The grout material shall be mixed, handled, and cured according to the manufacturer's instructions.

Grout is not permitted in contact with elastomeric bearings.

922.07.06 Tolerances

Bearings shall be set level to within a 500H:1V slope in any direction. The top of the bearing shall be set at the theoretical elevation specified in the Contract Documents, within the following tolerances:

Concrete deck and precast I-type girders	$\pm$ 5 mm
Steel plate girders	0 to + 3.0 mm
Steel and precast concrete box girders	0 to + 2.0 mm

922.07.07 Temporary Attachments

Temporary clamping devices shall be used to maintain correct orientation and setting and to prevent movement or separation of the bearing components during the handling, transportation, and installation. The clamping devices shall not be used for lifting or suspending the bearings. Clamping devices shall be removed after each bearing is in its final position, with all permanent connections made, and after all grout and concrete in contact with the bearing have been placed.

922.07.08 Permission to Proceed

Upon completion of the installation of the bearings on the substructure and prior to any loading on the bearings, the Quality Verification Engineer shall conduct an interim inspection to verify that the installation has been carried out in general conformance with Contract Documents and issue the Contractor written permission to proceed.

922.07.09 Jacking

Jacking operations shall be carried out under the direct supervision of an Engineer.

The lifting or lowering of the structure shall be carried out in one uniform and synchronized jacking operation. At no time during jacking operations shall the difference between any of the jacking points be more than 3 mm at the same abutment or pier cap.

When jacking is required in order to adjust the bearings, the structure shall be jacked the minimum amount required to allow the bearings to be adjusted.

922.07.10 Positive Attachment of Elastomeric Bearing Strips

Where positive attachment is specified for elastomeric bearing strips on ballast walls, wing walls, elastomer shall be attached with stainless steel concrete nails spaced at 400 mm or epoxy adhesive.

922.07.11 Sampling for Quality Assurance Testing

922.07.11.01 Sampling of Bearings

After the bearings have been fabricated, the Contract Administrator shall be notified in writing of the identification and availability of the bearings.

Where strip bearings have been specified for precast boxes placed side-by-side, each bearing strip shall be supplied at least 600 mm longer than required. A sample, 600 mm in length, shall be cut in the field from one end of each strip bearing and supplied for testing.

Elastomeric bearings beyond the number of bearings specified for installation shall be supplied as specified in the Contract Documents.

All bearings shall be available for sampling either at the project site or at a location acceptable to the Contract Administrator. Sample bearings for testing purposes will be selected at random by the Contract Administrator from all the bearings of each size and thickness fabricated for the Contract. The Contract Administrator shall advise the Contractor in writing which bearings have been selected for testing.

Elastomeric bearings for testing, and a copy of the bearing layout and installation drawings and Working Drawings according to OPSS 1202, shall be delivered by the Contractor to:

Head, Concrete Section
145 Sir William Hearst Avenue, Room 15
Downsview, Ontario, M3M 0B6

Bearings weighing more than 30 kg shall be delivered on a wooden pallet which can be lifted by a forklift.

922.07.11.02 Sampling of Approach Slab Bearings and Ballast Wall Bearings

Elastomers delivered to the site shall exceed the required length to allow for a 1m labelled test sample to be taken from the approach slab or ballast wall elastomers on each structure.

Elastomers shall be delivered by the Contractor, along with a transmittal form to:

Head, Concrete Section
145 Sir William Hearst Avenue, Room 15
Downsview, Ontario, M3M 0B6

922.07.11.03 Grout Sampling

One set of three compressive strength cubes shall be cast for each day of production of grout. Casting of cubes shall be according to CSA A3004-C2. For early strength testing, additional cubes shall be cast. Cubes for compressive strength testing shall be delivered by the Contractor, with a transmittal form, to the Regional Quality Assurance Laboratory.

922.07.12 Certificate of Conformance

After loading of the deck and any specified jacking, but prior to opening to traffic, a Certificate of Conformance shall be submitted to the Contract Administrator confirming fabrication and installation are in general conformance with the Contract Documents.

920.07.13 Management of Excess Materials

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

922.08 QUALITY ASSURANCE

922.08.01 Acceptance of Bearings

Acceptance of bearings shall be on a lot basis. The number, type, and size of elastomeric bearing samples to be selected for destructive testing shall be as specified in the Contract Documents.

The acceptance of bearings shall be according to the requirements of this specification. If the bearing tested does not meet the requirements of this specification, all bearings from the lot are unacceptable and shall not be included in the Work. Unacceptable bearings that have been included in the Work shall be removed and replaced at the Contractor's expense. Repairs to elastomeric bearings are not permitted.

Bearings supplied as replacements for rejected bearings shall be sampled, tested, and accepted on the same basis as the original bearings.

The Contractor shall allow 60 Days from the time of submission of elastomeric bearings and drawings, according to this specification, for the Owner's testing program.

922.08.02 Acceptance of Approach Slab Bearings and Ballast Wall Bearings

Acceptance of bearings shall be on a lot basis. For testing of approach slab bearing and ballast wall bearing elastomers, a lot shall be all the bearings on a structure.

The acceptance of bearings shall be according to the requirements of OPSS 1202. For each lot, one 1 m sample of elastomer shall be tested according to OPSS 1202. If the bearing tested does not meet the requirements of this specification, all bearings from the lot shall be considered unacceptable but with the agreement of the Owner may be permitted to remain in the Work with a payment adjustment. The payment adjustment shall be calculated based on individual lots and applied according to the Basis of Payment section of this specification.

922.08.03 Acceptance of Grout Compressive Strength

One set of three cubes shall be tested for 7-Day compressive strength according to CSA A3004-C2. Grout shall be acceptable if the average 7-Day compressive strength of the set of three cubes is greater than or equal to 35 MPa. Unacceptable grout shall be removed and replaced at the Contractor's expense.

922.09 MEASUREMENT FOR PAYMENT

922.09.01 Bearings

For measurement purposes, a count shall be made of the number of the bearings installed and of the bearings supplied for destructive testing.

Alternatively, bearings may be a lump sum item.

922.10 BASIS OF PAYMENT

922.10.01 Bearings - 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.

When Bearings is a lump sum item, payment at the Contract price for the tender item Bearings shall include full compensation for the bearings supplied for destructive testing.

For structural rehabilitation, when repairs to the existing bearing seat or soffit above the bearing areas is required prior to the installation of the new elastomeric bearing to ensure full contact is achieved, and if the work is not specified in the Contract Documents, payment for such work shall be administered as a Change in the Work.

922.10.02 Payment Adjustment for Bearings

922.10.02.01 Elastomeric Bearings with Steel Laminates

When the elastomer cover to each of the embedded steel plates in the test sample is within the tolerances of the specifications, a payment adjustment factor of 1.00 shall be applied to the Contract price for the bearings location represented by the sample. Bearings that do not meet tolerances are rejectable and shall be removed and replaced at the Contractor's expense.

When the elastomer cover to any or all of the embedded steel plates in the test sample is within the payment adjustment range shown in Table 1 and/or Table 2, and the Contractor requests that the Owner accept the bearings in the lot represented by the sample as is, the cover payment adjustment factor equal to 0.5, shall apply to the lot. In the case where both Table 1 and Table 2 indicate a cover payment adjustment factor of 0.5, the payment adjustment factor of 0.5 applies.

When multiple test samples are represented by the tender item, the payment adjustment shall apply to the total plan area of laminated elastomeric bearings represented by the sample, divided by the total plan area of all laminated elastomeric bearings represented by the tender item.

When the average elastomer cover to the embedded steel plates in the test sample exceeds the tolerance specified in the Contract Documents and exceeds 70% of the average effective elastomer thickness of internal layers, or when the average thickness of individual layers of elastomer exceeds the tolerance specified in the Contract Documents, the Contractor may request that the Owner accept the bearings if they meet the design requirements. The bearing supplier shall update the bearing design on the shop drawings for the as-built configuration and shall evaluate the bearing for the design loads based on the as-built geometry.

922.10.02.02**Approach Slab and Ballast Wall Bearings**

The payment adjustment for each unacceptable lot of approach slab and ballast wall bearings shall be minus \$2,000.

TABLE 1
Payment Adjustment Factors for Elastomer Cover to Embedded Steel Plates – Low Cover
at Top and Bottom and Low Cover at Sides

		Minimum Top and Bottom Cover, mm		
		< 3.0	3.0 to 3.9	≥ 4.0
Minimum Side Cover, mm	< 4.0	Rejectable	Rejectable	Rejectable
	4.0 to 4.9	Rejectable	Rejectable, Contractor may request to have bearings within this range accepted with a payment adjustment factor of 0.5	Rejectable, Contractor may request to have bearings within this range accepted with a payment adjustment factor of 0.5
	≥ 5.0	Rejectable	Rejectable, Contractor may request to have bearings within this range accepted with a payment adjustment factor of 0.5	Acceptable

TABLE 2
Payment Adjustment Factors for Elastomer Cover to Embedded Steel Plates – Low Cover
at Top and Bottom and High Cover at Sides

		Minimum Top and Bottom Cover, mm		
		< 3.0	3.0 to 3.9	≥ 4.0
Maximum Side Cover, mm	≤ 12.0	Rejectable	Rejectable, Contractor may request to have bearings within this range accepted with a payment adjustment factor of 0.5	Acceptable
	12.1 to 15.0	Rejectable	Rejectable, Contractor may request to have bearings within this range accepted with a payment adjustment factor of 0.5	Rejectable, Contractor may request to have bearings within this range accepted with a payment adjustment factor of 0.5
	> 15.0	Rejectable	Rejectable	Rejectable

Appendix 922-A, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.