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REVISION INFORMATION SHEET

ONTARIO PROVINCIAL STANDARDS FOR ROADS AND PUBLIC WORKS

VOLUME 1 MUNICIPAL AND PROVINCIAL COMMON GENERAL AND CONSTRUCTION SPECIFICATIONS

MANUAL REVISION #96

NOVEMBER 2015

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for use of Ontario Provincial Standards; therefore, manual holders are cautioned about immediately discarding superseded and cancelled standards.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.rags.mto.gov.on.ca/techpubs/ops.nsf/OPSHom epage>)
- 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 1

Please remove the entire index and replace with the attached revised index.

Standard Specifications Volume 1

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSS	Dated	OPSS	Dated	
314	November 2013	314	Notice to Users of OPSS 314	“CONSTRUCTION SPECIFICATION FOR UNTREATED SUBBASE, BASE, SURFACE, SHOULDER, SELECTED SUBGRADE, AND STOCKPILING” Superseded by OPSS.PROV 314 in OPS Volume 5 and OPSS.MUNI 314 in OPS Volume 7.
331	November 2011	331	Notice to Users of OPSS 331	“CONSTRUCTION SPECIFICATION FOR FULL DEPTH RECLAMATION WITH EXPANDED ASPHALT STABILIZATION” Superseded by OPSS.PROV 331 in OPS Volume 5 and OPSS.MUNI 331 in OPS Volume 7.
333	November 2013	333	Notice to Users of OPSS 333	“CONSTRUCTION SPECIFICATION FOR COLD IN-PLACE RECYCLING” Superseded by OPSS.PROV 333 in OPS Volume 5 and OPSS.MUNI 333 in OPS Volume 7.
335	November 2013	335	Notice to Users of OPSS 335	“CONSTRUCTION SPECIFICATION FOR COLD IN-PLACE RECYCLING WITH EXPANDED ASPHALT” Superseded by OPSS.PROV 335 in OPS Volume 5 and OPSS.MUNI 335 in OPS Volume 7.
341	November 2004	341	November 2015	“CONSTRUCTION SPECIFICATION FOR ROUTING AND SEALING CRACKS IN HOT MIX ASPHALT PAVEMENT” The following changes were made: -Section 341.07.04, Placing Sealant, The word “immediately” removed from second paragraph. -Section 341.08.02, Deficiencies and Repairs, Re-written to deal with the 1mm seal.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSS	Dated	OPSS	Dated	
351	November 2010	351	November 2015	“CONSTRUCTION SPECIFICATION FOR CONCRETE SIDEWALK” See Summary of Revisions.
360	March 1995	360	November 2015	“CONSTRUCTION SPECIFICATION FOR FULL DEPTH REPAIR OF CONCRETE PAVEMENT OR CONCRETE BASE” Section 360.07.08, Sampling and testing – Slump, Air Content and Compressive Strength, updated to further define the cylinder’s dimensions.
362	March 1998	362	November 2015	“CONSTRUCTION SPECIFICATION FOR FAST TRACK FULL DEPTH REPAIRS TO CONCRETE PAVEMENT” Subsection 362.07.03, rewritten.
364	September 1996	364	November 2015	“CONSTRUCTION SPECIFICATION FOR PARTIAL DEPTH REPAIRS IN CONCRETE PAVEMENT” The specification has been reaffirmed. No changes to technical information.
401	November 2013	401	Notice to Users of OPSS 401	“CONSTRUCTION SPECIFICATION FOR TRENCHING, BACKFILLING, AND COMPACTING” Superseded by OPSS.PROV 401 in OPS Volume 5 and OPSS.MUNI 401 in OPS Volume 7.
407	November 2014	407	November 2015	“CONSTRUCTION SPECIFICATION FOR NEW MAINTENANCE HOLE, CATCH BASIN, DITCH INLET, AND VALVE CHAMBER INSTALLATION” See Summary of Revisions.
408	November 2014	408	November 2015	“CONSTRUCTION SPECIFICATION FOR ADJUSTING OR REBUILDING MAINTENANCE HOLES, CATCH BASINS, DITCH INLETS, AND VALVE CHAMBERS” See Summary of Revisions.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSS	Dated	OPSS	Dated	
410	November 2013	410	Notice to Users of OPSS 410	“CONSTRUCTION SPECIFICATION FOR PIPE SEWER INSTALLATION IN OPEN CUT” Superseded by OPSS.PROV 410 in OPS Volume 5 and OPSS.MUNI 410 in OPS Volume 7.
		411	November 2015	“CONSTRUCTION SPECIFICATION FOR THE CLEANING AND FLUSHING OF PIPE SEWERS, CATCH BASINS, MAINTENANCE HOLES, DITCH INLETS, AND OIL-GRIT SEPARATORS” This is a New Specification.
421	November 2013	421	Notice to Users of OPSS 421	“CONSTRUCTION SPECIFICATION FOR PIPE CULVERT INSTALLATION IN OPEN CUT” Superseded by OPSS.PROV 421 in OPS Volume 5 and OPSS.MUNI 421 in OPS Volume 7.
422	April 2004	422	November 2015	“CONSTRUCTION SPECIFICATION FOR PRECAST REINFORCED CONCRETE BOX CULVERTS IN OPEN CUT” See Summary of Revisions.
463	November 2009	463	November 2015	“CONSTRUCTION SPECIFICATION FOR PIPELINE AND CONDUIT INSTALLATION BY PIPE BURSTING” Section 463.03, Definitions, definition for Product rewritten.
490	November 2010	490	November 2015	“CONSTRUCTION SPECIFICATION FOR SITE PREPARATION FOR PIPELINES, UTILITIES, AND ASSOCIATED STRUCTURES” The specification has been reaffirmed. No changes to technical information.
492	November 2010	492	November 2015	“CONSTRUCTION SPECIFICATION FOR SITE RESTORATION FOLLOWING INSTALLATION OF PIPELINES, UTILITIES, AND ASSOCIATED STRUCTURES” See Summary of Revisions.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSS	Dated	OPSS	Dated	
493	November 2009	493	November 2015	“CONSTRUCTION SPECIFICATION FOR TEMPORARY POTABLE WATER SUPPLY SERVICES” See Summary of Revisions.
603	November 2014	603	November 2015	“CONSTRUCTION SPECIFICATION FOR INSTALLATION OF DUCTS” See Summary of Revisions.
631	November 2012	631	November 2015	“CONSTRUCTION SPECIFICATION FOR CONCRETE FOOTINGS AND MAINTENANCE PLATFORMS FOR HIGH MAST LIGHTING POLES” Clause 631.07.02.06, 5th paragraph revised and existing b) and c) deleted.
		707	November 2015	“CONSTRUCTION SPECIFICATION FOR MODIFIED OVERHEAD SIGNBOARDS” This is a New Specification.
803	November 2010	803	November 2015	“CONSTRUCTION SPECIFICATION FOR SODDING” This specification has been reaffirmed with no technical changes.
805	November 2015	805	November 2015	“CONSTRUCTION SPECIFICATION FOR TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES” See Summary of Revisions.
		830	November 2015	“CONSTRUCTION SPECIFICATION FOR LOCAL SEED BANK” This is a New Specification.

SUMMARY OF REVISIONS TO OPSS 351

CONSTRUCTION SPECIFICATION FOR CONCRETE SIDEWALK

- Section 351.02, References, ASTM A 48M-03 and C1029-07 added.
- Section 351.03, Definitions, Cold Weather defined.
- Section 351.04, Design and Submission Requirements, Added.
- Section 351.05.01, Concrete, Revised.
- Section 351.05.04, Granular, Revised.
- Section 351.05.06, Tactile Walking Surface Indicator Plates, New section added.
- Section 351.07.02, General Construction, Updated.
- Section 351.07.09, Tactile Walking Surface Indicator Plate Installation, New section added.
- Section 351.07.11, Contraction Joints, Updated.
- Section 351.07.12, Identification Stamp, Updated.
- Section 351.07.17, Tactile Walking Surface Tolerances, New section added.
- Section 351.09.01.02, Tactile Walking Surface Indicators for Concrete Sidewalk Ramps, New section added.
- Section 351.10.02, Tactile Walking Surface Indicators for Concrete Sidewalk Ramps – Item, New section added.
- Designer Action/Considerations, Updated.
- Related Ontario Provincial Standards Drawings, 310.031, 310.033, and 310.039 added.

SUMMARY OF REVISIONS TO OPSS 407

CONSTRUCTION SPECIFICATION FOR NEW MAINTENANCE HOLE, CATCH BASIN, DITCH INLET, AND VALVE CHAMBER INSTALLATION

- Section 408.02, References, OPSS 408, 510, and 920 added, and CSA removed.
- Section 408.03, Definitions, Structures definitions updated.
- Section 407.07.22, Catch Basin Apron, Updated.
- Section 407.09.01.02, Adjusting Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers, Removed.
- Section 407.10; Basis of Payments, Updated.
- Appendix 407-A, Updated.

SUMMARY OF REVISIONS TO OPSS 408

CONSTRUCTION SPECIFICATION FOR ADJUSTING OR REBUILDING MAINTENANCE HOLES, CATCH BASINS, DITCH INLETS, AND VALVE CHAMBERS

- Section 408.02, References, CSA removed.
- Section 408.03, Definitions, Structure definition added.
- Section 408.07.05, Transporting, Unloading, and Storing and Handling, updated.
- Section 408.07.08, Adjusting, updated.
- Section 408.09.01.01, Adjusting or Rebuilding Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers, Addition of 2nd sentence.
- Appendix 408-A, Updated.

SUMMARY OF REVISIONS TO OPSS 422

CONSTRUCTION SPECIFICATION FOR PRECAST REINFORCED CONCRETE BOX CULVERTS IN OPEN CUT

- Title, deletion of “And Box Sewers”. Deletion of “Box Sewer” in the entire document
- Section 422.03, Definitions, addition of “Distribution Slab”.
- Subsection 422.05.01, Concrete, addition of “and distribution slab”.
- Subsection 422.05.04, Precast Reinforced Concrete Box Units, addition of 2nd sentence.
- Subsection 422.05.06, Steel Reinforcement, addition of “and distribution slab”.
- Subsection 422.05.07, Mortar, replacement of “normal” Portland cement to “type GU”.
- Subsection 422.07.01, Selection of Box Units, deletion of “for spans not greater than 3 metres” Portland cement to “type GU”.
- Clause 422.07.09.02, Geotextile, addition of “not covered by a distribution slab” in 1st paragraph addition of 3rd paragraph.
- Subsection 422.07.10, Concrete Appurtenances and Concrete Distribution Slab, title addition of “and Concrete Distribution Slab”.
- Appendix 422-A, Related Ontario Provincial Standard Drawings, addition of OPSD 3920.100, Precast Reinforced Concrete Box Culvert With Height Of Fill $\geq 0.6\text{m}$ and OPSD 3920.110, Precast Reinforced Concrete Box Culvert With Height Of Fill $< 0.6\text{m}$.

SUMMARY OF REVISIONS TO OPSS 492

CONSTRUCTION SPECIFICATION FOR SITE RESTORATION FOLLOWING INSTALLATION OF PIPELINES, UTILITIES, AND ASSOCIATED STRUCTURES

- Section 492.02, References, OPSS 1540 - Standard Highway Fence Components added.
- Section 492.02, References, CSA 18-09 removed.
- Section 492.05.04.02, Wood Braces for Wire Fence, reference to OPSS 771 replaced with OPSS 1540.
- Section 492.05.05, Highway Fence, reference to OPSS 771 replaced with OPSS 1540.
- Section 492.05.06, Steel Posts, reference to CSA replaced with OPSS 1540.
- Section 492.05.08, Gates, reference to OPSS 771 replaced with OPSS 1540.
- Designer Actions, Related Ontario Provincial Standard Drawings, reference to OPSD 912.533 replaced with OPSD 912.532.

SUMMARY OF REVISIONS TO OPSS 493

CONSTRUCTION SPECIFICATION FOR TEMPORARY POTABLE WATER SUPPLY SERVICES

- Section 493.02, References, CSA, ASTM, and NSF standard references updated.
- Section 493.05.02, Temporary Potable Water Supply Services, Reference to NSF removed from item "b".
- Section 493.07.01, General (Construction), Written notices requirement increased to 48 hours.
- Section 493.07.01, General (Construction), Designer action allowed with respect to connections to the private plumbing system of a residential unit.
- Section 493.07.02, Temporary Watermains, Source connections are now to be specified in Contract Documents.
- Section 493.07.03, Temporary Potable Water Supply Services, Inside diameter now marked as minimum.

SUMMARY OF REVISIONS TO OPSS 603

CONSTRUCTION SPECIFICATION FOR INSTALLATION OF DUCTS

- Section 603.02, References, OPSS 904 deleted.
- Subsection 603.07.07; Rigid Ducts, Concrete Encased; 3rd paragraph; concrete requirements have been revised.
- Subsection 603.10.01, term "Extra Work" revised to "Change in the Work".

SUMMARY OF REVISIONS TO OPSS 805

CONSTRUCTION SPECIFICATION FOR TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

OPSS 805 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. Below are some of the highlights of the changes:

- Section 805.01, Scope, deletion of “and the removal of sediment accumulated by the control measure”.
- Section 805.02, References, addition of OPSS 518, OPSS 804 and Ontario Water Resource Act.
- Section 805.03, Definitions, deletion of “Downstream”, “Inflection Point” and “Upstream”.
- Section 805.03, Definitions, addition of “Diversion Ditch”, “Erosion”, “Fibre Roll”, “High Water Level”, “Riparian Vegetation”, “Sediment” and “Waterbody Bank”.
- Section 805.03, Definitions, modified “Waterbody” and “Watercourse”.
- Subsection 805.05.01, Straw and Straw Bales, title modified and 2nd paragraph modified.
- Clause 805.05.02.02, Silt Fence Geotextile, 2nd paragraph added.
- Clause 805.05.02.03, Berm Barrier and Rock Flow Check Dame Geotextile, title and 1st paragraph modified.
- Clause 805.05.02.05, Filter Bags, new clause.
- Subsection 805.05.03, Plastic Sheeting, new subsection.
- Subsection 805.05.04, Stakes, 1st sentence modified, 2nd and 3rd sentence deleted.
- Subsection 805.05.05, Control Measure Support, 1st paragraph modified, 2nd paragraph added.
- Clause 805.05.05.01, Post, new clause.
- Subsection 805.05.06, Berm Barriers, new subsection.
- Subsection 805.05.07, Sandbags, 1st paragraph modified addition of “clean”... “19mm gravel”... “6mm pea gravel”.
- Subsection 805.05.08, Fibre Rolls, new subsection.
- Clause 805.05.09.01, Floatation, deleted 50mm, added as specified in the Contract Documents.
- Clause 805.05.09.04, Anchors, “Danforth” deleted.
- Clause 805.05.11, Corrugated Pipe, 300mm in diameter deleted, addition of “Pipe diameter shall be as specified in the Contract Documents”.
- Clause 805.05.13 Erosion Control Blankets, new subsection.

- Subsection 805.07.01, “General” deleted.
- Clause 805.07.01.01, Retention of Riparian Vegetation, new clause.
- Clause 805.07.01.02, Protection of Stockpiled Materials, new clause.

MANUAL REVISION RECORD

Municipal and Provincial Common

Volume 1 – General and 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
74	APRIL 2005	Included in new manuals	100		
75	NOV 2005	Included in new manuals	101		
76	APRIL 2006	Included in new manuals	102		
77	NOV 2006	Included in new manuals	103		
78	APRIL 2007	Included in new manuals	104		
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83	NOV 2009	Included in new manuals	109		
84	APRIL 2010	Included in new manuals	110		
85	JULY 2010	Included in new manuals	111		
86	NOV 2010	Included in new manuals	112		
87	APRIL 2011	Included in new manuals	113		
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APR 2007	100	Notice to Users of OPSS 100 (General Conditions of Contract)
OCT 1992	102	Weighing of Materials
NOV 2012	106	Electrical Work
NOV 2014	120	Notice to Users of OPSS 120 (The Use of Explosives)
APR 2015	127	Schedule of Rental Rates for Construction Equipment, Including Model and Specification Reference
APR 2006	128	Supply of Pre-Qualified Material and Products
NOV 2011	180	Management of Excess Materials
NOV 2012	182	Notice to Users of OPSS 182 (Environmental Protection for Construction in Waterbodies and on Waterbody Banks - <i>Reissued 2010-11</i>)
DIVISION 2 - GENERAL GRADING		
NOV 2011	201	Clearing, Close Cut Clearing, Grubbing, and Removal of Surface and Piled Boulders
NOV 2013	206	Notice to Users of OPSS 206 (Grading)
NOV 2014	209	Notice to Users of OPSS 209 (Embankments Over Swamps and Compressible Soils)
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NOV 2014	220	Notice to Users of OPSS 220 (Wick Drain Installation)
DIVISION 3 - PAVEMENT (FLEXIBLE AND RIGID)		
NOV 2009	301	Restoring Unpaved Roadway Surfaces
NOV 2007	302	Priming Granular Base
NOV 2009	303	Double Chip Seal
NOV 2006	304	Single and Double Surface Treatment
NOV 2008	305	Granular Sealing
APR 2012	307	Stockpiling of Patching Materials and Patching of Asphalt Pavement



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NOV 2009	312	Asphalt Curb and Gutter Systems
APR 2007	313	Notice to Users of OPSS 313 (Hot Mix Asphalt - End Result)
NOV 2015	314	Notice to Users of OPSS 314 (Untreated Subbase, Base, Surface, Shoulder, Selected Subgrade, And Stockpiling)
NOV 2010	316	Extruded Expanded Polystyrene Frost Heave Treatment
NOV 2014	320	Notice to Users of OPSS 320 (Open Graded Drainage Layer)
NOV 2014	330	Notice to Users of OPSS 330 (In-Place Full Depth Reclamation of Bituminous Pavement and Underlying Granular)
NOV 2015	331	Notice to Users of OPSS 331 (Full Depth Reclamation with Expanded Asphalt Stabilization)
APR 2004	332	Hot In-Place Recycling and Hot In-Place Recycling with Integral Overlay
NOV 2015	333	Notice to Users of OPSS 333 (Cold In-Place Recycling)
NOV 2007	334	Cold Recycled Mix
NOV 2015	335	Notice to Users of OPSS 335 (Cold In-Place Recycling with Expanded Asphalt)
NOV 2009	336	Micro-Surfacing (Reissued 2010-11)
NOV 2008	337	Slurry Seal
NOV 2015	341	Routing and Sealing Cracks in Hot Mix Asphalt Pavement
MAR 1998	350	Concrete Pavement and Concrete Base
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NOV 2000	352	Concrete Steps



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NOV 2010	356	Pervious Concrete Pavement for Low-Volume Traffic Applications
NOV 2015	360	Full Depth Repair of Concrete Pavement or Concrete Base
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NOV 2015	364	Partial Depth Repairs in Concrete Pavement
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NOV 2008	369	Sealing or Resealing of Joints and Cracks in Concrete Pavement and Concrete Base
DIVISION 4 - DRAINAGE, WATERMAINS, AND UTILITY		
NOV 2015	401	Notice to Users of OPSS 401 (Trenching, Backfilling, And Compacting)
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NOV 2010	403	Rock Excavation for Pipelines, Utilities, and Associated Structures in Open Cut (Formerly OPSS 515)
NOV 2010	404	Support Systems (Formerly OPSS 538)
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NOV 2015	410	Notice to Users of OPSS 410 (Pipe Sewer Installation In Open Cut)
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NOV 2012	412	Sewage Forcemain Installation in Open Cut
NOV 2014	413	Manure Pipeline Installation in Open Cut
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NOV 2013	416	Pipeline and Utility Installation by Jacking and Boring
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NOV 2012	450	Pipeline and Utility Installation in Soil by Horizontal Directional Drilling
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NOV 2015	463	Pipeline and Conduit Installation by Pipe Bursting
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NOV 2015	493	Temporary Potable Water Supply Services (Reissued 2010-11)
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DIVISION 5 - MISCELLANEOUS

NOV 2014	501	Notice to Users of OPSS 501 (Compacting)
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NOV 2009	503	Site Preparation for Pipelines, Utilities, and Associated Structures (Relocated: Now OPSS 490)
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NOV 2009	504	Preservation, Protection, and Reconstruction of Existing Facilities (Relocated: Now OPSS 491)
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NOV 2013	506	Dust Suppressants
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NOV 2005	507	Site Restoration Following Installation of Pipelines, Utilities, and Associated Structures (Relocated: Now OPSS 492)
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NOV 2014	510	Notice to Users of OPSS 510 (Removal)
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NOV 2013	511	Rip-Rap, Rock Protection, and Granular Sheeting
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NOV 2009	514	Trenching, Backfilling, and Compacting (Relocated: Now OPSS 401)
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NOV 2005	515	Rock Excavation for Pipelines, Utilities, and Associated Structures in Open Cut (Relocated: Now OPSS 403)
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NOV 2005	516	Excavating, Backfilling, and Compacting for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers (Relocated: Now OPSS 402)
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NOV 2010	517	Dewatering of Pipeline, Utility, and Associated Structure Excavation
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NOV 2011	518	Control of Water from Dewatering Operations
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JUNE 1991	532	Pavement Marking (Relocated: Now OPSS 710)
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NOV 2005	538	Support Systems (Relocated: Now OPSS 404)
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NOV 2008	555	Guide Rail End Treatment - Eccentric Loader Terminal System (Relocated: Now OPSS 730)
NOV 2008	556	Connecticut Impact Attenuation System (Relocated: Now OPSS 753)
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NOTICE TO USERS OF OPSS 314

CONSTRUCTION SPECIFICATION FOR UNTREATED SUBBASE, BASE, SURFACE, SHOULDER, SELECTED SUBGRADE, AND STOCKPILING

OPSS 314 has been removed from this
OPS volume

The provincial version of OPSS 314 is now in:

OPS Volume 5,
Provincial-Oriented
General and Construction Specifications
and designated as OPSS.PROV 314

The municipal version of OPSS 314 is now in:

OPS Volume 7,
Municipal-Oriented
General and Construction Specifications
and designated as OPSS.MUNI 314

USE OF EITHER OF THE SPECIFICATIONS IS AS SPECIFIED
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NOTICE TO USERS OF OPSS 331

CONSTRUCTION SPECIFICATION FOR FULL DEPTH RECLAMATION WITH EXPANDED ASPHALT STABILIZATION

OPSS 331 has been removed from this
OPS volume

The provincial version of OPSS 331 is now in:

OPS Volume 5,
Provincial-Oriented
General and Construction Specifications
and designated as OPSS.PROV 331

The municipal version of OPSS 331 is now in:

OPS Volume 7,
Municipal-Oriented
General and Construction Specifications
and designated as OPSS.MUNI 331

**USE OF EITHER OF THE SPECIFICATIONS IS AS SPECIFIED
IN THE CONTRACT DOCUMENTS**



NOTICE TO USERS OF OPSS 333

CONSTRUCTION SPECIFICATION FOR COLD IN-PLACE RECYCLING

OPSS 333 has been removed from this
OPS volume

The provincial version of OPSS 333 is now in:

OPS Volume 5,
Provincial-Oriented
General and Construction Specifications
and designated as OPSS.PROV 333

The municipal version of OPSS 333 is now in:

OPS Volume 7,
Municipal-Oriented
General and Construction Specifications
and designated as OPSS.MUNI 333

**USE OF EITHER OF THE SPECIFICATIONS IS AS SPECIFIED
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NOTICE TO USERS OF OPSS 335

CONSTRUCTION SPECIFICATION FOR COLD IN-PLACE RECYCLING WITH EXPANDED ASPHALT

OPSS 335 has been removed from this
OPS volume

The provincial version of OPSS 335 is now in:

OPS Volume 5,
Provincial-Oriented
General and Construction Specifications
and designated as OPSS.PROV 335

The municipal version of OPSS 335 is now in:

OPS Volume 7,
Municipal-Oriented
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and designated as OPSS.MUNI 335

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CONSTRUCTION SPECIFICATION FOR ROUTING AND SEALING CRACKS IN HOT MIX ASPHALT PAVEMENT

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341.01 SCOPE

This specification covers the work of routing existing cracks up to 20 mm in width and cleaning and sealing routed and unrouted cracks in hot mix asphalt pavements with hot poured rubberized asphalt sealant compound.

341.01.01 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.

341.01.02 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.

341.02 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 Specification, Material

OPSS 1212 Hot Poured Rubberized Asphalt Joint Sealing Compound

Ministry of Transportation, Ontario, Publication

SP-024 Manual for Condition Rating of Flexible Pavements - Distress Manifestations

341.04 DESIGN AND SUBMISSION REQUIREMENTS

341.04.01 Submission Requirements

The Contract Administrator shall be provided with the following data at least 5 Business Days prior to placement of sealant:

- a) The sealant information from the manufacturer shall include:
- i. Batch numbers.
 - ii. Test results in accordance to OPSS 1212 from each batch on samples that have been subjected to both one heating cycle and two heating cycles.
 - iii. Application recommendations.
 - iv. Recommended heating time and temperature.
 - v. Allowable storage time and temperature after initial heating.
 - vi. Allowable reheating criteria.
 - vii. Application temperature range.
- b) Storage location of sealant pucks.

341.05 MATERIALS

341.05.01 Crack Sealant

Crack sealant shall be hot poured rubberized asphalt sealant according to OPSS 1212.

341.06 EQUIPMENT

341.06.01 Router

All routing equipment shall consist of mechanical routers capable of continually creating well-defined right angled routs and keeping the rout centreline within 8 mm of the centre of the crack and providing a rout width of 40 to 50 mm and a depth of not less than 8 mm. For surfaces that are to be overlaid with hot mix as part of the Contract, rout geometry of 20 x 20 mm shall be used. Such capability shall be demonstrated to the Contract Administrator prior to its use.

When the Contractor cannot demonstrate to the satisfaction of the Contract Administrator that a router is capable of maintaining the specified dimensions and shape of the rout, the Contractor shall then adjust or replace as many cutters in the router's cutting head as necessary until the dimensions and shape of the rout again meets the specification requirements.

341.06.02 Heating Kettle

The heating kettle for joint sealant compound shall be a double boiler oil heat transfer type with built in agitator and equipped with thermometers to measure the temperature of both heat transfer oil and the sealing compound. The heating kettle shall be equipped with a spigot.

The heating kettle shall have automatic thermometric controls that will prevent overheating of the sealant.

341.06.03 Hot Compressed Air Lance

The hot compressed air lance shall have a discharge air temperature of approximately $500^{\circ}\text{C} \pm 100^{\circ}\text{C}$ and an air velocity greater than 1,000 m/s.

341.07 CONSTRUCTION

Cracks shall be routed, cleaned, and sealed or cleaned and sealed as specified in the Contract Documents.

341.07.01 Crack Routing

Cracks up to 20 mm in width shall be routed to the dimensions as specified in the Contract Documents.

All other cracks up to 20 mm in width discovered at the time of routing shall be routed with the exception of any alligator and map cracking as described in SP-024.

The routing of all transverse and skewed cracks shall be terminated within 25 mm of the pavement edge.

Two or more cracks shall not be joined by routing through uncracked pavement or routed in areas where a crack does not exist.

Cracks greater than 20 mm in width do not require routing.

341.07.02 Sealant Preparation

The sealant compound shall be melted slowly with constant agitation until it is in a lump-free, free-flowing state, within the temperature range recommended by the manufacturer for application.

Temperature gauges for both the heating oil and sealant on the kettle melter shall be properly calibrated at all times.

On a daily basis, the heating kettle is to be completely discharged prior to it being charged. The initial charge of the kettle with sealant shall be carried out in the presence of the Contract Administrator at a location acceptable to both the Contract Administrator and the Contractor.

The temperature of the sealant shall be monitored and recorded with the applicable date and time. The temperature records shall be made available to the Contract Administrator upon request.

341.07.03 Cleaning of Routed and Unrouted Cracks

Immediately prior to placing the sealant compound, all routed and unrouted cracks shall be cleaned and dried using a hot compressed air lance.

Before sealant application, all loose debris from the routing and cleaning operation shall be completely removed from the road surface. All moisture, debris, and loose fractured aggregate shall be removed from the routed and unrouted cracks immediately prior to the time the sealant compound is being placed.

341.07.04 Placing Sealant

Immediately following the cleaning of routed and unrouted cracks, the sealant compound shall be placed using either a manual pouring cone filled from a spigot located on the heating kettle itself, or by using a hose and wand fitted with the proper sized tip that allows the sealant to be pumped directly from the heating kettle into the routed or unrouted crack. The tip of the cone or wand shall be placed to the bottom of the crack to ensure uniform application.

For pavements that are to be overlaid with hot mix, all routed and unrouted cracks shall be filled with sealant so that, upon complete cooling, the top of the sealant is 4 to 6 mm below the adjacent pavement surface.

For all other pavements, all routed and unrouted cracks shall be filled with sealant so that, upon complete cooling, the sealant is no more than 1 mm below the adjacent pavement surface.

A squeegee, with its bottom edge trimmed to form the specified dimensions of the finished sealant surface after cooling, shall be used to strike off the sealant after it is poured into the routed or unrouted crack. The

sealant shall be struck off starting from the low side and working towards the high side of the pavement surface.

In order to maintain the sealant surface dimensions, the sealant shall be topped up and struck off again prior to being dusted.

Sealant compound damaged by construction traffic or the Contractor's operation shall be replaced.

341.07.05 Sealant Dusting

Where traffic is to be maintained during crack sealing, the surface of the sealant shall be dusted with Portland cement or alternative materials acceptable to the Contract Administrator prior to allowing traffic on the sealed areas.

341.07.06 Management of Excess Material

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

341.08 QUALITY ASSURANCE

341.08.01 Sampling and Testing Sealant

The Contract Administrator may require the Contractor to provide a sample of the sealant puck, approximately 4 litres in volume, from one or more batches of sealant. Such samples shall be placed in properly labelled suitable containers and submitted to the Contract Administrator.

At least once each hour, the temperature of the sealant shall be independently checked by the Contract Administrator. If the Contract Administrator finds that the temperature of the sealant is not within the manufacturer's recommended range, then the Contractor shall remove all of the sealant that has been placed since the last acceptable temperature verified by the Contract Administrator. Any sealant that is rejected shall be replaced with acceptable material.

During the process of placing, the Contract Administrator may require the Contractor to take samples of the sealant directly from the heating kettle. A minimum of three 4-litre samples shall be taken from the heating kettle spigot at points when approximately 1/4, 1/2, and 3/4 of the proposed volume has been placed on the Contract. Additional samples may be requested by the Contract Administrator. All samples shall be placed in a properly labelled triple tight metal container.

All samples submitted to the Contract Administrator shall be labelled with the following information clearly shown:

- a) Contract number.
- b) Sealant type including the manufacturer and the product designation.
- c) Manufacturer's batch number.
- d) Highway number.
- e) Contractor and subcontractor.
- f) The station and offset in the roadway where the sample was taken.
- g) The point in the Contract at which the sample was taken, e.g., the percentage of work completed.

- h) Sampling date.
- i) Weather conditions.
- j) Persons taking the sample.

341.08.02 Deficiencies and Repairs

Where a routed crack is found to be more than 10% outside the specified rout dimension, geometry, or location, it shall be considered unacceptable and corrected by additional routing.

Where the sealant subsides in the rout by more than 1 mm below the adjacent pavement surface, the surface of the sealant shall be cleaned and topped up. Where pavements are to be overlaid, if the surface of the sealant is greater than 6mm below the adjacent pavement surface, the surface of the sealant shall be cleaned and topped up.

Where the sealant,

- a) contains imbedded foreign material other than dusting material,
- b) contains entrapped air bubbles,
- c) has debonded or pulled away from the routed crack, or,
- d) has been excessively heated,

the sealant shall be removed, the routed crack rerouted at the Contract Administrator's discretion, and resealed.

341.09 MEASUREMENT FOR PAYMENT

341.09.01 Actual Measurement

341.09.01.01 Routing, Cleaning, and Sealing Cracks in Hot Mix Asphalt Pavement

Measurement for payment shall be in linear metres along the routed, cleaned, and sealed crack.

Any portion of the sealed crack where the rout migrates away from the crack shall not be included in the measurement.

341.09.01.02 Cleaning and Sealing Unrouted Cracks in Hot Mix Asphalt Pavement

Measurement for payment shall be measured in linear metres along the cleaned and sealed unrouted crack.

341.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement is based on the units shown in the clauses under Actual Measurement.

341.10 BASIS OF PAYMENT

**341.10.01 Routing, Cleaning, and Sealing Cracks in Hot Mix Asphalt Pavement - Item
Cleaning and Sealing Unrouted Cracks in Hot Mix Asphalt Pavement - 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.

Sealant compound damaged by construction traffic or the Contractor's operation shall be replaced at no extra cost to the Owner.

Work to remove and replace sealant compound due to the sealant not being within the manufacturer's specified temperature range shall be completed at no extra cost to the Owner.

Work to remove and replace sealant compound to correct deficiencies and make repairs shall be completed at no extra cost to the Owner.

**Appendix 341-A, November 2015
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 specify the following in the Contract Documents:

- Rout dimensions (341.07.01)
- The quantity of routing and sealing of cracks and the quantity of cleaning and sealing of cracks.

Consideration for cracks to be routed and sealed include:

- Transverse and skewed cracks up to 20 mm in width.
- Longitudinal cracks up to 20 mm in width that are further than 150 mm from the pavement edge.

Consideration for cracks to be sealed without routing includes longitudinal cracks in fully or partially paved shoulders, within 150 mm of the pavement edge.

The designer may specify an overfill sealant geometry for transverse and skewed cracks. If overfill is desired, the designer should specify it in the Contract Documents.

Routing and sealing is recommended for the spring and fall months when crack widths are larger and the pavement surface temperature is less than 50°C.

The designer should identify to the Owner the need for full-time inspection of the routing and sealing operations.

A pavement condition survey is recommended to determine the extent of routing and sealing or crack cleaning and sealing required.

The designer should ensure that the Ontario Provincial Standards General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

OPSD 508.010 Routing and Sealing Cracks Up to 20 mm in Width in Asphalt Pavement



CONSTRUCTION SPECIFICATION FOR CONCRETE SIDEWALK

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351.01 SCOPE

This specification covers the requirements for the construction of concrete sidewalks.

351.01.01 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 as specified in the Contract Documents.

351.01.02 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.

351.02 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 314	Untreated Granular, Subbase, Base, Surface, Shoulder and Stockpiling
OPSS 408	Adjusting or Rebuilding Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers
OPSS 501	Compacting
OPSS 904	Concrete Structures
OPSS 919	Formwork and Falsework

Ontario Provincial Standard Specifications, Material

OPSS 1010	Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1212	Hot Poured Rubberized Asphalt Joint Sealing Compound
OPSS 1308	Joint Filler in Concrete
OPSS 1315	White Pigmented Curing Compounds for Concrete
OPSS 1350	Concrete - Materials and Production

ASTM International

C 171-07	Sheet Materials for Curing Concrete
A 48M-03	Gray Iron Castings
C 1028-07	Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

351.03 DEFINITIONS

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

Cold Weather means as defined in OPSS 904.

Sidewalk Bay means the area between two transverse joints, regardless of the type of joint.

351.04 DESIGN AND SUBMISSION REQUIREMENTS

351.04.01 Tactile Walking Surface Indicator Plate Submission Requirements

One copy of the manufacturer's installation instructions and Working Drawings for each type of tactile walking surface indicator plates shall be submitted to the Contract Administrator prior to the installation of the plates.

When requested, a certificate from the manufacturer for the tactile walking surface indicator plates that confirms the product was manufactured and met the test requirements according to the Contract Documents shall be submitted to the Contract Administrator. The certificate shall include test results from an independent testing laboratory currently accredited by the Standards Council of Canada.

351.05 MATERIALS

351.05.01 Concrete

Concrete shall be according to OPSS 1350, with a minimum specified 28-Day compressive strength of 30 MPa. Coarse aggregate for the concrete shall have a nominal maximum size of 19.0 mm.

351.05.02 Expansion Joint Material

Expansion joint filler material shall be asphalt impregnated fibreboard having a minimum of 12 mm thickness and shall be according to OPSS 1308, Type A.

Hot poured rubberized asphalt joint sealing compound shall be according to OPSS 1212.

351.05.03 Subgrade Moisture Vapour Barrier

Subgrade moisture vapour barrier shall be according to ASTM C 171.

351.05.04 Granular

Granular base shall be according to OPSS 1010.

351.05.05 Curing Compound

Curing compound shall be according to OPSS 1315.

351.05.06 Tactile Walking Surface Indicator Plates

Gray cast iron tactile walking surface indicator plates shall be as specified in the Contract Documents. Castings shall be according to ASTM A 48M, Class 35B, and shall be bare and not coated with paint or other coatings or substances. Castings shall be sound, free from pouring faults, cracks, blowholes, and other defects.

The surface of each new cast iron plate on both the tops of the truncated domes and the field between the truncated domes shall have a minimum wet and dry static coefficient of friction of 0.8 according to ASTM C 1028.

The initials or trademark of the manufacturer, year of manufacture, and country of manufacture shall be distinctly cast and legible in raised letters on the top side of each plate.

351.06 EQUIPMENT

351.06.01 Forms

Forms shall be according to OPSS 919.

351.06.02 Slip Forming

The equipment used for slip forming shall have automatic horizontal and vertical alignment controls shall be used in conjunction with at least one stringline.

351.07 CONSTRUCTION

351.07.01 General

The work required for concrete sidewalk shall include earthwork, granular base, compaction, preparation work, formwork, Utility adjustment and isolation, concrete placing and finishing, jointing, curing, and protection.

Concrete sidewalk shall be constructed at the locations and to the widths and thicknesses specified in the Contract Documents.

Excavation and embankment construction shall be according to OPSS 206.

351.07.02 Grading Tolerances

351.07.02.01 Subgrade

When the subgrade is prepared for:

- a) granular base, the finished subgrade surface shall be within a 15 mm deviation measured at any point on a 3 m long straight edge.
- b) sidewalk, the finished subgrade surface shall be within a 12 mm deviation from the specified grade and cross-section, with the surface being within a 10 mm deviation measured at any point on a 3 m long straight edge.

351.07.02.02 Granular Base

Placement of granular base material shall be according to OPSS 314.

When a granular base is prepared for sidewalk, the finished granular surface shall be within a 12 mm deviation from the specified grade and cross-section, with the surface being within a 10 mm deviation measured at any point on a 3 m long straight edge.

351.07.03 Compaction

Compaction shall be according to OPSS 501.

351.07.04 Preparation Work

351.07.04.01 General

Before placing concrete on:

- a) subgrade, the subgrade shall be wetted down, except where clays occur.
- b) granular base, the granular immediately ahead of the concrete placing operation shall be wetted down thoroughly.

The wetting down shall be carried out without leaving standing water.

Alternatively, a subgrade moisture vapour barrier may be placed to completely cover the subgrade under the sidewalk. Adjacent strips shall be lapped 100 mm minimum and ends shall be lapped 300 mm minimum.

351.07.05 Form Setting

Throughout their entire length, forms shall be set true to the lines, grades, and thickness specified in the Contract Documents and in direct contact with the subgrade or granular base.

351.07.06 Utility Adjustment

Work done on adjustment of maintenance holes, valve chambers, and catch basins shall be according to OPSS 408. Utility appurtenances shall be adjusted flush with the surface of the new sidewalk.

Appurtenances maintained by Utility companies other than the Owner shall be adjusted by the Utility company concerned under arrangement by the Contract Administrator. The Contractor shall excavate to the edge of the appurtenance and indicate the required grade of the new sidewalk.

351.07.07 Utility Isolation in Sidewalk

The required Utility isolations shall be constructed in the concrete sidewalk to the details and at the locations specified in the Contract Documents.

351.07.08 Placing Concrete

Concrete shall be placed, consolidated, and finished in a manner that ensures uniform consistency. Any excess concrete beyond the sidewalk edge shall be removed. Concrete shall be placed by a continuous pour method. Where concrete placing is interrupted for more than 45 minutes a 12 mm thick asphalt impregnated fibreboard joint filler shall be installed vertically across the sidewalk width before resuming concrete placing.

Concrete shall not be placed against any material which is at a temperature above 35 °C or against any material whose temperature is below 0 °C.

351.07.09 Tactile Walking Surface Indicator Plate Installation

A set of two cast iron tactile walking surface indicator plates shall be set into wet prepared concrete at each concrete sidewalk ramp as specified in the Contract Documents and according to the plate manufacturer's installation instructions.

Plates shall be cleaned after installation.

351.07.10 Concrete Finishing

Finishing of the concrete surface shall take place while the concrete is sufficiently plastic to achieve the desired grades, elevations, and texture.

The surface of the sidewalk shall be uniform, dense, free from undulations and projections, struck off true to grade and cross-section, and finished with a float.

Excessive fines and water shall not be drawn to the surface.

Surface evaporation retardants shall not be used as an aid for finishing concrete.

The application of water, cement, or combination of both to the concrete surface shall not be permitted as a finishing aid.

Localized defects shall be repaired using concrete.

The sidewalk shall be given a broomed texture after finishing with a float.

The presence of footprints or other marks in the completed sidewalk shall require sawcutting, removal, and replacement of the complete sidewalk bay.

351.07.11 Joints

351.07.11.01 General

Longitudinal and transverse joints shall be constructed of the type and at the locations specified in the Contract Documents. The concrete adjacent to all formwork and joints shall be finished with a tool that produces a 5 mm rounded edge and a smooth, horizontal surface with a maximum width of 50 mm. All tooling shall be uniform and straight and shall be depressed to a maximum of 1 mm below the adjacent surface. Any ridges along the tooled marks shall be removed.

351.07.11.02 Dummy Joints

Dummy joints shall be hand formed using a 5 mm radius dummy joint tool.

351.07.11.03 Contraction Joints

Contraction joints shall be placed at every third dummy joint and shall be sawcut or formed to a depth that is one quarter the thickness of the sidewalk.

When the sidewalk width is 2.5 m or greater, a longitudinal contraction joint shall be sawn or formed at a maximum spacing interval of 1.5 m.

351.07.11.04 Expansion Joints

Expansion joints shall be constructed to the full depth of the slab.

Expansion joints shall be filled with expansion joint material and shall be clean and dry at the time of construction.

Expansion joints shall be constructed where the sidewalk abuts a rigid object or changes direction.

351.07.12 Identification Stamp

At the request of the Contract Administrator, the sidewalk shall be clearly and legibly marked with an approved stamp each end of the work, and at other places as directed. The stamp shall be centred on the sidewalk bay next to and parallel to a transverse joint. The stamp shall identify the Contractor's name and the year of construction.

351.07.13 Concrete Curing

Concrete shall be cured using a membrane-curing compound applied according to OPSS 904.

For the purpose of membrane-curing compound application, the application rate shall be 0.2 L/m².

351.07.14 Cold Weather Concreting

The placing and protection of concrete sidewalks in cold weather shall be according to OPSS 904.

351.07.15 Protection of Sidewalk

Vehicular traffic shall be restricted from crossing the sidewalk after the concrete has been placed for a minimum period of three days or until the concrete has reached 75% of the specified 28-Day compressive strength.

351.07.16 Sidewalk Tolerances

The surface of the concrete, after texturing, shall be within a 6 mm deviation measured at any point on a 3 m long straight edge.

The minimum acceptable thickness of the sidewalk shall be the specified thickness minus 8 mm. If the thickness deficiency exceeds 8 mm, the sidewalk shall be removed and replaced.

Core samples of the finished concrete may be taken to establish the actual thickness of the slab at locations determined by the Contract Administrator.

Unacceptable areas of sidewalk identified by the Contract Administrator shall require the sawcutting, removal, and replacement of the complete sidewalk bay by the Contractor.

351.07.17 Tactile Walking Surface Tolerances

Tolerances for the tactile walking surface indicator plates shall be as specified in the Contract Documents. If the tactile walking surface indicator plates are not within the specified tolerances, the plates shall be rejected.

Rejected plates shall be removed and replaced as directed by the Contract Administrator.

351.07.18 Field Sampling and Testing of Concrete

Field sampling and testing of concrete shall be according to OPSS 1350.

351.07.19 Management of Excess Material

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

351.09 MEASUREMENT FOR PAYMENT

351.09.01 Actual Measurement

351.09.01.01 Concrete Sidewalk

Measurement of concrete sidewalk shall be by area in square metres.

351.09.01.02 Tactile Walking Surface Indicators for Concrete Sidewalk Ramps

For measurement purposes a count shall be made for each set of tactile walking surface indicator plates installed at each concrete sidewalk ramp. A set shall consist of two tactile walking surface indicator plates.

351.09.02 Plan Quantity Measurement

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

351.10 BASIS OF PAYMENT

351.10.01 Concrete Sidewalk - 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.

Repair or removal and replacement of an unacceptable sidewalk bay shall be completed at no extra cost to the Owner.

351.10.02 Tactile Walking Surface Indicators for Concrete Sidewalk Ramps – 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.

351.10.03 Excavation

Payment for excavation shall be under the tender item Earth Excavation, Grading or Rock Excavation, Grading according to OPSS 206.

351.10.04 Utility Adjustment

Payment for the adjustment of Utility appurtenances shall be paid under the appropriate items according to OPSS 408.

No payment shall be made for appurtenances adjusted by the Utility company.

Appendix 351-A, November 2015 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 specify the following in the Contract Documents:

- Locations of sidewalks wider than 1.5m in areas with higher pedestrian volumes (see TAC GDG, Section 2.2.6.5 and MTO GDSOH, Section D.8.4) (351.07.01)
- Line, grade, and thickness requirements of concrete sidewalk (351.07.01 and 351.07.05)
- Details and locations of required Utility isolations (351.07.07)

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 310.010	Concrete Sidewalk
OPSD 310.020	Concrete Sidewalk Adjacent to Curb and Gutter
OPSD 310.030	Concrete Sidewalk Ramps at Intersections
OPSD 310.031	Concrete Sidewalk Ramps at Signalized Intersections with Intersecting Crosswalks
OPSD 310.033	Concrete Sidewalk Ramps at Unsignalized Intersections
OPSD 310.039	Concrete Sidewalk Ramps Tactile Walking Surface Indicators Component
OPSD 310.040	Utility Isolation in Concrete Sidewalks
OPSD 310.050	Concrete Sidewalk Driveway Entrance Details
OPSD 310.060	Joint Detail for Concrete Pedestrian Crosswalk at Signalized Intersection



CONSTRUCTION SPECIFICATION FOR FULL DEPTH REPAIR OF CONCRETE PAVEMENT OR CONCRETE BASE

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360.01 SCOPE

This specification describes the requirements for full depth repair of concrete pavement or concrete base including sawcutting; removal of pavement; installation of epoxy coated tie bars, dowel bars and load transfer devices; forming joints; and placing, texturing and curing of the concrete.

360.01.01 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.

360.01.02 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.

360.02 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 350 Concrete Pavement, Concrete Base and Lean Concrete Base

Ontario Provincial Standard Specifications, Materials

OPSS 1002 Aggregates - Concrete

360.03 DEFINITIONS

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

Staged Repair means where an area cannot be repaired completely due to traffic or construction sequence requirements, the repair shall be completed in separate stages. Each stage shall be a minimum of one lane in width and 2 m in length.

Diamond Grinding means altering the profile and texture of a concrete pavement surface by utilizing grinding equipment that employs diamond blades.

360.05 MATERIALS

360.05.01 Epoxy Resins

Epoxy resins shall be as specified in the Contract Documents.

360.05.02 Concrete

Concrete for full depth repair of concrete pavement or concrete base shall be according to the Materials section of OPSS 350 except that the nominal maximum size of coarse aggregate can be less than 37.5 mm according to OPSS 1002.

The class of concrete shall be nominal minimum 28-day compressive strength of 30 MPa.

360.06 EQUIPMENT

360.06.01 General

Equipment for full depth repair of concrete pavement or concrete base shall be according to the Equipment section of OPSS 350.

360.06.02 Placing and Finishing Equipment

Equipment used for placing, consolidating and finishing concrete shall be a self-propelled, vibratory steel screed or steel cylinder screed with integral internal vibration including automatic shut-off, levelling auger and shall operate on fixed forms. For repair areas less than 10 m in length, the concrete may be placed with a vibratory steel screed.

360.06.03 Gang Drill

The gang drill shall consist of not less than three independently powered pneumatic drills. Drilling equipment shall be used in such a way so as not to damage the adjacent pavement.

360.07 CONSTRUCTION

360.07.01 Staged Repair

When the operation requires a staged repair, additional dowel bars shall be installed to connect the repair stages, as required.

360.07.02 Concrete Removal

The outer limits of the concrete removal shall be saw cut full depth. The concrete removal method shall ensure that the concrete to be removed is not broken in place and that the adjoining concrete and underlying base remains undisturbed. When the existing granular base is disturbed, the loosened material shall be removed, the surface compacted and replaced with an additional depth of concrete.

360.07.03 Preparation Work

The preparation work for full depth repair of concrete pavement or concrete base shall be according to OPSS 350.

360.07.04 Joints

Joints for full depth repair of concrete pavement or concrete base shall be according to OPSS 350.

360.07.04.01 Dowel Bar and Tie Bar Placement

Gang drills shall be used to drill holes in the existing concrete for insertion of the dowel bars or tie bars. Drill holes shall be thoroughly cleaned. The dowel bars or tie bars shall be secured into the existing concrete with epoxy resin. The epoxy resin shall be injected into the back of the cleaned drill hole and the dowel or tie bar, with grout retention disks attached, shall be inserted to ensure the bars are completely enveloped with epoxy resin.

360.07.04.02 Tie Bars

Tie bars shall be installed at all longitudinal joints as specified in the Contract Documents.

360.07.04.03 Dowel Bars at Transverse Joints

Dowel bars shall be installed at all transverse joints as specified in the Contract Documents. The tolerance for the alignment of dowel bars shall be 6 mm in the length of the dowel bar in both the vertical and horizontal planes of the pavement. When reinforcement is present, dowels may be adjusted 25 mm horizontally, and raised or lowered 10 mm, to avoid drilling the reinforcement.

360.07.04.04 Transverse Joints - Expansion

Expansion joints shall be placed when replacing existing expansion joints or as specified in the Contract Documents.

360.07.04.05 Transverse Joints - Contraction

Transverse contraction joints shall be cut or formed to match existing joints or working cracks and skewed if required. Dowels or load transfer devices shall be installed at mid depth of the concrete slab, in a plane with the pavement surface and parallel to the centreline of the road.

360.07.05 Concreting

360.07.05.01 General

Concreting for full depth repair of concrete pavement or concrete base shall be according to OPSS 350.

360.07.05.02 Placing Concrete

Before placing concrete, it shall be demonstrated that the equipment to be used provides for proper adjustment of screeds, floats, propulsion and control equipment.

Concrete shall be placed at or near its permanent location, at a steady rate and in such a manner to avoid segregation of the materials. Any concrete placed beyond the outer limits of the pavement edge shall be removed immediately.

Concrete shall be placed to avoid disturbing or displacing the load transfer devices.

When an interruption in placing concrete of more than 45 minutes occurs, a transverse construction joint shall be formed.

Concrete shall not be placed against any material which is at a temperature above 35°C or against any material which is at a temperature below 0°C.

360.07.05.03 Texturing of Surface

Texturing of the surface shall be according to OPSS 350 except that manual devices may be used to provide the required tined texture.

Texturing is not required on concrete base or when the concrete surface shall be diamond ground as specified elsewhere in the contract.

360.07.05.04 Surface Tolerance

The surface of the concrete repair shall join flush with the existing concrete pavement or concrete base.

360.07.06 Curing, Joint Sealing, Removal of Forms and Shoulders

Curing, joint sealing and shoulders for full depth repair of concrete pavement or concrete base shall be according to OPSS 350.

360.07.07 Miscellaneous Protection

Miscellaneous protection for full depth repair of concrete pavement or concrete base shall be according to OPSS 350 except that the last sentence of the Traffic clause shall not apply.

360.07.07.01 Traffic

For early opening determination, one set of cylinders shall be taken from the last placement of concrete in the section to be opened to traffic.

360.07.08 Sampling and Testing - Slump, Air Content and Compressive Strength

Sampling and testing for full depth repair of concrete pavement or concrete base shall be according to OPSS 350 except that the compressive strength requirement shall be based on testing of standard cylinders with a frequency of one set of two cylinders 150 X 300mm (or one set of three cylinders 100 X 200mm) for each fifteen cubic metre unit of concrete but not less than one set of cylinders per Day.

360.07.09 Removal of Unacceptable Concrete

Concrete found to be unacceptable shall be removed and replaced with new material.

360.07.10 Management of Excess Material

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

360.08 QUALITY ASSURANCE

360.08.01 Criteria for Determining Unacceptable Concrete

If the tests on cylinders do not show a nominal minimum 28-day compressive strength of 30 MPa, the area represented by the cylinders shall be removed and replaced.

360.09 MEASUREMENT FOR PAYMENT

360.09.01 Actual Measurement

360.09.01.01 Full Depth Concrete Slab Repair

Measurement shall be of the surface area of the concrete repair placed in square metres.

360.09.02 Plan Quantity Measurement

360.09.02.01 Full Depth Concrete Slab Repair

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

360.10 BASIS OF PAYMENT

360.10.01 Full Depth Concrete Slab Repair - 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 dowel bars, tie bars and load transfer devices.

Where the existing granular base is disturbed, the removal of loosened material, compaction of the surface, and replacement with an additional depth of concrete shall be at no extra cost to the Owner. The removal and replacement of unacceptable concrete shall be at no extra cost to the Owner.

Appendix 360-A, November 2015
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 specify the following in the Contract Documents:

- Epoxy resins. (360.05.01)
- Tie bars. (360.07.04.02)
- Dowel Bars at Transverse Joints. (360.07.04.03)
- Transverse Joints - Expansion. (360.07.04.04)

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

No information provided here.



CONSTRUCTION SPECIFICATION FOR FAST TRACK FULL DEPTH REPAIRS TO CONCRETE PAVEMENT

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362.01 SCOPE

This specification covers the requirements for full depth repair of concrete pavement or concrete base including saw-cutting; removal of pavement; installation of epoxy coated tie bars, dowel bars and load transfer devices; forming joints; and placing, texturing, curing, sampling and testing of concrete to permit opening to traffic within a specified time period of 24 hours or less.

362.01.01 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.

362.01.02 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.

362.02 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 Specification, Construction

OPSS 360 Full Depth Repair of Concrete Pavement or Concrete Base

Ontario Provincial Standard Specifications, Materials

OPSS 1315 White Pigmented Membrane Curing Compounds for Concrete
OPSS 1350 Concrete - Materials and Production

CSA Standards

A23.2-1C Sampling Plastic Concrete*
A23.2-17C Temperature of Freshly Mixed Hydraulic Cement Concrete*
A23.2-4C Air Content of Plastic Concrete by the Pressure Method*
A23.2-5C Slump and Slump Flow of Concrete*
CSA A283-1980 Qualification Code for Concrete Testing Laboratories
* Part of A23.1-09/A23.2-09-Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete]

362.03 DEFINITIONS

For the purpose of this specification the following definition shall apply:

Fast Track Repair means a process in which a section of concrete pavement or concrete base is closed to traffic, repairs are completed, and the section reopened within a specified time period of 24 hours or less.

362.04 SUBMISSION AND DESIGN REQUIREMENTS

362.04.01 Concrete Mix

At least three weeks prior to the placement of the concrete, a calibration chart for the mix design strength versus concrete temperature and a copy of the mix design proportions together with all supporting technical data shall be submitted to the Contract Administrator for review.

362.05 MATERIALS

362.05.01 Concrete

A rapid setting concrete mix shall be designed according to OPSS 1350 with the following specific requirements:

Compressive Strength - 15 MPa minimum prior to opening to traffic
- 30 MPa minimum at 28 days

Air Content - $6.5 \pm 1.5\%$

The use of a concrete superplasticizer, Type 30 Portland cement and calcium chloride based accelerators are permitted.

362.05.02 Curing Compound

Curing compound shall be according to OPSS 1315.

362.06 EQUIPMENT

362.06.01 Placing and Finishing Equipment

Equipment for placing and finishing concrete shall be according to OPSS 360.

362.07 CONSTRUCTION

362.07.01 General

Construction shall be according to OPSS 360.

362.07.02 Operational Constraint

Fast track full depth repairs shall be completed at each repair location within the time frames specified.

If the repair is not progressing at a rate that shall permit the restoration of traffic within the specified time period, appropriate temporary measures, acceptable to the Contract Administrator, shall be taken to open the road to traffic.

A full depth concrete repair shall replace the above temporary work during the next scheduled closure.

362.07.03 Testing of Concrete

Field sampling and testing of concrete shall be performed according to OPSS 1350.

Field sampling and testing of concrete shall be performed by a person holding either of the following certifications:

- a) CCIL Certified Concrete Testing Technician, or
- b) Concrete Field Testing Technician - Grade 1.

This person shall have a valid, original card issued by the certifying agency in their possession at all times. Samples for determining acceptance of concrete for air and slump shall be grab samples taken according to CSA A23.2-1C after approximately 10% of the load has been discharged. The discharge shall be stopped and no additional concrete shall be discharged or placed into the work until samples have been tested and found acceptable.

Temperature shall be measured according to CSA A23.2-17C. Slump shall be measured according to CSA A23.2-5C. Air content shall be measured according to CSA A23.2-4C. The air meter shall be calibrated at least once a year according to CSA A23.2-4C and a copy of the calibration certificate shall be with the air meter and available for review, when requested by the Contract Administrator.

Thermocouples shall be installed potentiometers shall be provided at a minimum of two test locations per truck load. The time when the concrete pavement has attained a minimum compressive strength of 15 MPa shall be determined based on the calibration chart.

Test results which verify 15 MPa concrete at each test location shall be submitted immediately, on site, to the Contract Administrator.

At each repair area, a minimum of three sets of two autogenous test cylinders shall be made. The cylinders shall be tested at times and temperatures which correlate insitu and design strengths with relation to the calibration chart. Testing of cylinders shall be carried out at a CSA certified laboratory.

362.07.04 Curing

Immediately after finishing, the concrete surface shall be sprayed with a white pigmented membrane curing compound at a rate of 0.2 litres per square metre, then covered with a polyethylene sheet.

The temperature of the concrete at the time of placing shall be less than or equal to 35°C. The use of insulation to retain heat in the concrete is permitted.

362.07.05 Management of Excess Material

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

362.08 QUALITY ASSURANCE

Quality assurance shall be according to OPSS 360.

362.09 MEASUREMENT OF PAYMENT

362.09.01 Actual Measurement

362.09.01.01 Fast Track Full Depth Repairs to Concrete Pavement

Measurement for fast track full depth repairs to concrete pavement shall be made in square metres without deduction for appurtenances.

362.09.02 Plan Quantity Payment

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

362.10 BASIS OF PAYMENT

362.10.01 Fast Track Full Depth Repairs to Concrete Pavement - Item

Payment at the contract price for the above work shall be full compensation for all labour, Equipment, and Material required to do the work including tie bars, load transfer devices and sampling and testing of concrete.

Temporary measures to open the road to traffic shall be at no extra cost to the Owner.

Appendix 362-A, November 2015
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 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



CONSTRUCTION SPECIFICATION FOR PARTIAL DEPTH REPAIRS IN CONCRETE PAVEMENT

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364.01 SCOPE

This specification covers the requirements for partial depth repairs in concrete pavement and includes removal of concrete, preparation of surfaces, placement of concrete and forming joints associated with the repairs.

364.01.01 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.

364.01.02 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.

364.02 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 350	Concrete Pavement, Concrete Base and Lean Concrete Base
OPSS 360	Full Depth Repair of Concrete Pavement or Concrete Base
OPSS 929	Abrasive Blast Cleaning - Concrete Construction

Ontario Provincial Standard Specifications, Material

OPSS 1002	Aggregates - Concrete
OPSS 1301	Hydraulic Cementing Materials
OPSS 1350	Concrete, Materials and Production

364.03 DEFINITIONS

Partial Depth Repairs means areas of concrete pavement repair to a minimum depth of 50 mm and a maximum depth of one-third the thickness of the existing concrete slab.

Working Cracks means full depth cracks which are subject to horizontal and or vertical movement.

364.05 MATERIALS

364.05.01 Coarse Aggregate

Coarse aggregates shall be according to OPSS 1002 with a nominal maximum aggregate size of 19 mm.

364.05.02 Cement Paste for Surface Preparation

Cement paste shall consist of normal Portland cement according to OPSS 1301 and sufficient water to produce a paste that can be applied with a brush. Cement paste not used within 30 minutes shall be discarded.

364.05.03 Concrete

Concrete shall be according to OPSS 1350 and the following specific requirements:

Class of concrete	30 MPa at 28 days
Maximum slump	60 mm
Air content	$6.0 \pm 1.5 \%$

364.07 CONSTRUCTION

364.07.01 General

The Contract Administrator shall clearly delineate the limits of the repair area. The perimeter of the concrete pavement repair area shall be sawcut vertically to a depth of 50 mm. The concrete within the sawcut area shall be removed to a minimum depth of 50 mm and a maximum depth of one-third the thickness of the existing concrete slab using equipment that prevents the fracture of the underlying sound concrete. Wire mesh in the concrete shall be removed to the edge of the repair.

The area shall be abrasive blast cleaned according to OPSS 929. Immediately prior to filling the repair area with concrete, the surface area of the repair shall be uniformly coated with cement paste. The repair area shall then be filled with concrete, finished flush with the adjacent surface and cured according to OPSS 350.

364.07.01.01 Joints and Working Cracks

When the partial depth repair area includes an existing pavement joint or working crack, a joint shall be formed in the repair area to match the existing pavement joint or working crack. The joint shall be formed by placing a compressible joint material along the cut line in such a manner that prevents the plastic concrete from infiltrating the existing joint or crack. The width of compressible material shall match the existing joint or working crack. Prior to placement of compressible material, joints or working cracks shall be blown clean with compressed air.

364.07.02 Miscellaneous Protection

Miscellaneous protection for partial depth repairs in concrete pavement shall be according to OPSS 350 except that the requirement of two samples per lot shall not apply.

364.07.02.01 Traffic

For early opening determination, one set of test cylinders shall be taken from the last load of concrete placed in the pavement section to be opened to traffic. The test cylinders shall be field cured adjacent to the repair area. Early opening to traffic shall be according to OPSS 360.

364.07.03 Management of Excess Material

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

364.09 MEASUREMENT OF PAYMENT

364.09.01 Actual Measurement

Measurement shall be in square metres of the horizontal area repaired.

364.10 BASIS OF PAYMENT

364.10.01 Partial Depth Repairs in Concrete Pavement - 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 364-A, November 2015
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 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



NOTICE TO USERS OF OPSS 401

CONSTRUCTION SPECIFICATION FOR TRENCHING, BACKFILLING, AND COMPACTING

OPSS 401 has been removed from this
OPS volume

The provincial version of OPSS 401 is now in:

OPS Volume 5,
Provincial-Oriented
General and Construction Specifications
and designated as OPSS.PROV 401

The municipal version of OPSS 401 is now in:

OPS Volume 7,
Municipal-Oriented
General and Construction Specifications
and designated as OPSS.MUNI 401

**USE OF EITHER OF THE SPECIFICATIONS IS AS SPECIFIED
IN THE CONTRACT DOCUMENTS**



**CONSTRUCTION SPECIFICATION FOR NEW
MAINTENANCE HOLE, CATCH BASIN, DITCH INLET,
AND VALVE CHAMBER INSTALLATION**

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407.01	SCOPE
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This specification covers the requirements for the installation of maintenance holes, catch basins, ditch inlets, and valve chambers.

407.01.01 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.

407.01.02 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.

407.02 REFERENCES

When the Contract Documents indicate that provincial-oriented specifications shall 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 shall 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 353	Concrete Curb and Gutter Systems
OPSS 402	Excavating, Backfilling, and Compacting for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers
OPSS 404	Support Systems
OPSS 408	Adjusting or Rebuilding Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers
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 510	Removal
OPSS 517	Dewatering of Pipeline, Utility, and Associated Structure Excavation
OPSS 904	Concrete Structures
OPSS 920	Deck Joint Assemblies, Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds, and Waterstops - Structures

Ontario Provincial Standard Specifications, Material

OPSS 1004	Aggregates - Miscellaneous
OPSS 1301	Cementing Materials
OPSS 1302	Water
OPSS 1350	Concrete - Materials and Production
OPSS 1351	Precast Reinforced Concrete Components for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers
OPSS 1440	Steel Reinforcement for Concrete
OPSS 1850	Frames, Grates, Covers, and Gratings
OPSS 1853	Rubber Adjustment Units for Maintenance Holes, Catch Basins, and Valve Chambers
OPSS 1854	High Density Polyethylene (HDPE) and Expanded Polystyrene (EPS) Adjustment Units for Maintenance Holes, Catch Basins, and Valve Chambers

Canadian General Standards Board (CGSB)

1.181-99	Ready-Mixed Organic Zinc-Rich Coating
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ASTM International

C 923M-08	Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
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407.03 DEFINITIONS

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

Adjustment Units means circular and rectangular units used between the structure and the frame to adjust the elevation of the frame for grates and covers.

Structure means cast-in-place and precast maintenance holes, catch basins, ditch inlets, and valve chambers.

407.04 DESIGN AND SUBMISSION REQUIREMENTS

407.04.01 Submission Requirements

The Contract Administrator shall be notified in writing a minimum of 10 Days prior to precast components for structures being delivered to the site of the works giving the following information:

- a) Name of the company that shall be supplying the materials.
- b) The schedule for the delivery of each component to the site of the works.

407.05 MATERIALS

407.05.01 Concrete

Concrete for cast-in-place structures shall be according to OPSS 1350 with a nominal minimum 28-Day compressive strength of 30 MPa.

407.05.02 Steel Reinforcement

Steel bar reinforcement, bar mats, and wire fabric for cast-in-place structures shall be according to OPSS 1440.

407.05.03 Precast Concrete Components for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

Precast units shall be according to OPSS 1351 and as specified in the Contract Documents.

407.05.04 Steps and Ladders

Steps shall be according to OPSS 1351 and as specified in the Contract Documents.

Ladders shall be as specified in the Contract Documents.

407.05.05 Adjustment Units

Precast concrete adjustment units shall be according to OPSS 1351.

Rubber adjustment units shall be according to OPSS 1853.

High density polyethylene (HDPE) and expanded polystyrene (EPS) adjustment units shall be according to OPSS 1854.

407.05.06 Mortar and Grout

Mortar shall consist of a mixture of one part Portland cement according to OPSS 1301 and three parts mortar sand according to OPSS 1004, wetted with sufficient water to make the mixture plastic. Water shall be according to OPSS 1302.

Grout shall consist of a mixture of one part Portland cement according to OPSS 1301 and two parts mortar sand according to OPSS 1004, wetted with sufficient water to make the mixture plastic. Water shall be according to OPSS 1302.

407.05.07 Frames With Covers or Grates

Frames with covers or grates shall be according to OPSS 1850 and as specified in the Contract Documents.

407.05.08 Aluminum Safety Platforms

Aluminum safety platforms shall be according to OPSS 1351 and as specified in the Contract Documents.

407.05.09 Joint Seal Systems

Joint seal systems for precast concrete structures shall be according to OPSS 1351.

407.05.10 Zinc Rich Paint

Zinc rich paint shall be according to CAN/CGSB 1.181.

407.05.11 Resilient Connectors

Resilient connectors between pipes and structures shall be according to ASTM C 923M.

407.07 CONSTRUCTION

407.07.01 General

Structures of the type specified in the Contract Documents shall be installed on undisturbed and competent foundations at the locations and to the elevations specified in the Contract Documents and shall be constructed plumb and true to alignment.

The top of structures shall be installed below the final grade to allow for the placement of adjustment units to facilitate the placement of the top of the frame with grate or cover to the final grade.

407.07.02 Restrictions

The following restrictions shall apply:

- a) Precast concrete maintenance hole tees may be used only when the mainline pipe sewer is concrete.
- b) Precast concrete maintenance hole tees may not be used when a change in pipe size, longitudinal grade, or direction is required.

407.07.03 Site Preparation

Site preparation shall be according to OPSS 490.

407.07.04 Preservation and Protection of Existing Facilities

Preservation and protection of existing facilities shall be according to OPSS 491.

407.07.05 Protection Against Floatation

Damage to the structure due to floatation shall be prevented during construction and until completion of the work.

407.07.06 Cold Weather Work

All work shall be protected from freezing. Structures shall not be installed on frozen ground.

407.07.07 Transporting, Unloading, Storing, and Handling

Manufacturer's recommendations for transporting, unloading, storing, and handling shall be followed.

Materials that are unsound or damaged shall be rejected.

407.07.08 Excavating, Backfilling, and Compacting

Excavating, backfilling, and compacting for the installation of structures shall be according to OPSS 402.

407.07.09 Support Systems

Support systems shall be according to OPSS 404.

407.07.10 Dewatering

Dewatering shall be according to OPSS 517.

407.07.11 Cast-In-Place Structures

Concrete placement shall be according to OPSS 904.

All inside wall protuberances shall be removed once the forms are stripped.

407.07.12 Precast Structures

Precast or mono bases shall be placed level. Subsequent sections complete with joint seal systems shall be installed according to the manufacturer's recommendations. Joint seal systems for special site conditions (infiltration/exfiltration) shall be as specified in Contract Documents.

Adjustment of the structure shall be carried out by lifting the affected sections free of the excavation, re-leveling the base, if necessary, and re-installing the sections. Damaged sections and gaskets shall be replaced.

Lift holes shall be plugged with mortar.

407.07.13 Installation of Inlet and Outlet Pipes Into Concrete Structures

Inlet and outlet pipes shall be securely set into the structure's concrete base or walls using grout or approved pipe connectors so that the structure is watertight.

One of the following connections shall be provided where a pipe connects to a structure:

- a) A flexible pipe joint shall be provided within 300 mm of the outside face of the structure for flexible and rigid pipe.
- b) A concrete cradle to the first joint for rigid pipe.
- c) A resilient connector (i.e., a flexible, watertight connector) in the structure opening for flexible and rigid pipe.
- d) A special approved structure designed for pipe support.

Installation of pipe connectors shall be according to the manufacturer's recommendations.

All pipes, except in valve chambers, shall be flush with the inside walls of the structure.

When specified in the Contract Documents, cast iron or medium density polyethylene goss traps shall be placed at the outlet pipe of the catch basin.

When a subdrain is specified in the Contract Documents, the opening for the connection of the subdrain outlet shall be formed by coring. The subdrain outlet pipe shall be sealed into place using non-shrink grout. A 50 mm diameter weep hole shall be cored into the same wall as the subdrain connection and at the same invert elevation.

407.07.14 Benching and Channelling

When specified in the Contract Documents, the inside concrete bottom of the structures shall be benched and channelled to accommodate the pipe.

Where benching is hand finished, it shall have a wood float finish and channelling shall have a steel trowel finish. Channelling shall be smooth and flush with adjacent pipe inverts.

407.07.15 Installation of Adjustment Units

Installation of adjustment units shall be according to OPSS 408.

407.07.16 Installation of Frames with Grates or Covers

When precast concrete adjustment units are used, frames with grates or covers shall be set in a full bed of mortar on the precast concrete adjustment units.

When HDPE or EPS adjustment units are used, frames with grates or covers shall be installed and sealed according to the HDPE or EPS adjustment unit manufacturer's instructions.

When rubber adjustment units are used, frames with grates or covers shall be set firmly in place on the rubber adjustment unit by laying a continuous strip of butyl tape on the top surface of the rubber adjustment units and on the bottom of the frame.

Ditch inlet grates shall be installed as specified in the Contract Documents.

Installation of frames with grates or covers which lie within the flow lines of a curb and gutter system shall be according to OPSS 353.

407.07.17 Installation of Aluminum Safety Platforms

Aluminum safety platforms shall be installed as specified in the Contract Documents.

407.07.18 Installation of Extension Stems and Boxes for Valve Chambers

Extension stems and boxes shall be installed as specified in the Contract Documents.

Caps for valve boxes shall be installed flush with the final grade. Guides for the valve extension stems shall be securely anchored to the valve chamber.

407.07.19 Installation of Ladders and Steps

Ladders shall be installed as specified in the Contract Documents.

Steps shall be installed according to OPSS 1351. Steps shall be accurately set in the forms and supported to prevent their displacement if they are being cast-in-place during the placing of concrete for the structure.

407.07.20 Installation of Frost Straps

Frost straps shall be installed as specified in the Contract Documents.

407.07.21 Valve Chamber Insulation

Insulation for the roof, wall, or access way of the valve chamber shall be installed as specified in the Contract Documents.

407.07.22 Catch Basin Apron

Curb and gutter with concrete aprons on existing catch basins shall be constructed at the locations as specified in the Contract Documents.

The work shall include, but not be limited to, the following:

- a) Remove existing curb and gutter and existing pavement by saw cutting to the limits shown in the Contract Documents.
- b) Disposal of all materials designated for removal shall be according to OPSS 510.
- c) Construction of concrete curb and gutter shall be according to OPSS 353.
- d) Adjustment of frame and grate to suit final pavement elevations shall be according to OPSS 408.
- e) Placement of concrete for concrete apron shall be according to OPSS 904.
- f) Concrete for curb and gutter and apron shall be poured in place as one structure.
- g) Placement of hot-poured rubberized asphalt joint sealing compound and joint filler in construction joints shall be according to OPSS 920.
- h) The horizontal limits of the concrete apron to fit local conditions.

407.07.23 Clean Out of Structures

During the progress of the work and until completion and acceptance of the work, structures shall be kept clean and free of all foreign material.

407.07.24 Site Restoration

Site restoration shall be according to OPSS 492.

407.07.25 Leakage Test

Sanitary sewer maintenance holes and storm sewer maintenance holes shall be tested for leakage when specified in the Contract Documents. Leakage shall not exceed a rate of 3 litres per hour per metre of head above the lowest pipe invert in the maintenance hole.

The test shall be performed by plugging all pipe openings in the maintenance hole and filling the maintenance hole with water. After one hour has elapsed, the distance the surface of the water has dropped shall be measured and the leakage determined by calculating the volume of that portion of the maintenance hole formerly occupied by the water.

Maintenance holes failing the initial test shall have the leaks repaired and be re-tested until the leakage is below the allowable limit.

There shall be no visible infiltration.

407.07.26 Management of Excess Material

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

407.09 MEASUREMENT FOR PAYMENT

407.09.01 Actual Measurement

407.09.01.01 Maintenance Holes, Catch Basins, Apron, Ditch Inlets, and Valve Chambers

For measurement purposes, a count shall be made of the number of structures installed and adjusted.

407.09.01.02 Maintenance Hole Leakage Testing

For measurement purposes, a count shall be made of the number of maintenance holes passing the leakage test.

407.09.02 Plan Quantity Measurement

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

407.10 BASIS OF PAYMENT

**407.10.01 Maintenance Holes, “type, size” - Item
Catch Basins “type, size” - Item
Ditch Inlets “size” - Item
Valve Chambers “size” - Item
Maintenance Hole Leakage Testing - Item
Catch Basin Apron - 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.

The horizontal limits of the concrete apron to fit local conditions shall be at no additional cost to the Owner.

When the Owner raises or lowers the depth of a maintenance hole by up to and including 150 mm, it shall not constitute a Change in the Work and adjustment shall not be made to the payment. Where the depth of a maintenance hole is raised or lowered by more than 150 mm, this shall then constitute a Change in the Work for the full extent of the change from the original grade.

Appendix 407-A, November 2015 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, and/or a soils report in the Contract Documents.

The designer should specify the following in the Contract Documents:

- Material requirements for:
 - Precast units. (407.05.03)
 - Steps and ladders. (407.05.04)
 - Frames with covers or grates. (407.05.07)
 - Aluminum safety platforms. (407.05.08)
- Structure type, location, and elevation. (407.07.01)
- Type and location of goss traps. (407.07.13)
- Subdrains. (407.07.13)
- Benching. (407.07.14)
- Installation of:
 - Ditch inlet grates. (407.07.16)
 - Aluminum safety platforms. (407.07.17)
 - Extension stems and boxes. (407.07.18)
 - Ladders and steps. (407.07.19)
 - Frost straps. (407.07.20)
 - Valve chamber insulation. (407.07.21)
 - Curb and gutter with concrete aprons. (407.07.22)

The Contractor may use any of the connections shown in subsection 407.07.13 d). If a specific connection is required, it shall be specified in the Contract Documents.

Designer should determine if leakage testing for storm and sanitary sewer maintenance holes is required. If it is required, it shall be specified in the Contract Documents. Ground water conditions shall determine the type of test required and shall be specified in the Contract Documents. Alternative leakage test method(s) can be considered such as air or CCTV inspection. (407.07.25)

The tender item description for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers should include reference to one or more of the attributes shown (i.e., type of structure or size of structure, to be complete). (407.10.01)

Appendix 407-A

The tender item description for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers should include reference to one or more of the attributes shown (i.e., type of structure or size of structure, to be complete). (407.10.01)

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 400.001	Hoisting Hook Rib for Cast Iron Frames for Catch Basins, Maintenance Holes, and Valve Chambers
OPSD 400.010 to 400.120	Cast Iron Catch Basin Frames With Grates
OPSD 401.010 to 401.060	Cast Iron Maintenance Hole Frames With Covers
OPSD 402.010 to 402.021	Cast Iron Valve Chamber Frames With Covers
OPSD 403.010	Galvanized Steel Honey Comb Grating for Ditch Inlets
OPSD 404.010 to 404.022	Aluminum Safety Platforms
OPSD 405.010 to 405.020	Maintenance Hole Steps
OPSD 610.010 to 610.030	Catch Basin Frame With Grate Installation
OPSD 701.010 to 701.015	Precast Concrete Maintenance Holes, 1,200 to 3,600 mm in Diameter
OPSD 701.021	Maintenance Hole Benching and Pipe Opening Details
OPSD 701.030 to 701.081	Precast Concrete Maintenance Hole Components, 1,200 to 3,600 mm in Diameter
OPSD 701.100	Frost Strap Installation
OPSD 702.040 to 702.050	Precast Concrete Ditch Inlet Maintenance Hole
OPSD 703.011 to 703.015	Precast Concrete Single Inlet Flat Cap, 1,500 to 3,600 mm in Diameter
OPSD 703.021 to 703.024	Precast Concrete Twin Inlet Flat Cap, 1,500 to 3,000 mm in Diameter
OPSD 704.010 to 704.012	Maintenance Hole, Catch Basin, and Valve Chamber Adjustment Units
OPSD 705.001 to 705.002	Concrete Catch Basin Apron
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 Types A and B with 1,500 to 3,000 mm Diameter Flat Cap
OPSD 707.010	Precast Maintenance Hole Manufactured Tee
OPSD 708.020	Support for Pipe at Catch Basin or Maintenance Hole
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 1101.020	Valve Operator



**CONSTRUCTION SPECIFICATION FOR
ADJUSTING OR REBUILDING MAINTENANCE HOLES,
CATCH BASINS, DITCH INLETS, AND VALVE CHAMBERS**

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408.01 SCOPE

This specification covers the requirements for adjusting or rebuilding maintenance holes, catch basins, ditch inlets, and valve chambers and the installation of safety platforms.

408.01.01 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.

408.01.02 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.

408.02 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 402	Excavating, Backfilling, and Compacting for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers
OPSS 404	Support Systems
OPSS 407	Maintenance Hole, Catch Basis, Ditch Inlet, and Valve Chamber Installation
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 904	Concrete Structures

Ontario Provincial Standard Specifications, Material

OPSS 1004	Aggregates - Miscellaneous
OPSS 1301	Cementing Materials
OPSS 1302	Water
OPSS 1350	Concrete - Materials and Production

OPSS 1351	Precast Reinforced Concrete Components for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers
OPSS 1440	Steel Reinforcement for Concrete
OPSS 1850	Frames, Grates, Covers, and Gratings
OPSS 1853	Rubber Adjustment Units for Maintenance Holes, Catch Basins, and Valve Chambers
OPSS 1854	High Density Polyethylene (HDPE) and Expanded Polystyrene (EPS) Adjustment Units for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

Canadian General Standards Board (CGSB)

1.181-99 Ready-Mixed Organic Zinc-Rich Coating

408.03 DEFINITIONS

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

Adjusting means changing the final grade of the frame with cover or grate on an existing structure,

- a) upwards by the addition of adjustment units, or
- b) downwards by removal of existing adjustment units or bricks and mortar, regardless of the size or type of structure.

Adjustment Units means circular and rectangular units used between the structure and the frame to adjust the elevation of the frame for grates and covers.

Lift Rings means circular and rectangular pre-fabricated metal or high density polyethylene units used to adjust the elevation of the grates and covers only. They are inserted between the frame and the grate or cover.

Rebuilding means changing the final grade of the frame with grate or cover on an existing structure,

- a) upwards by the addition of precast concrete sections, concrete, and adjustment units; or
- b) downwards by the removal of precast concrete sections, concrete, and adjustment units or bricks and mortar, regardless of the size or type of structure.

Structure means cast-in-place and precast maintenance holes, catch basins, ditch inlets, and valve chambers.

408.05 MATERIALS

408.05.01 Concrete

Concrete for cast-in-place structures shall be according to OPSS 1350 with a nominal minimum 28-Day compressive strength of 30 MPa.

408.05.02 Steel Reinforcement

Steel bar reinforcement, bar mats, and wire fabric for cast-in-place structures shall be according to OPSS 1440.

408.05.03 Precast Concrete Components for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

Precast units shall be according to OPSS 1351 and as specified in the Contract Documents.

408.05.04 Steps and Ladders

Steps shall be according to OPSS 1351 and as specified in the Contract Documents.

Ladders shall be as specified in the Contract Documents.

408.05.05 Adjustment Units

Precast concrete adjustment units shall be according to OPSS 1351.

Rubber adjustment units shall be according to OPSS 1853.

High density polyethylene (HDPE) and expanded polystyrene (EPS) adjustment units shall be according to OPSS 1854.

408.05.06 Mortar

Mortar shall consist of a mixture of one part Portland cement according to OPSS 1301 and three parts mortar sand according to OPSS 1004, wetted with sufficient water to make the mixture plastic. Water shall be according to OPSS 1302.

408.05.07 Frames With Covers or Grates, and Lift Rings

Frames with covers or grates, and lift rings shall be according to OPSS 1850.

408.05.08 Aluminum Safety Platforms

Aluminum safety platforms shall be according to OPSS 1351 and as specified in the Contract Documents.

408.05.09 Joint Seal Systems

Joint seal systems for precast concrete structures shall be according to OPSS 1351.

408.05.10 Zinc Rich Paint

Zinc rich paint shall be according to CAN/CGSB 1.181.

408.07 CONSTRUCTION

408.07.01 General

The work of adjusting or rebuilding structures shall include the removal and subsequent replacement of the frame with grate or cover.

All structures shall be adjusted or rebuilt plumb, true to alignment and grade, and as specified in the Contract Documents.

During the progress of the work and until the final acceptance, all structures in service shall be kept clean and free of all extraneous material.

Prior to adjusting or rebuilding a structure, the existing frame with cover or grate shall be carefully removed and salvaged. Suitability of the salvaged frame with cover or grate for reuse shall be determined by the Contract Administrator.

The installation of adjustment units, frames, covers, grates, lift rings, precast concrete components, and cast-in-place aprons shall be according to OPSS 407 and of the type as specified in the Contract Documents.

Additional steps or ladder extensions are required when the distance from the adjusted cover or grate reference elevation to the first step exceeds 450 mm. Additional steps shall be placed according to OPSS 1351.

Alterations to ladders, valve extension stems and boxes, and frost straps shall be as specified in the Contract Documents.

After having been raised, any structure that has a total height of 5.0 m or more shall have a safety platform installed in it. The aluminum safety platforms shall be installed as specified in the Contract Documents.

After adjusting or rebuilding a valve chamber, insulation shall be installed according to the manufacturer's recommendations on the roof, wall, or access way of the valve chamber, when specified in the Contract Documents.

408.07.02 Site Preparation

Site preparation shall be according to OPSS 490.

408.07.03 Preservation and Protection of Existing Facilities

Preservation and protection of existing facilities shall be according to OPSS 491.

408.07.04 Cold Weather Work

All work shall be protected from freezing.

408.07.05 Transporting, Unloading, and Storing and Handling

Transporting, unloading, storing, and handling shall be according to manufacturer's recommendations.

Materials that are unsound or damaged shall be rejected.

408.07.06 Excavating, Backfilling, and Compacting

Excavating, backfilling, and compacting for the adjustment or rebuilding of structures shall be according to OPSS 402.

408.07.07 Support Systems

Support systems shall be according to OPSS 404.

408.07.08 Adjusting

All existing brickwork and mortar shall be removed from the top of the existing structure.

When there are adjustment units on an existing structure, adjustment units shall be added or removed as required so when the adjustment is completed there is a minimum of one to a maximum of three adjustment units on the top of the structure prior to placing the frame with grate or cover.

408.07.08.01 Precast Concrete Adjustment Units

Precast concrete adjustment units shall be used to set the frame with grate or cover at the required position and elevation.

A minimum of one adjustment unit, but not more than three adjustment units are required at each structure to a maximum height of 300 mm.

The first adjustment unit shall be laid in a full bed of mortar and aligned with the opening in the structure. Successive adjustment units shall be laid plumb to the first adjustment unit and sealed according to manufacturer's recommendations.

408.07.08.02 High Density Polyethylene (HDPE) and Expanded Polystyrene (EPS) Adjustment Units

When specified in the Contract Documents, HDPE or EPS adjustment units shall be used to set the frame with grate or cover at the required position and elevation.

A minimum of one adjustment unit is required at each structure up to a maximum height of 100 mm.

HDPE or EPS adjustment units shall be installed and sealed according to manufacturer's recommendations.

Rubber adjustment units shall not be used in conjunction with HDPE or EPS adjustment units.

408.07.08.03 Rubber Adjustment Units

Rubber adjustment units shall be used when specified in the Contract Documents. One rubber adjustment unit is used to replace the top precast concrete adjustment unit per structure and shall be used in conjunction with one or two precast concrete adjustment units. More than one rubber adjustment unit may be placed when wedge shaped rubber units are used to provide slope to the frame with grate or cover. In either instance, the total height of the rubber units shall be greater than 25 mm and less than 75 mm. The rubber unit is to be placed on the precast concrete adjustment unit so it provides the surface on which the frame rests.

The rubber adjustment unit shall be bonded firmly in place on the precast concrete adjustment unit by laying a continuous strip of butyl tape on the top surface of the precast concrete unit. If more than one rubber unit is used, a continuous strip of butyl tape is to be laid between each rubber adjustment unit.

408.07.09 Rebuilding

408.07.09.01 General

All existing brickwork and mortar or adjustment units shall be removed from the top of the existing structure.

The completed rebuilt structure shall have a minimum of one to a maximum of three adjustment units on the top of the structure prior to placing the frame with grate or cover.

408.07.09.02 Cast-In-Place Structures

When the top of the structure is to be lowered, the concrete shall be carefully removed to the required elevation and exposed steel reinforcement shall be cut off as specified in the Contract Documents. The upper section of the structure shall then be rebuilt to its original configuration using cast-in-place concrete and steel reinforcement as specified in the Contract Documents.

To raise the top of structures with a tapered upper section, the concrete in the structure shall be removed for the entire depth of the taper. The upper section, including straight walls and taper shall then be rebuilt to the original configuration using cast-in-place concrete and steel reinforcement as specified in the Contract Documents.

To raise the top of straight walled structures, the existing roof section, if any, shall be removed. The existing walls shall then be extended upward and the roof section rebuilt to the original configuration using cast-in-place concrete and steel reinforcement as specified in the Contract Documents.

When cast-in-place units are to be raised or lowered with cast-in-place concrete, the top surface of all existing walls shall be roughened and a bonding agent shall be applied to the joint before the walls are extended upwards.

Concrete shall be placed according to OPSS 904.

All inside wall protuberances shall be removed once the forms are stripped.

408.07.09.03 Precast Concrete Structures

Where precast concrete structures having either a tapered or flat slab top section are to be raised or lowered, the top section shall be carefully removed and salvaged and riser sections of suitable height shall be carefully removed from, substituted for, or added to the existing riser sections. The top section shall then be replaced. All of the above work shall be performed according to OPSS 407.

The procedure described for lowering a cast-in-place structure shall be followed as an alternative to the method described above for lowering a precast structure.

408.07.10 Restoration

Restoration shall be according to OPSS 492.

408.07.11 Leakage Test

Sanitary sewer maintenance holes and storm sewer maintenance holes shall be tested for leakage according to OPSS 407.

408.07.12 Management of Excess Material

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

408.09 MEASUREMENT FOR PAYMENT

408.09.01 Actual Measurement

408.09.01.01 Adjusting or Rebuilding Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

For measurement purposes, a count shall be made of the number of structures adjusted or rebuilt. When more than one adjustment or rebuild is specified for a structure, each adjustment or rebuild shall be counted separately.

408.09.01.02 Installation of Safety Platforms

For measurement purposes, a count shall be made of the number of safety grates installed.

408.09.02 Plan Quantity Measurement

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

408.10 BASIS OF PAYMENT

408.10.01
Adjusting Maintenance Holes - Item
Rebuilding Maintenance Holes - Item
Adjusting Catch Basins - Item
Rebuilding Catch Basins - Item
Adjusting Ditch Inlets - Item
Rebuilding Ditch Inlets - Item
Installation of Lift Rings - Item
Adjusting Valve Chambers - Item
Rebuilding Valve Chambers - Item
Installation of Safety Platforms - Item
Rebuilding Catch Basin Apron - 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.

Appendix 408-A, November 2015 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 specify the following in the Contract Documents:

- Material requirements for:
 - Precast units. (408.05.03)
 - Steps and ladders. (408.05.04)
 - Aluminum safety platforms. (408.05.08)
- Adjustment and rebuilding requirements. (408.07.01)
- Use of HDPE or EPS adjustment units. (407.07.08.02)
- Rubber adjustment units. (407.07.08.03)
- Alterations to ladders, valve extension stems and boxes, and frost straps. (408.07.01)
- Installation of:
 - Aluminium safety platforms. (408.07.01)
 - Valve chamber insulation. (408.07.01)
- Additional adjustments required. (408.09.01.01)
- Cut-off of exposed steel reinforcement. (408.07.09.02)
- Concrete and steel placement requirements. (408.07.09.02)

The designer should consider determining the number of salvageable frames with covers or grates. If there are frames with covers or grates that are not suitable for salvage, then an item should be added to the Contract Documents to ensure there are a sufficient number of new frames with covers or grates to fill the Contract needs.

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 400.001	Hoisting Hook Rib for Cast Iron Frames for Catch Basins, Maintenance Holes, and Valve Chambers
OPSD 400.010 to 400.120	Cast Iron Catch Basin Frames With Grates
OPSD 401.010 to 401.060	Cast Iron Maintenance Hole Frames With Covers
OPSD 402.010 to 402.021	Cast Iron Valve Chamber Frames With Covers
OPSD 403.010	Galvanized Steel Honey Comb Grating for Ditch Inlets
OPSD 404.020 to 404.022	Aluminum Safety Platforms
OPSD 405.010 to 405.020	Maintenance Hole Steps
OPSD 406.010	Aluminum Ladder for maintenance Holes
OPSD 610.010 to 610.030	Catch Basin Frame With Grate Installation

OPSD 701.010 to 701.015	Precast Concrete Maintenance Holes, 1,200 to 3,600 mm in Diameter
OPSD 701.030 to 701.081	Precast Concrete Maintenance Hole Components, 1,200 to 3,600 mm in Diameter
OPSD 701.100	Frost Strap Installation
OPSD 702.040 to 702.050	Precast Concrete Ditch Inlet Maintenance Hole
OPSD 703.011 to 703.015	Precast Concrete Single Inlet Flat Cap, 1,500 to 3,600 mm in Diameter
OPSD 703.021 to 703.024	Precast Concrete Twin Inlet Flat Cap, 1,500 to 3,000 mm in Diameter
OPSD 704.010 to 704.012	Maintenance Hole, Catch Basin, and Valve Chamber Adjustment Units
OPSD 705.001 to 705.002	Concrete Catch Basin Apron
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 Types A and B with 1,500 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 1101.020	Valve Operator



NOTICE TO USERS OF OPSS 410

CONSTRUCTION SPECIFICATION FOR PIPE SEWER INSTALLATION IN OPEN CUT

OPSS 410 has been removed from this
OPS volume

The provincial version of OPSS 410 is now in:

OPS Volume 5,
Provincial-Oriented
General and Construction Specifications
and designated as OPSS.PROV 410

The municipal version of OPSS 410 is now in:

OPS Volume 7,
Municipal-Oriented
General and Construction Specifications
and designated as OPSS.MUNI 410

**USE OF EITHER OF THE SPECIFICATIONS IS AS SPECIFIED
IN THE CONTRACT DOCUMENTS**



**CONSTRUCTION SPECIFICATION FOR
THE CLEANING AND FLUSHING OF PIPE SEWERS, CATCHBASINS,
MAINTENANCE HOLES, DITCH INLETS, AND OIL-GRIT SEPARATORS**

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411.01	SCOPE
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This specification covers the requirements for the cleaning and flushing of pipe sewers, catchbasins, maintenance holes, ditch inlets, and oil-grit separators.

411.01.01 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.

411.01.02 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.

411.02 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 409	Closed-Circuit Television Inspection of Sewers
OPSS 410	Pipe Sewer Installation in Open Cut

411.03 DEFINITIONS

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

Air Gap Method means a clear vertical separation between the pressurized potable water supply and a non-pressurized, non-potable water receiving vessel.

Backflow Prevention means a device used to protect potable water supplies from contamination or pollution due to backflow.

Cleaning means suction and vacuuming removal of debris within pipe sewers, catchbasins, maintenance holes, ditch inlets, and oil-grit separators.

Combination Hydro-Jet Cleaner means a service vehicle or equipment capable of pressure washing, suction vacuum cleaning of debris.

Debris means sludge, dirt, sand, gravel, rocks, bricks, other solid and semi-solid materials, and roots, grease, and encrustations and other materials that may cause restriction to flow in pipe sewers, catchbasins, maintenance holes, ditch inlets, and oil-grit separators.

Flushing means hydraulic pressure washing using various nozzles, pressure and flow rates to flush debris within pipe sewer systems downstream.

Oil-grit separator means a device designed to separate oil and suspended solids from water.

Pipe Sewer means as defined in OPSS 410.

411.04 DESIGN AND SUBMISSION REQUIREMENTS

When Equipment requiring an environmental compliance approval for a waste management system, issued by the Ontario Ministry of Environment and Climate Change, will be used for the work, a copy of the environmental compliance approval shall be submitted to the Contract Administrator a minimum of two weeks prior to commencement of the work.

411.05 MATERIALS

411.05.01 Water Source

Water source shall be as specified in the Contract Documents. When the source is not specified, water shall be clean and free from oil, acid, alkali, organic matter, or other deleterious substances.

Backflow prevention and air gap methods shall be used when water is taken from potable water systems.

411.06 EQUIPMENT

411.06.01 Combination Hydro-Jet Cleaner

A combination hydro-jet cleaner specifically designed for the purpose of cleaning pipe sewers, catch basins, maintenance holes, ditch inlets, oil-grit separators, and similar facilities, using a selection of nozzles and attachments to permit reaming and root cutting as required, shall be used for the work. The equipment shall be sufficient to clear blockages and remove debris from pipe sewer systems with varied sizes and downstream constraints.

411.07 CONSTRUCTION

411.07.01 General

The work shall commence at the upstream end of pipe sewer systems and progress to the downstream end.

The conditions of the site and the pipe sewer system shall be thoroughly assessed, including the degree of pipe blockage and types of debris. The equipment, nozzles, flow rates, and pressures necessary to complete the work shall be determined. Any supplemental information regarding the sewer network and the assessment method shall be as specified in the Contract Documents.

For post installation inspections, sewers requiring cleaning and flushing shall be as specified in the Contract Documents.

The Owner may request additional documentation of findings after cleaning and flushing operations as specified in the Contract Documents.

Prior to using any mechanical equipment, verify with CCTV inspections if any utility clearance is required.

Water flow volumes and pressures shall not cause damage to the pipe sewer system or flooding of property. Water flow volumes and pressures shall be appropriate for the age and condition of the pipe sewer system.

Debris that cannot be removed by flushing shall be loosened and broken up using reamers and root cutters as required.

No blockage to service connections shall occur as a result of the cleaning and flushing or cleanout operation.

Protection of waterbodies and waterbody banks shall be as specified in the Contract Documents.

411.07.02 Pipe Sewer Cleaning and Flushing

Flushing shall be used to transport debris from each section of pipe sewer to the downstream maintenance hole or catchbasin. Each section of pipe sewer between maintenance holes, catch basins, ditch inlets shall be cleaned and flushed before cleaning and flushing the next downstream section. Debris shall be continuously cleaned from the downstream maintenance hole or catchbasin as flushing occurs.

The passage of debris from one section of pipe sewer to another shall not be permitted, unless specified in the Contract Documents. A weir or sediment trap shall be placed in the maintenance hole to prevent passage of debris from the upstream pipes. When cleaning and flushing is completed for each section, the weir or sediment trap shall be removed.

Cleaning and flushing shall continue for each section of pipe sewer until no further debris is flushed from the pipe, and the pipe sewer section is free of impediments to flow. A minimum of 90% of the pipe sewer circumference shall be free of debris.

If cleanout cannot be completed due to damaged or broken pipe sewer, catchbasin, maintenance hole, or ditch inlet, the Contract Administrator shall be immediately notified.

411.07.03 Catchbasin, Maintenance hole, and Ditch Inlet Cleanout

A combination hydro-jet cleaner shall remove debris from catchbasins, maintenance holes, and ditch inlets separately.

411.07.04 Oil-Grit Separator Cleanout

Oil-grit separators shall be cleaned out by closing or blocking off the inlet and outlet pipes, dewatering the system, removal of debris by vacuum or other mechanical means, and cleaning and flushing to remove sediment. The inlet and outlet pipes shall not be reopened or unblocked until after the separator has been inspected by the Contract Administrator.

411.07.05 Closed-Circuit Television Inspection

Unless otherwise specified in the Contract Documents, pipe sewers shall be inspected after cleaning by closed-circuit television (CCTV) according to OPSS 409. The Contract Administrator shall be notified a minimum 24 hours prior to the inspection.

When specified in the Contract Documents, water shall be added immediately prior to CCTV inspection to the upstream end of the sewer system for minimum flow to the system low point by gravity.

411.07.06 Management of Excess Material

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

Debris removed from pipe sewers, catchbasins, maintenance holes, ditch inlets, and oil-grit separators shall be managed as excess material according to the Contract Documents.

Liquid shall be decanted or filtered and returned to the sewer of origin. The decanted or filtered liquid shall comply with Provincial Water Quality Objectives and local municipal bylaws.

411.09 MEASUREMENT FOR PAYMENT

411.09.01 Actual Measurement

411.09.01.01 Pipe Sewer Cleaning and Flushing

Measurement for pipe sewer cleaning and flushing shall be by length in metres, by time in hours, or by volume in cubic metres, as specified in the Contract Documents.

411.09.01.01.01 By Length

Measurement shall be in metres and along the centreline of the pipe sewer from the centre of the maintenance hole, catch basin, or ditch inlet at each end of the pipe sewer system to be cleaned out.

When cleaning and flushing is incomplete due to a collapsed pipe or immovable blockage, the length of collapsed pipe or blockage shall be deducted from the length measured for payment.

411.09.01.01.02 By Time

Measurement shall be by time in hours that the combination hydro-jet cleaner is in effective operation.

411.09.01.01.03 By Volume

Measurement shall be by volume in cubic metres of decanted debris, in predetermined truck box capacities.

411.09.01.02 Catchbasin, Maintenance Hole, Ditch Inlet, and Oil-Grit Separator Cleanout

For measurement purposes, a count shall be made of the number of structures cleaned.

411.09.02 Plan Quantity Measurement

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

411.10

BASIS OF PAYMENT

411.10.01

**Pipe Sewer Cleaning and Flushing – Item
Catchbasin, Maintenance Hole, Ditch Inlet Cleanout, and Oil-Grit Separator
Cleanout – 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 411-A, November 2015
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 specify the following in the Contract Documents:

- The owner shall provide any available information on the condition of the sewer network (e.g. size, age, constraints, material, known defects, vulnerable sections). (411.07.01)
- The owner may choose to evaluate, specify or approve the assessment method of pipe prior to work. (411.07.01)
- For post installation inspections, the owner shall identify sewers requiring flushing and cleaning (411.07.01)
- If access to the waterbody or a waterbody bank is required, necessary protection measures shall be specified (411.07.01)
- The individual owners may request documentation of findings after flushing completion (e.g. presence of grease, roots, construction debris, pipe defect and; an estimate of the light/medium/heavy level of material removed, where applicable; and submission of inspection reports and maps) (411.07.01)
- The owner shall identify if passing material between maintenance holes will be permitted (411.07.02)
- The owner shall designate if CCTV inspection is not required (411.07.05)
- The owner shall designate if additional water for minimum flow is required prior to the camera inspection (411.05)
- The owner shall designate water source where applicable including any metering or tracking if required (411.07.05.01)
- The owner shall designate disposal sites where applicable, designating as temporary or permanent, as necessary, including any additional environmental requirements (411.07.06)
- Method of measurement for pipe sewer cleaning and flushing. (411.09.01.01)

Related Ontario Provincial Standard Drawings

No information provided here.



NOTICE TO USERS OF OPSS 421

CONSTRUCTION SPECIFICATION FOR PIPE CULVERT INSTALLATION IN OPEN CUT

OPSS 421 has been removed from this
OPS volume

The provincial version of OPSS 421 is now in:

OPS Volume 5,
Provincial-Oriented
General and Construction Specifications
and designated as OPSS.PROV 421

The municipal version of OPSS 421 is now in:

OPS Volume 7,
Municipal-Oriented
General and Construction Specifications
and designated as OPSS.MUNI 421

**USE OF EITHER OF THE SPECIFICATIONS IS AS SPECIFIED
IN THE CONTRACT DOCUMENTS**



**CONSTRUCTION SPECIFICATION FOR
PRECAST REINFORCED CONCRETE BOX CULVERTS
IN OPEN CUT**

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422.01 SCOPE

This specification covers the requirements for the installation of precast reinforced concrete box culverts and box in open cut, and includes the requirements for excavation, bedding, backfilling, and cover material.

422.01.01 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.

422.01.02 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.

422.02 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, General

OPSS 180 Management and Disposal of Excess Material

Ontario Provincial Standard Specifications, Construction

OPSS 209	Embankments Over Swamps
OPSS 404	Support Systems
OPSS 501	Compacting
OPSS 517	Dewatering of Pipeline, Utility and Associated Structure Excavation
OPSS 539	Temporary Protection Systems
OPSS 902	Excavating and Backfilling - Structures
OPSS 904	Concrete Structures
OPSS 905	Steel Reinforcement for Concrete

Ontario Provincial Standard Specifications, Material

OPSS 1002	Aggregates - Concrete
OPSS 1004	Aggregates - Miscellaneous
OPSS 1010	Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1205	Clay Seal
OPSS 1301	Cementing Materials
OPSS 1302	Water
OPSS 1350	Concrete - Materials and Production
OPSS 1440	Steel Reinforcement for Concrete
OPSS 1821	Precast Reinforced Concrete Box Culverts
OPSS 1860	Geotextiles

MTO Laboratory Testing Manual

LS-706	Moisture - Density Relationship of Soils Using 2.5 kg Rammer and a 305 mm Drop
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ASTM International

D 2487-00	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
D 2488-00	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
D 2922-01	Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 3017-01	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

422.03 DEFINITIONS

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

Backfill means earth, rock, or granular material used as fill within the excavation placed beyond the limits of bedding and cover below the subgrade elevation, including frost tapers.

Bedding means the material used to support the bottom of the box unit.

Box Culvert means a culvert constructed of precast reinforced concrete box units rectangular in cross-section.

Box Unit means a single precast reinforced concrete box unit of a box culvert.

Concrete Appurtenances means head walls, cut-off walls, aprons, collars, and any other concrete fixtures associated with the box culverts, excluding concrete bedding or concrete structures covered elsewhere in the Contract Documents and specified as such.

Cover means the material placed as a protective layer around the box unit to prevent damage to the box unit.

Distribution Slab means a reinforced concrete slab placed directly on the top slab of a box culvert to distribute loading.

Excavation, Earth and Rock means the excavation material classified as earth and rock according to OPSS 902.

Excavation, Swamp means swamp excavation as defined in OPSS 209.

Geotechnical Engineer means a professional engineer licensed by the Professional Engineers of Ontario to practice in the Province of Ontario who is responsible for the work related to earth and rock, including site investigation, foundation recommendations, inspection, and quality control with respect to the design and installation of box culverts.

Native Material means the original material removed to form an excavation and which is acceptable to the Contract Administrator for return to the same or other excavation as backfill or cover.

Soil means soil as defined in OPSS 902.

422.04 DESIGN AND SUBMISSION REQUIREMENTS

Six copies of the fabrication and assembly drawings, including handling details, shall be submitted to the Contract Administrator two weeks prior to delivery of the box units.

422.05 MATERIALS

422.05.01 Concrete

Concrete for appurtenances and distribution slab shall be according to OPSS 1350.

422.05.02 Granulars

Granulars shall be according to OPSS 1010.

422.05.03 Fine Aggregates for Levelling Course

Fine aggregate for levelling courses shall be according to OPSS 1002.

422.05.04 Precast Reinforced Concrete Box Units

Precast reinforced concrete box units for spans not greater than 3 metres shall be according to OPSS 1821. Box unit reinforcement shall be consistent throughout a culvert as specified in the Contract Documents.

422.05.05 Clay Seal

Clay seal shall be according to OPSS 1205.

422.05.06 Steel Reinforcement

Steel reinforcement for concrete appurtenances and concrete distribution slab shall be according to OPSS 1440.

422.05.07 Mortar

Mortar for joints shall be composed of one part Portland cement type GU and two parts mortar sand wetted with only sufficient water to make the mixture plastic. The Portland cement type GU shall be according to OPSS 1301, mortar sand shall be according to OPSS 1004, and water shall be according to OPSS 1302.

422.05.08 Preformed Gasket

Preformed gaskets shall be as specified by the manufacturer of the box units.

422.05.09 Joint Sealing Compound

Joint sealing compound shall be butyl mastic as specified by the manufacturer of the box units.

422.05.10 Grout

Grout shall be non-shrink and non-staining.

422.05.11 Geotextile

Geotextile type shall be as specified in the Contract Documents and according to OPSS 1860.

422.05.12 Native Material

Native material shall be classified according to the Unified Soil Classification System using the procedures prescribed in ASTM D 2488. When precise classification of native material is required, ASTM D 2487 shall be used.

422.05.13 Bedding

Bedding shall be as specified in the Contract Documents. Earth bedding shall be classified as Group I or Group II according to Table 1.

The maximum particle size for bedding shall not exceed 25 mm in diameter, unless the bedding layer has a thickness of 150 mm or greater, in which case the maximum particle size shall not exceed 38 mm in diameter.

422.05.14 Backfill

Backfill shall be as specified in the Contract Documents. Earth backfill shall be classified as Group I, Group II, or Group III according to Table 1.

Earth backfill shall be free of boulders over 100 mm in diameter, topsoil, frozen materials, organic matter, and other deleterious material.

422.05.15 Cover

Cover shall be as specified in the Contract Documents. Earth cover shall be classified as Group I or Group II according to Table 1.

Cover shall be free of boulders having a diameter greater than 100 mm, debris, organic matter, or frozen materials.

422.07 CONSTRUCTION

422.07.01 Selection of Box Units

The box units shall be selected from Table 1 in OPSS 1821 based on the dimensions and height of fill specified in the Contract Documents.

422.07.02 Excavation

The excavation for the installation of the box units shall be according to OPSS 902, including frost tapers and culvert end treatments.

422.07.03 Support Systems

Support systems shall be according to OPSS 404.

422.07.04 Dewatering

Dewatering shall be according to OPSS 517.

422.07.05 Temporary Protection Systems

Temporary protection systems shall be according to OPSS 539.

422.07.06 Foundations

The foundation shall be comprised of firm to hard in situ soil or compacted backfill.

When unsuitable or unstable material is encountered during the excavation for the foundation, the unsuitable or unstable material shall be removed to firm to hard in situ soil and replaced to the foundation grade with compacted backfill meeting the requirements of Group I or Group II, according to Table 1. The foundation on each side of the box unit, for a minimum distance equal to the inside width of the box unit shall be at least as stable as the foundation below the box unit.

422.07.07 Bedding

Bedding shall be placed to the dimensions shown in the Contract Documents.

The bedding shall be placed as uniformly as possible. Bedding under the middle third of the box unit base shall be loosely placed and uncompacted. Bedding requiring compaction shall be placed in layers not exceeding 200 mm in thickness, loose measurement, and each layer shall be compacted according to OPSS 501.

Bedding shall not be placed on frozen earth grade.

422.07.08 Levelling

The surface prepared to support the box units shall have a 75 mm minimum thickness top levelling course of uncompacted Granular A or fine aggregates.

422.07.09 Installing Box Units

422.07.09.01 Box Units

Box units shall be installed to the alignment and grade specified in the Contract Documents.

Box units shall not be installed on bedding containing frozen material.

End units to accommodate concrete appurtenances shall be as specified in the Contract Documents.

The box units shall be installed to make a continuous line forming a box culvert. The gap at box unit joints shall not exceed 20 mm.

For box units placed in parallel for multiple cell installations, a 60 mm $\pm$ 10 mm gap filled with grout between adjacent cells shall be provided.

Installation of the box units shall commence at the outlet end and proceed in the upstream direction with the bell ends of the box units facing upgrade. The box units shall be placed with the base of each box unit in uniform contact with the prepared bedding throughout its full length. The ends of the box units shall be joined so there is no unevenness along the inside. The box units and joint surfaces shall be kept clean as work progresses. Water shall not be allowed to flow through the box units during installation. The excavation shall be kept dry and the box units shall not be installed in water.

422.07.09.02 Geotextile at Joints

A 600 mm wide strip of geotextile shall be placed to form a continuous barrier centered around the exterior of all buried joints not covered by a distribution slab.

Geotextile shall be free of folds, tears, and wrinkles. The geotextile shall be joined so that the material laps a minimum of 500 mm and shall be pinned together. Alternatively, the geotextile shall be joined according to the seam requirements of OPSS 1860.

Geotextile shall not be placed between the top slab of box units and distribution slabs. Where a distribution slab is required, the geotextile shall be held in place by cover and geotextile ends shall be secured to the box units.

422.07.09.03 Mortared Joints

When mortared joints are specified in the Contract Documents, all joints shall be thoroughly cleaned and wetted. Mortar shall then be applied over the joint around the inner and outer perimeter. After the mortar joint is complete the joint inside shall be wiped clean and smooth.

422.07.09.04 Preformed Gasket

When a preformed gasket is specified in the Contract Documents for sealing the joint between the box units, it shall be placed according to the manufacturer's recommendations.

422.07.09.05 Joint Sealing Compound

When joint sealing compound is specified in the Contract Documents for sealing the joint between the box units, it shall be applied according to the manufacturer's recommendations.

422.07.09.06 Lift Holes

All lift holes shall be filled with mortar after installation of the box unit.

422.07.10 Concrete Appurtenances and Concrete Distribution Slab

Concrete placement, sampling, and testing shall be according to OPSS 904. Reinforcing steel shall be placed according to OPSS 905. Steel grating shall be provided as specified in the Contract Documents.

422.07.11 Backfill

Backfill shall be placed in layers not exceeding 200 mm in thickness, loose measurement. Compaction shall be according to OPSS 501.

Backfilling on each side of the box units shall be completed simultaneously. At no time shall the levels on each side differ by more than 400 mm.

When native material is specified as backfill in the Contract Documents, earth material may be substituted, when approved by the Contract Administrator. In areas within the roadway, for a depth equal to the frost treatment, earth backfill shall have frost susceptibility characteristics similar to the native material. The Contract Administrator shall decide on the suitability of the earth backfill that the Contractor proposes to substitute.

Rock may be used as backfill provided the installed box units are protected by a minimum thickness of cover material as specified in the Contract Documents.

Box unit installation and backfill shall be completed prior to the start of any subbase and base course construction over the box unit location.

Shoring and bracing shall be withdrawn and removed as the excavation is being backfilled.

422.07.12 Cover

Cover shall be placed in layers not exceeding 200 mm in thickness, loose measurement, and each layer shall be compacted according to OPSS 501.

Cover in trenches and in other locations where pavements require controlled differential settlement shall be of a type and compaction level to control pavement differential settlement within acceptable limits for the specified type of pavement.

422.07.13 Clay Seal

When a clay seal is specified in the Contract Documents, the clay seal shall be placed to the dimensions specified in the Contract Documents and compacted to a minimum of 95% of the maximum dry density (MDD). The MDD shall be determined from LS-706, carried out on a single representative sample. Field density and field moisture determinations shall be made according to ASTM D 2922 and ASTM D 3017.

422.07.14 Geotechnical Testing

When specified in the Contract Documents, compliance of earth backfill material type and compaction with the requirements of this specification shall be verified by a Geotechnical Engineer approved by the Contract Administrator.

422.07.15 Management and Disposal of Excess Material

Management and disposal of excess material shall be according to OPSS 180.

422.09 MEASUREMENT FOR PAYMENT

422.09.01 Actual Measurement

422.09.01.01 Precast Reinforced Concrete Box Culverts

Measurement of the actual length of box culvert installed shall be made in metres along the centreline of the invert of the box culvert.

422.09.02 Plan Quantity Measurement

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

422.10 BASIS OF PAYMENT

422.10.01 “size” Precast Concrete Box Culvert - 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.

422.10.02 Clay Seal - 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.

422.10.03 Granular

Granular material used for bedding and levelling courses, backfill, cover, and frost tapers shall be paid for under the appropriate granular items specified in the Contract Documents.

Payment will not be made for granular used to fill any area excavated beyond the lines specified in the Contract Documents or used as cover when acceptable earth cover is available.

422.10.04 Steel Reinforcement in Concrete Appurtenances

Payment for steel reinforcement in concrete appurtenances shall be according to OPSS 905.

422.10.05 Concrete in Appurtenances

Payment for concrete appurtenances shall be according to OPSS 904.

422.10.06 Excavation for Box Culverts

Payment for earth and rock excavation shall be according to OPSS 902.

422.10.07 Swamp Excavation

Where swamp excavation is required to place precast concrete box culverts, payment for the swamp excavation shall be under the tender item covering the swamp excavation for earth embankment construction.

TABLE 1
Group Classification for Earth Bedding, Backfill and Cover Materials

Group	Grain Size	Description	Symbols
I	Coarse	Well-Graded Gravel, Gravel-Sand Mixtures, little or no fines	GW
		Poorly-Graded Gravel, Gravel-Sand Mixtures, little or no fines	GP
		Well-Graded Sand, Gravelly Sand, little or no fines	SW
		Poorly-Graded Sand, Gravelly Sand, little or no fines	SP
II	Medium	Clayey Gravel or Gravel-Sand-Clay Mixtures	GC
		Clayey Sand or Sand-Clay Mixtures	SC
		Silty Sand or Sand-Silt Mixtures	SM
		Silty Gravels or Gravel-Sand-Silt Mixtures	GM
		Inorganic Silts and Very Fine Sands, Silty or Clayey Fine Sands, Clayey Silts	ML
III	Fine	Clayey Gravel or Gravel-Sand-Clay Mixtures	GC
		Clayey Sand or Sand-Clay Mixtures	SC
		Inorganic Clay, Gravelly Clay, Sandy Clay, Silty Clay, Lean Clay	CL
		Inorganic Silts, Micaceous or Diatomaceous Fine Sandy or Silty Soil	MH

Appendix 422-A, November 2015 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 design should specify the following in the Contract Documents:

- Geotextile type. (422.05.11)
- Bedding. (422.05.13)
- Backfill. (422.05.14)
- Cover. (422.05.15)
- Dimensions of box units and height of fill. (422.07.01)
- Bedding dimensions. (422.07.07)
- Alignment and grade of the box units. (422.07.09.01)
- Minimum cover material requirements for installation protection against rock backfill. (422.07.11)
- Clay seal. (422.07.13)

The designer should determine if the following is required and if so, specify in the Contract Documents:

- Concrete appurtenances. (422.07.09.01)
- Mortared joints. (422.07.09.03)
- Preformed gasket. (422.07.09.04)
- Joint sealing compound. (422.07.09.05)
- Steel grating. (422.07.10)
- Native backfill. (422.07.11)
- Geotechnical testing. (422.07.14)

To be complete, the tender item descriptions for Precast Concrete Box Culvert should include the size of the box unit.

Related Ontario Provincial Standard Drawings

OPSD 803.010	Backfill and Cover for Concrete Culverts
OPSD 3920.100	Precast Reinforced Concrete Box Culvert With Height Of Fill $\geq 0.6\text{m}$
OPSD 3920.110	Precast Reinforced Concrete Box Culvert With Height Of Fill $< 0.6\text{m}$
OPSD 4040.05	Culverts Warning Message Layout Details
OPSD 4040.06	Culverts Warning Message Lettering Details



**CONSTRUCTION SPECIFICATION FOR
PIPELINE AND CONDUIT INSTALLATION BY PIPE BURSTING**

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463.01 SCOPE

This specification covers requirements for installation of pipelines and conduits using the trenchless technology known as pipe bursting.

463.01.01 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.

463.01.02

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.

463.02

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 401	Trenching, Backfilling, and Compacting
OPSS 404	Support Systems
OPSS 407	Maintenance Hole, Catch Basin, Ditch Inlet, and Valve Chamber Installation
OPSS 409	Closed-Circuit Television Inspection of Pipelines
OPSS 441	Watermain Installation in Open Cut
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 493	Temporary Potable Water Supply Services
OPSS 517	Dewatering of Pipeline, Utility, and Associated Structure Excavation
OPSS 539	Temporary Protection Systems

463.03

DEFINITIONS

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

Fusion means connecting product lengths into a continuous length using elevated temperatures and pressure.

Launch Pit means an access excavation or existing access structure to an existing product for the insertion of the pipe bursting head and product.

Pipe Bursting means the application of a pipe bursting head into the interior of and along the length of an existing product to split or fracture the existing product so that the existing product and surrounding material is opened up to a sufficient size to accommodate the insertion of a product in the cavity created, without leaving any significant voids around the product. Pipe bursting methods include static, pneumatic, and hydraulic. Pipe bursting is also known internationally as pipe cracking or pipe splitting.

Product means the new pipelines or conduits.

Pull means the installation of one continuous reach of product. Generally, a pull shall commence at a launch pit and terminate at a pull pit.

Pull Pit means an access excavation or existing access structure to an existing product to receive the product or pipe bursting head or both.

Structure means a maintenance hole, valve chamber, or other such facility to access the product.

463.04

DESIGN AND SUBMISSION REQUIREMENTS

463.04.01

Submission Requirements

The following information shall be submitted to the Contract Administrator 7 Days prior to the commencement of pipe bursting operations:

- a) A work plan outlining the schedule, procedures, launch pit and pull pit locations, and Working Drawings required to execute the work on the product, service laterals, and structures.
- b) A list of personnel, including backup personnel, and their qualifications and experience.
- c) A traffic control plan.
- d) Safety plan, including the contracting company safety manual and emergency procedures.
- e) When fusion joining is used, written record of current training showing that the operator has been fully trained in the use of the fusion equipment by an authorized representative of the fusion equipment manufacturer and the product manufacturer or, when applicable, certified by the Owner or Utility for which the work is being completed.
- f) When applicable, product bypass and temporary supply system plans, including installation, operation, and testing procedures and a list of material and equipment to be used.
- g) Manufacturer's technical data containing complete information on product:
 - i. Material composition, physical properties, inside diameter, and wall thickness.
 - ii. Maximum tensile strength and corresponding maximum allowable pulling force.
 - iii. Transporting, unloading, storing and handling recommendations.

- iv. Repair.
- v. Fusion times and temperatures.
- vi. Minimum bend radius.
- vii. Recommended restraint method in structure.
- viii. Product recovery requirements.
- ix. Relaxation requirements.

h) Contingency plans for the following potential conditions:

- i. Unforeseen obstructions causing burst stoppage.
- ii. Deviation from required alignment and grade.
- iii. Extended service disruption.
- iv. Damage to the existing service connections and the replacement of product's structural integrity and methods of repair.
- v. Damage to other existing Utilities.
- vi. Soil heaving or settlement.
- vii. Contaminated soil or water.
- viii. Alignment passing through buried structures.

463.05 MATERIALS

463.05.01 Pipe Materials

Pipe type, class, pressure rating, and size shall be as specified in the Contract Documents.

463.05.02 Valves

Valve type, class, pressure rating, and size shall be as specified in the Contract Documents.

463.05.03 Fittings

Fittings shall be suitable for and compatible with the type, class, pressure rating, and size of pipe with which they are used.

463.05.04 Lubricant

Lubricant used to reduce friction, to maintain the annular space created by the pipe bursting head, and to allow the insertion of the product shall be non-toxic and biodegradable.

463.06 EQUIPMENT

463.06.01 Pipe Bursting Head

The pipe bursting head shall be according to the manufacturer's specifications for head sizes recommended for various product diameters and types, as well as parameters associated with maximum allowable upsize percentages.

463.06.02 Pipe Bursting Power Source

The pipe bursting power source shall generate sufficient force to burst and compact the existing product into the surrounding material.

463.06.03 Fusion Equipment

Fusion equipment, when used, shall be sized and rated for the product. Fusion clamps shall be sized to clamp the product properly.

463.07 CONSTRUCTION

463.07.01 General

The product shall be installed following the alignment and grade of the existing pipe and to the ovality specified in the Contract Documents.

The Contract Administrator shall be notified at least 48 hours prior to commencement of work.

463.07.02 Site Preparation

Site preparation shall be according to OPSS 490 and as specified herein.

The work site shall be graded or filled to provide a level working area for the pipe bursting equipment. No alterations beyond what is required for the pipe bursting operations shall be made. All activities shall be confined to designated work areas.

463.07.03 Preservation and Protection of Existing Facilities

Preservation and protection of existing facilities shall be according to OPSS 491.

When specified in the Contract Documents, an existing facility shall be exposed to verify its horizontal and vertical location. The number of exposures required to monitor work progress shall be as specified in the Contract Documents.

463.07.04 Transporting, Unloading, Storing, and Handling Materials

Manufacturer's recommendations for transporting, unloading, storing, and handling of materials shall be followed.

463.07.05 Trenching, Backfilling, and Compacting

Trenching, backfilling, and compacting for launch pits, pull pits, and other excavation locations shall be according to OPSS 401.

Launch pits and pull pits shall be sized to allow the use of the pipe bursting equipment and to allow the product to be installed such that the product manufacturer's recommendations for product bending radius are not exceeded.

463.07.06 Support Systems

Support systems shall be according to OPSS 404.

463.07.07 Dewatering

Dewatering shall be according to OPSS 517.

463.07.08 Temporary Protection Systems

The construction of temporary protection systems shall be according to OPSS 539.

Where 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 where necessary to prevent damage to such works or proposed works.

463.07.09 Temporary Potable Water Supply Services

When specified in the Contract Documents, temporary potable water supply services shall be according to OPSS 493.

463.07.10 Product By-Pass

When specified in the Contract Documents, during the execution of the work the flow within the existing product shall be bypassed around the product being replaced and the continuity of service to each facility connected to the affected section of product shall be maintained.

The pumps and by-pass lines shall be of adequate capacity and size to handle all flows.

463.07.11 Preparation of Existing Product and Structures

All existing crosses, tees, valves, and service connections shall be located, exposed, and disconnected prior to any pipe bursting operation.

Prior to pipe bursting, the inlets, outlets, and benching of existing structures shall be enlarged sufficiently for clearance of the pipe bursting head and the product. Enlargements shall be made neatly and be no greater than that required for their purpose. Size of the enlargements shall be sufficient to allow for restoration and sealing to the product.

Existing product shall be cleared of obstructions (e.g., rocks and debris) or mechanical obstructions (e.g., repair sleeves, clamps, couplings, and intolerable deviations in grade or alignment) prior to pipe bursting.

463.07.12 Product Joining

463.07.12.01 General

The product shall be joined according to the manufacturer's recommendations.

The product shall be assembled and joined at the site to provide a leak-proof joint.

When space and the Contract Documents permit, the length of the product to be pulled shall be joined as one length prior to the commencement of the pulling operation.

When used, fusion shall be performed by technicians trained in the use of the fusion equipment.

Joints shall be capable of withstanding the loading of the installation process. All joints shall be subject to acceptance by the Contract Administrator prior to insertion.

463.07.12.02 Connection to Product or Structures

Product shall be allowed to recover from any induced stresses and strains before connection to new or existing product or structures are made. Product recovery time shall be according to the manufacturer's recommendations.

The product connection to the structure or to an existing product shall be leak-proof.

463.07.12.03 Service Connections

Service connection work shall be as specified in the Contract Documents.

Service connection work shall not commence until the product has fully recovered.

463.07.13 Product Installation

Installation procedures shall be according to the product manufacturer's guidelines.

The product shall be protected from damage during the installation process.

Suitable guides shall be used to protect the product from damage at the insertion point and at any intermediate re-entry points.

Upon commencement of the bursting process, product insertion shall be continuous from the launch pit to the pull pit, except when approved by the Contract Administrator. A pushing machine may be used to assist insertion from the rear.

When specified in the Contract Documents, a weak link, breakaway connector, or load monitor shall be used to prevent excess pulling force from damaging the product.

463.07.14 Structures and Valves

When the product enters or exits an existing structure, the structure wall shall be restored as specified in the Contract Documents. Restoration shall securely locate and anchor the product in the wall and shall produce a leak-proof seal.

The existing structure's benching shall be restored according to the requirements of the product, any other incoming product, and as specified in the Contract Documents.

When new structures or valves are specified, they shall be installed according to OPSS 407 and OPSS 441, respectively.

463.07.15 Testing

Testing of the product joining and installation shall be as specified in the Contract Documents.

When specified in the Contract Documents, closed-circuit television (CCTV) inspection shall be completed on the product after installation.

463.07.16 Record Keeping

Verification record requirements of the alignment and grade of the installed product shall be as specified in the Contract Documents. A copy of the verification records shall be given to the Contract Administrator at the completion of the pipe bursting operations.

463.07.17 Closed-Circuit Television Inspection

CCTV inspection shall be according to OPSS 409.

463.07.18 Site Restoration

Site restoration shall be according to OPSS 492.

463.07.19 Management of Excess Material

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

463.08 QUALITY ASSURANCE

463.08.01 Acceptance Criteria

Acceptance criteria for the product installation shall be as specified in the Contract Documents.

463.09 MEASUREMENT FOR PAYMENT

463.09.01 Actual Measurement

463.09.01.01 Product Installation by Pipe Bursting

Measurement for a product installation by pipe bursting shall be by length in metres along the horizontal centreline of the product between connecting points or, if there is no connecting point, to the end of the product. When the connecting point is a structure, measurement for a product installation shall be by length in metres to the centre of the structure.

463.09.01.02 Service Connections

For measurement purposes, a count shall be made of the number of existing services that are disconnected from the existing product and reconnected to the product.

463.09.02 Plan Quantity Measurements

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

463.10 BASIS OF PAYMENT

**463.10.01 Product Installation by Pipe Bursting, “*type of product, diameter of product, use of product*” - Item
Product Bypass - Item
Service Connections - Item
Closed-Circuit Television Inspection - 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.

463.10.02 Closed-Circuit Television Inspection

When the Contract does not contain a separate tender item for CCTV inspection, the Contract price for the Product Installation by Pipe Bursting item shall include full compensation for all labour, Equipment, and Material to do the work of CCTV inspection.

Appendix 463-A, November 2015
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

This specification was written to encompass the majority of pipe bursting operations for small and medium sized projects. However, the basic design considerations should always include properly planned entry and exit points, grade of existing host pipe, adjacent Utilities, and connection requirements.

The International Pipe Bursting Association (IPBA) normally assigns pipe bursting work to one of three classifications. These following classifications (January 2012 version) are intended for use as general guidelines when considering replacement of existing pipe by pipe bursting techniques. The classification should be determined based on the more stringent parameter in the table below.

IPBA Classification and Degree of Difficulty	Depth of Pipe m	Existing Pipe Diameter mm	New Pipe Diameter Options	Burst Length m	Original Trench Width	Soil Type
A - Minimal	< 3.65	-50 - 300	Size on Size	0 - 100	Relatively wide trench compared to expander head outside diameter.	Compressible soils outside trench (loose sand, gravel, soft clay).
B - Moderate	> 3.66 to < 5.5	—350-450	Single Upsize	-100 - 150	Trench width less than 4" wider than the expander head outside diameter.	Moderately compressible soils outside trench (medium dense to dense sand, medium to stiff clay).
C - Comprehensive	> 5.6+	-500 - 900	Double / Triple Upsize	-150 - 300	Incompressible soils outside trench.	Constricted trench geometry (width less than or equal to outside diameter of bursting head).
D - Developmental						

The designer may consider a pre-qualification process to ensure that the contractor(s) possess the required capabilities and qualifications to undertake the work required under the contract.

The designer should include the following in the Contract Documents:

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- Pipe type, class, pressure rating, and size. (463.05.01)
- Valve type, class, pressure rating, and size. (463.05.02)
- Product ovality. (463.07.01)
- Service connection work. (463.07.12.03)
- Benching restoration. (463.07.14)
- Testing of product joining and installation. (463.07.15)
- Verification record requirements. (463.07.16)
- Acceptance criteria. (463.08.01)

The designer should determine if the following are required and, if so, they should be specified in the Contract Documents:

- Exposing existing facilities. (463.07.03)
- Use of temporary potable water supply services. (463.07.09)
- Product by-pass. (463.07.10)
- Joining and pulling product as one length. (463.07.12.01)
- Use of a weak link, breakway connector, or load monitor. (463.07.13)
- Wall restoration. (463.07.14)
- Completion of a CCTV inspection. (463.07.15)

The designer should give consideration, in consultation with the pipe manufacturer, to minimum allowable product bending radii commensurate with the pipeline's strength.

The designer should give special consideration to the required grades at the entry and exit points. The designer may undertake a CCTV inspection and location analysis prior to pipe bursting to review the existing line and grade to determine if deviations are acceptable.

Product upsizing by using a pipe bursting technique may induce stresses in the surrounding soil resulting in potential damage to nearby Utilities and foundations. The degree of distortion on the zone of influence is a function of the degree of upsizing, the pipe material of a nearby Utility, the location of nearby Utilities in relation to the pipe burst pipe, and the soil conditions. The designer may consider exposure of critical services by non-destructive methods to monitor the pipe bursting progress and impacts.

The designer should consider the need for product bypass, temporary potable water supply services, or temporary flow stoppage or blockage with inflatable plugs during the pipe bursting operation. The designer may require that during the execution of the work, the flow shall be bypassed around the product being replaced and the continuity of service to each facility connected to the affected section of product be maintained. The designer should consider what should be done if there is an extended service disruption.

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For certain product installations, the designer may consider the requirement of a weak link, breakaway connector, or load monitor to prevent excess pulling force from damaging the product.

The designer should consider the type of interface and the degree of continuity between the product and the existing structure to ensure appropriate anchoring and seals in order to prevent product retraction or inadvertent leaks to the new system.

The designer may specify the completion of a CCTV inspection of the product after installation, particularly when grade thresholds are critical. In smaller diameter product installations when the designer elects to complete a CCTV survey, the designer may wish to specify a lighter interior colour of the product installation, if available.

Testing of product joining and installation may include hydrostatic, air, BACT-T, etc.

Verification record requirements may include such information as reporting information available from the pipe bursting machine, daylighting, installation of tracer wire with the product, the use of acoustic or magnetic locating equipment, etc.

Acceptance criteria requirements may include such considerations as successful bursting operation from entry to pull back location; CCTV inspection, removal of extra coupon pipe length from the pull back pit to view for stresses, grade verification, etc.

The designer may consider including a process regarding payment for failed pipe bursting attempts in the Contract Documents.

The tender item description for Product Installation by Pipe Bursting should include reference to one or more of the attributes shown (i.e., type of product, diameter of product, and use of product) to be complete.

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.



**CONSTRUCTION SPECIFICATION FOR
SITE PREPARATION FOR PIPELINES, UTILITIES,
AND ASSOCIATED STRUCTURES**

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490.03	DEFINITIONS
490.04	DESIGN AND SUBMISSION REQUIREMENTS - Not Used
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490.06	EQUIPMENT - Not Used
490.07	CONSTRUCTION
490.08	QUALITY ASSURANCE - Not Used
490.09	MEASUREMENT FOR PAYMENT - Not Used
490.10	BASIS OF PAYMENT

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490-A	Commentary
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490.01 SCOPE

This specification covers the requirements of site preparation for the installation of sanitary and storm pipe sewers, pipe culverts and end sections, forcemains and associated appurtenances, watermains and associated appurtenances, and other underground Utilities; maintenance holes, catch basins, ditch inlets, or valve chambers; and any other specified subsurface construction.

490.01.01 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.

490.01.02 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.

490.02 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 201	Clearing, Close Cut Clearing, Grubbing, and Removal of Surface and Piled Boulders
OPSS.MUNI 206	Grading
OPSS 412	Sewage Forcemain Installation in Open Cut
OPSS 441	Watermain Installation in Open Cut
OPSS 706	Traffic Control Signing
OPSS 801	Protection of Trees
OPSS 802	Topsoil
OPSS 805	Temporary Erosion and Sediment Control Measures

490.03 DEFINITIONS

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

Associated Appurtenances means as defined in OPSS 412 for a sewer system, and OPSS 441 for a watermain.

490.07 CONSTRUCTION

490.07.01 General

Site preparatory work shall be performed prior to the installation of the pipelines, Utilities, and associated structures.

490.07.02 Removal of Existing Signing

Removal of existing signing shall be according to OPSS 706.

490.07.03 Clearing and Grubbing

Clearing and grubbing and related work shall be according to OPSS 201.

490.07.04 Shrub and Tree Relocation

Shrubs and trees to be relocated shall be protected according to OPSS 801 in their original and final locations.

Shrub and tree relocation shall be as specified in the Contract Documents.

490.07.05 Tree Protection and Pruning

Tree protection and pruning shall be according to OPSS 801.

490.07.06 Stripping and Stockpiling Topsoil

Stripping of topsoil shall be according to OPSS.MUNI 206. Topsoil shall be removed carefully in the Work Areas and shall not be mixed with subsoil or other materials.

Stockpiling of topsoil shall be according to OPSS 802 and as specified in the Contract Documents. Topsoil shall not be placed in or near tree stands, along flood plains, and in areas containing natural wildlife habitats. Perimeter drainage ditches shall be constructed to intercept and divert run-off to adjacent settling ponds. Temporary erosion and sediment control measures shall be according to OPSS 805. Stockpiles shall be protected to ensure minimum environmental interference.

490.07.07 Removal of Fences and Guide Rails

Property owners or occupants shall be given at least 24 hours notice in advance of dismantling fences. Fences and guide rails shall be dismantled, where necessary. All components that are broken, bent, or damaged as a result of the operation shall be removed from the site and replaced with new components. All reusable components shall be stored and protected.

490.07.08 Management of Excess Material

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

490.10**BASIS OF PAYMENT**

Payment at the Contract price for the appropriate tender items for the installation of sanitary and storm pipe sewers, pipe culverts and end sections, forcemains and associated appurtenances, watermains and associated appurtenances, and other underground Utilities; maintenance holes, catch basins, ditch inlets, or valve chambers; and any other specified subsurface construction shall be full compensation for all labour, Equipment, and Material to do the work of site preparation.

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 490-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 should specify the shrub and tree relocation and planting requirements in the Contract Documents. (490.07.04)

The designer may choose to specify a specific location for stockpiled topsoil in the Contract Documents. (490.07.06)

If separate items are required to cover the various components of site preparation, they should be included in the Contract Documents.

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.



**CONSTRUCTION SPECIFICATION FOR
SITE RESTORATION FOLLOWING INSTALLATION OF PIPELINES,
UTILITIES, AND ASSOCIATED STRUCTURES**

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492.09	MEASUREMENT FOR PAYMENT - Not Used
492.10	BASIS OF PAYMENT

APPENDICES

492-A	Commentary
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492.01 SCOPE

This specification covers the requirements for the restoration of a site following installation of sanitary and storm pipe sewers, pipe culverts and end sections, forcemains and associated appurtenances, watermains and associated appurtenances, and other underground utilities; maintenance holes, catch basins, ditch inlets, or valve chambers; and any other specified subsurface construction.

492.01.01 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.

492.01.02 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.

492.02 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 304	Single and Double Surface Treatment
OPSS 310	Hot Mix Asphalt
OPSS 313	Hot Mix Asphalt - End Result
OPSS 314	Untreated Granular, Subbase, Base, Surface Shoulder, and Stockpiling
OPSS 350	Concrete Pavement and Concrete Base
OPSS 351	Concrete Sidewalk
OPSS 353	Concrete Curb and Gutter Systems
OPSS 412	Sewage Forcemain Installation in Open Cut
OPSS 441	Watermain Installation in Open Cut
OPSS 490	Site Preparation for Pipelines, Utilities, and Associated Structures
OPSS 721	Steel Beam Guide Rail and Cable Guide Rail
OPSS 771	Standard Highway Fence
OPSS 772	Chain-Link Fence
OPSS 802	Topsoil
OPSS 803	Sodding
OPSS 804	Seed and Cover

Ontario Provincial Standard Specification, Material

OPSS 1010	Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1540	Standard Highway Fence Components
OPSS 1541	Chain-Link Fence Components
OPSS 1601	Wood - Material, Preservative Treatment, and Shop Fabrication

Canadian General Standards Board (CGSB)

138.2-96	Steel Framework for Chain Link Fence
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492.03 DEFINITIONS

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

Associated Appurtenances means as defined in OPSS 412 and OPSS 441.

492.05 MATERIALS

492.05.01 Granular Materials

Granular materials shall be according to OPSS 1010.

492.05.02 Barbed Wire

Barbed wire shall be according to CAN/CGSB-138.2.

492.05.03 Electric Fence Wire

Electric fence wire shall be 2 mm diameter hot dipped galvanized wire.

492.05.04 Wood Fence

Wood fence material shall be according to OPSS 1601.

492.05.04.01 Board or Split Rail Fence

Posts and boards shall be the same size and type as used in the original fence.

Rails shall be split cedar in good condition and of adequate lengths to build either a straight or snake fence.

492.05.04.02 Wood Braces for Wire Fence

Diagonal wood braces shall be according to OPSS 1540.

492.05.05 Highway Fence

Highway fence material shall be according to OPSS 1540.

492.05.06 Steel Posts

Steel posts shall be according to OPSS 1540.

492.05.07 Chain-Link Fence

Chain-link fence material shall be according to OPSS 1541.

492.05.08 Gates

Gates shall be fabricated from material suitable to the fence on either side of the gate opening. Material for highway fence gates shall be according to OPSS 1540. Material for chain-link fence gates shall be according to OPSS 1541.

492.05.09 Guide Rail

Guide rail material shall be according to OPSS 721.

492.05.10 Concrete

Concrete for sidewalks shall be according to OPSS 351.

Concrete for curb and gutter shall be according to OPSS 353.

492.07 CONSTRUCTION

492.07.01 General

All disturbed areas shall be restored to an equivalent or better condition than existed prior to the commencement of construction.

492.07.02 Grading

Rough grading shall be performed to the levels, grades, and contours as specified in the Contract Documents allowing for the placement of surface materials. Soil shall not be disturbed within the drip line of trees and shrubs during grading.

Final grading shall be performed to the lines and elevations specified in the Contract Documents. The final grading shall be according to OPSS 206.

492.07.03 Roadway Restoration

The restoration of the roadway shall be scheduled to follow closely behind trench backfilling. The roadway shall be made and maintained safe for the passage of vehicular and pedestrian traffic after completion of backfilling and until permanent restoration takes place, as specified in the Contract Documents.

Granular subbase and base courses of the type specified in the Contract Documents shall be placed on the prepared subgrade to the dimensions specified in the Contract Documents and shall be according to OPSS 314.

The surface course of the type specified in the Contract Documents shall be placed on the prepared base course to the dimensions specified in the Contract Documents in accordance as follows:

- a) Asphalt pavement shall be according to OPSS 310 or OPSS 313 as specified in the Contract Documents.
- b) Concrete paving shall be not less than 150 mm in thickness and shall be according to OPSS 350.

- c) Gravel surface courses shall be according to OPSS 314.
- d) Surface treatment shall be according to OPSS 304.

492.07.04 Fences and Guide Rails

Fences and guide rails shall be restored with the same type of fence or guide rail that existed prior to construction along the lines and levels specified in the Contract Documents. A maximum clearance of 150 mm from ground level shall be maintained at any point along the fence line.

The erection of highway fence shall be according to OPSS 771.

The erection of chain-link fence shall be according to OPSS 772.

Posts for fences other than highway and chain-link fences shall be installed to the spacing that existed prior to construction.

Gates shall be installed at the same location and height as the gates that existed prior to construction. Gate size shall be according to the dimensions of the gate that existed prior to construction. Gates shall be secured with fittings to match the fence complete with latches, hinges, stops, and all necessary fittings.

Colour and finish material of the restored fence shall match the existing colour scheme and finish material. Where required, two coats of finish material shall be applied.

The construction of guide rails shall be according to OPSS 721.

492.07.05 Topsoil

Topsoil shall be placed after final grading operations have been completed and immediately prior to seeding or sodding operations. Topsoil shall be obtained from stockpiles prepared according to OPSS 490 or, if the required quantity is not obtainable from stockpiles, the Contractor shall import the required topsoil.

The quality of the topsoil and the construction methods for placing topsoil shall be according to OPSS 802. Stockpile sites within or adjacent to the Contract limits shall be restored to the original condition or to a condition acceptable to the Contract Administrator.

492.07.06 Shrub and Tree Replanting

Shrubs and trees shall be replanted as specified in the Contract Documents.

492.07.07 Sodding and Seeding

Lawns and grassed areas shall be sodded or seeded and covered as specified in the Contract Documents.

Sodding shall be according to OPSS 803.

Seeding and cover shall be according to OPSS 804.

492.07.08 Sidewalk and Concrete Curb and Gutter Systems

Concrete sidewalk shall be placed according to OPSS 351. Alignment and dimensions shall match existing sidewalk on either end of the restored sidewalk. Damaged sections of any sidewalk slab shall be removed and replaced to the nearest joint on either end of the damaged section.

Concrete curb and gutter systems shall be placed according to OPSS 353. Alignment and dimensions shall match the existing curb and gutter systems on either side of the restored curb and gutter. Damaged sections of curb and gutter shall be removed and replaced to the nearest joint or neat saw cut.

Placement of Granular A shall be according to OPSS 314 with a minimum depth of 100 mm as a base for the curb and gutter and sidewalk.

492.07.09 Management of Excess Material

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

492.10 BASIS OF PAYMENT

Payment at the Contract price for the appropriate tender items for the installation of sanitary and storm pipe sewers, pipe culverts and end sections, forcemains and associated appurtenances, watermain and associated appurtenances, and other underground utilities; maintenance holes, catch basins, ditch inlets, or valve chambers; and any other specified subsurface construction shall be full compensation for all labour, Equipment, and Material to do the work of site restoration.

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 492-A, November 2015 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 specify the following in the Contract Documents:

- Levels, grades, and contours for rough grading. (492.07.02)
- Lines and elevations for final grading. (492.07.02)
- Requirements for temporary roadway. (492.07.03)
- Type of granular subbase and base courses and surface course. (492.07.03)
- Dimensions of the granular subbase and base courses and surface course. (492.07.03)
- OPSS 310 or OPSS 313 for asphalt pavement. (492.07.03, a))
- Lines and levels for restoration of fences and guide rails. (492.07.04)
- Replanting of shrubs and trees. (492.07.06)
- Sodding or seeding and cover of lawns and grassed areas. (492.07.07)

Designer should determine if the Contract is to have separate items to cover the various components of site restoration or if the items for the installation of pipelines, utilities, and their associated structures will be all inclusive to cover the work. If separate items are desired, they should then be included in the Contract Documents along with the details of the work.

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 912.101 to 912.532	Guide Rail System, Steel Beam
OPSD 913.101 to 913.130	Guide Rail System, Cable
OPSD 971.101 to 971.102	Fence, Highway Installation
OPSD 972.101 to 972.131	Fence, Chain-Link



CONSTRUCTION SPECIFICATION FOR TEMPORARY POTABLE WATER SUPPLY SERVICES

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493.09	MEASUREMENT FOR PAYMENT - Not Used
493.10	BASIS OF PAYMENT

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493.01	SCOPE
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This specification covers the requirements for the installation of temporary watermain, service connections, and associated appurtenances prior to disconnecting service of an existing watermain on a temporary basis.

493.01.01 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.

493.01.02 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.

493.02 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 441	Watermain Installation in Open Cut

CSA Standards

B64.5-94	Double Check Valve (DCVA) Backflow Preventers [Part of B64 Series-07, Backflow Preventers and Vacuum Breakers Compendium]
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American Water Works Association (AWWA)

C510-07	Double Check Valve Backflow Prevention Assembly
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ASTM International

D 1784-11	Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
D 2241-15	Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
D 3139-98 (2001)	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
F 477-14	Elastomeric Seals (Gaskets) for Joining Plastic Pipe

NSF International

61-2014a Drinking Water System Components - Health Effects

493.03

DEFINITIONS

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

Associated Appurtenance means structures, devices, and appliances, other than pipe and conduit that are used in connection with a water distribution system, such as valves, hydrants, corporation cocks, services, and thrust restraints.

Excavation, Earth and Rock means the excavation classified as earth and rock according to OPSS 206.

Temporary Hydrant means temporary fire hydrant and all associated temporary appurtenances.

Temporary Potable Water Supply Services means temporary watermains, services, hydrants, and all associated appurtenances.

Temporary Services means temporary potable water supply services installed on or just below the ground surface for the purpose of providing potable water to customers while the existing watermain is out of service.

Temporary Watermain means temporary potable water supply hose or pipe installed on or just below the ground surface for the purpose of providing potable water to temporary services and temporary fire hydrants while the existing watermain is out of service.

Watermain means an installation designed for the conveyance of water under pressure using circular pipe.

493.04

DESIGN AND SUBMISSION REQUIREMENTS

493.04.01

Submission Requirements

The following information shall be submitted to the Contract Administrator 14 Days prior to the commencement of any work requiring temporary potable water supply services:

- a) Temporary potable water supply services plans including installation, operation, testing procedures, and a list of material and equipment to be used.
- b) Temporary hydrant details.

493.05 MATERIALS

493.05.01 General

The pipe size, 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 materials in contact with potable water shall be NSF/ANSI 61 compliant and, if being reused, shall have been used exclusively for potable water services in the past.

All materials shall be capable of withstanding 860 kPa pressure and all other conditions of use.

493.05.02 Temporary Potable Water Supply Services

The pipe, hose, and all other materials used in conjunction with the temporary potable water supply services shall be as follows:

- a) Flexible hose jackets shall be abrasion resistant, either double jacket or specially coated, and be capable of being driven over by vehicles periodically without short term effects.
- b) Hose lining shall be of material that does not impart any taste or odour to the water.
- c) Hose shall come complete with aluminium couplings with threads.
- d) Rigid pipe shall be made of class 12454-B PVC material according to ASTM D 1784. Material shall have a minimum hydrostatic design stress of 14 MPa.
- e) PVC shall be formulated with impact modifiers, heat stabilizers, and ultraviolet inhibitors.
- f) Pipe extrusion shall meet or exceed all requirements of ASTM D 2241.
- g) Joints and couplings shall be according to ASTM D 3139.
- h) O-rings shall be according to ASTM F 477.
- i) Double check valve backflow preventers shall be according to CSA B64.5 and AWWA C510.

493.05.03 Valves

Valves shall be according to OPSS 441.

493.05.04 Temporary Hydrants

Temporary hydrants shall be as specified in the Contract Documents.

493.07 CONSTRUCTION

493.07.01 General

Written notices to all affected property owners are required a minimum of 48 hours prior to any disruption of water service as a result of the temporary by-pass.

Temporary water services shall be connected to the temporary watermain for each single residential unit or other building.

Connection to the private plumbing system of a residential unit shall be via a wye at an outside tap or an existing water service as specified in the Contract Documents. The connection of single residential units in series is not permitted. Each temporary water service shall have its own valved connection to the temporary watermain.

Connection to other buildings shall be as specified in the Contract Documents.

An adequate water supply shall be available at all times. If the temporary potable water supply service fails, it shall be restored within the time period specified in the Contract Documents.

Care shall be exercised during the installation of temporary potable water supply services to avoid contamination of the services.

No work shall be done during freezing weather, unless directed by the Contract Administrator. No temporary watermains or temporary water services shall be installed or operated during freezing weather. Pipes already in use shall be removed or drained and existing services restored when so directed by the Contract Administrator.

493.07.02 Temporary Watermains

The temporary watermain shall be of a size to provide adequate water supply during peak demand of connected users.

At any connection of a temporary watermain to the water supply and distribution system (e.g., at hydrants) a double check valve backflow preventer shall be installed. Source connections shall be as specified in the Contract Documents.

493.07.03 Temporary Potable Water Supply Services

Temporary potable water supply services for single residential units shall be a minimum of 19 mm inside diameter. Temporary potable water supply services for other users, including flow to maintain fire protection systems, shall be as specified in the Contract Documents.

The temporary potable water supply service connections shall be valved near the point of connection to the temporary watermain and also valved near the point of connection to a private plumbing system so that both the temporary watermain and the temporary potable water supply services may be disinfected.

493.07.04 Temporary Hydrants

When a hydrant is removed from service, a temporary hydrant and the necessary valves and fittings shall be installed and maintained according to the Contract Documents.

Before permanently shutting down the existing watermain, the temporary hydrants shall be tested to ensure that they are in proper working order.

The hydrants that are out of service during construction operations shall be bagged and clearly marked with a "HYDRANT OUT OF SERVICE" tag.

Once in use, the temporary hydrants shall be maintained until the existing or new hydrants are restored to service.

All temporary potable water supply service attachments to fire hydrants shall be easily removable for fire fighting purposes.

All temporary hydrants shall have reflective tape on the barrel for increased visibility. The temporary hydrants shall stand in an upright position at all times.

493.07.05 Valves

Valves shall be installed at each branch of a temporary watermain.

Before permanently shutting down the existing watermain, the valves shall be tested to ensure that they are in proper working order.

493.07.06 Protection

The Contractor shall provide protection of the temporary potable water supply services at locations such as road crossings, sidewalks, driveways, and walkways.

When temporary watermain crosses over the roadway, the asphalt pavement shall be saw cut and removed and the temporary watermain shall be buried. Under no circumstance is a pipe road crossing to remain open and unprotected from vehicular and pedestrian traffic. If a concrete road base exists, it shall not be disturbed.

When temporary potable water supply services are used on full right-of-way reconstruction projects, the temporary potable water supply service piping shall also be buried at all sidewalks, driveways, and walkways.

When temporary potable water supply services are used on projects when the road surface is not being reconstructed, the temporary service piping shall be buried only at all road crossings. When temporary watermain or temporary potable water supply services cross a driveway or a sidewalk, asphalt or another acceptable material shall be mounded over the pipe. A polyethylene sheet shall be placed as a barrier on concrete or interlocking driveways. If the work performed or material used is not to the satisfaction of the Contract Administrator, action shall be taken to rectify the problem. Safety flashers and barricades, as may be required, shall be furnished and maintained. In general, the temporary potable water supply service pipe shall be laid where it causes the least obstruction and is least likely to be damaged.

The Contractor shall protect the temporary potable water supply services installed across all road crossings, sidewalks, driveways, and walkways during the extent of the construction schedule. This shall include earth excavation, backfill, asphalt reinstatement, and ramping material required as directed by the Contract Administrator.

The Contractor shall provide adequate signage at locations where hoses are exposed and may present a public safety hazard, such as blow off hoses at catchbasins.

493.07.07 Leakage Testing

The temporary potable water supply service shall be watertight.

Leakage testing shall be conducted in the presence of the Contract Administrator upon completion of the watermain, including services. All leaks shall be repaired prior to covering the pipe.

493.07.08 Flushing and Disinfecting Temporary Watermains and Services

Flushing and disinfecting operations shall be conducted in the presence of the Contract Administrator. 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. All temporary watermains and services shall be flushed at a flow velocity adequate to remove any foreign debris and until the discharged water runs clear.

After flushing is completed, water from the existing distribution system shall be allowed to flow at a controlled rate into the new temporary watermain. Liquid chlorine solution shall be introduced so that the chlorine is distributed throughout the section being disinfected at chlorine concentration of 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 in the presence of 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 and ready for operation, the Contract Administrator shall ensure that samples are taken for bacteriological tests. Samples shall be collected from every 350 m of the new watermain plus one sample from each end of each line and at least one sample from each branch. If there is indication of contamination, the disinfection procedure shall be repeated.

The temporary water supply service shall not be put into operation or the existing watermain removed from operation until approval has been given by the Contract Administrator.

Regular sampling and testing for chlorine residual shall be carried out by the Contract Administrator.

493.07.09 Removal of Temporary Potable Water Supply Services

Temporary potable water supply services may be used from approximately mid-April to mid-October. All temporary services shall be completely removed by mid-November. Any variation from this schedule shall be approved by the Contract Administrator.

493.07.10 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 directed to an acceptable outlet in a manner that meets the requirements of all applicable regulations. The method of disposal of chlorinated water is subject to the approval of the Contract Administrator.

493.10 BASIS OF PAYMENT

493.10.01 Temporary Potable Water Supply Services - 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.

On completion of the supply, installation, flushing, disinfecting, and testing of the temporary potable water supply services prior to putting it in operation, a progress payment to 60% of the above item shall be made. The balance shall be prorated over the remainder of the working period.

Removal or draining of the temporary potable water supply services during freezing weather and its subsequent return to service shall be at no additional cost to the Owner.

Appendix 493-A, November 2009
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. (493.05.01)
- Temporary hydrant requirements. (493.05.04)
- Temporary potable water supply services connection requirements to buildings other than single residential units. (493.07.01)
- Time requirements for restoring the temporary potable water supply service should it fail. (493.07.01)
- Temporary potable water supply services to buildings other than single residential units, including flow to maintain fire protection systems. (493.07.03)
- Temporary hydrant and the necessary valves and fittings to be installed and maintained. (493.07.04)

Where conditions of high ground water exist, external fluids may enter via air release and air/vacuum release valves, therefore, appropriate measures shall be taken.

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 1104.030 25 mm Blow Off Installation



CONSTRUCTION SPECIFICATION FOR INSTALLATION OF DUCTS

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603.01 SCOPE

This specification covers the requirements for the installation of flexible ducts, rigid ducts concrete encased, rigid ducts direct buried, rigid ducts by subsurface installation, rigid ducts steel encased by subsurface installation, and surface mounted duct systems. This specification also covers the requirements for rock excavation for all electrical work.

603.01.01 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.

603.01.02

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.

603.02

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 492	Site Restoration Following Installation of Pipelines, Utilities, and Associated Structures
OPSS 501	Compacting
OPSS 610	Removal of Electrical Equipment and Materials
OPSS 905	Steel Reinforcement for Concrete

Ontario Provincial Standard Specifications, Material

OPSS 1004	Aggregates - Miscellaneous
OPSS 1301	Cementing Materials
OPSS 1302	Water
OPSS 1350	Concrete - Materials and Production
OPSS 1359	Unshrinkable Backfill
OPSS 1440	Steel Reinforcement for Concrete
OPSS 1802	Smooth Walled Steel Pipe

CSA Standards

B137.1-13 Polyethylene (PE) Pipe, Tubing, and Fittings for Cold-Water Pressure Services
C22.2 No. 45.1-07 (R2012) Electrical Rigid Metal Conduit - Steel
C22.2 No. 211.1-06 (R2011) Rigid Types EB1 and DB2/ES2 PVC Conduit
C22.2 No. 211.2-06 (R2011) Rigid PVC (Unplasticized) Conduit
C22.2 No. 227.1-06 (R2011) Electrical Nonmetallic Tubing
C22.2 No. 2515-09 (R2014) Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

ASTM International

F 2160-10 Standard Specification for Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter (OD)

Underwriters Laboratories (UL)

UL 651A - 10/26/2011 Type EB and Rigid PVC Conduit and HDPE Conduit

National Electrical Manufacturers Association (NEMA)

TC 7-2013 Smooth Wall Coilable Electrical Polyethylene Conduit

Electrical Safety Authority (ESA)

Ontario Electrical Safety Code - 2012

603.03 DEFINITIONS

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

Electrical Junction Boxes means surface mounted or embedded boxes for use with electrical wirings or devices.

Horizontal Directional Drilling (HDD) means directional boring or guided horizontal boring.

Rock means as defined in OPSS 206.

603.05 MATERIALS

603.05.01 Concrete

Concrete shall be according to OPSS 1350 with a nominal 28-Day compressive strength of 20 MPa.

603.05.02 Steel Reinforcement

Steel reinforcement shall be according to OPSS 1440.

603.05.03 Sand Bedding

Sand bedding shall consist of sand conforming to the gradation requirements of mortar sand according to OPSS 1004.

603.05.04 Fish Line and Trace Wire

Fish line shall be nylon or polypropylene material with a minimum test strength of 400 N. Trace wire shall be minimum #12 AWG copper wire, green insulation.

603.05.05 Steel Liner

Steel liner shall be according to OPSS 1802.

603.05.06 Mortar

Mortar shall consist of a mixture of one part Portland cement according to OPSS 1301 and two parts mortar sand according to OPSS 1004, wetted with sufficient water to make the mixture plastic. Water shall be according to OPSS 1302. Air entrainment shall be 12%.

603.05.07 Unshrinkable Backfill

Unshrinkable backfill shall be according to OPSS 1359.

603.05.08 Ducts and Fittings

Ducts and fittings shall be according to the applicable standards shown in Table 1.

For surface mounted duct systems when runs of ducts exceed 50 m, rigid ducts and fittings shall be of regular wall thickness with watertight reinforced thermosetting resin conduit (RTRC) duct. Hanger support systems shall consist of galvanized steel supports and fibreglass tubular spacers with galvanized steel hardware. Support systems shall allow for multiple sizes of duct in each horizontal layer.

For surface mounted duct systems when runs of ducts are 50 m and under, they shall be rigid polyvinyl chloride (PVC) conduit or rigid galvanized steel conduit.

Ducts for HDD shall be solvent-free, mechanical spline connected with hydraulic seal, and rigid PVC ducts certified to CSA C22.2 No. 211.2.

603.05.09 Marker Tape

Marker tape shall be 75 mm wide polyethylene (PE) or copolymer material, colour red, with repeating black lettering "Caution - Buried Electric Line" or a similar message.

603.05.10 Concrete Anchors

Concrete anchors for surface mounted duct systems shall be of the epoxy resin system type when runs of ducts exceed 50 m. When runs are 50 m or less, the anchors shall be either of the epoxy resin type or metal expansion anchors. Each anchor shall have a minimum pullout strength of 60 kN for an embedment depth of 200 mm or less.

603.07 CONSTRUCTION

603.07.01 General

General requirements for electrical work shall be as specified in the Contract Documents.

Ducts shall be installed as specified in the Contract Documents.

Ducts for communication cables shall be installed in trenches with varying depth so that drainage is provided. A minimum depth of cover of 450 mm may be used in flat terrain in order to ensure that the ducts slope towards a maintenance hole. When the terrain allows natural drainage due to its slope, the depth of cover shall be 550 mm.

Non-metallic ducts installed and used when exposed to direct rays of the sun shall be specifically approved for the purpose and be marked (e.g., "SR," "Outdoor," "RTRC Type AG") according to the Ontario Electrical Safety Code.

Wobble joint fittings with expanded polystyrene bedding shall be installed when direct buried rigid ducts terminate at concrete structures such as electrical maintenance holes, footings, bridge structures, retaining walls, and duct banks.

603.07.02 Protection During Construction

When ducts are installed prior to placing roadbed granular materials, the ducts shall be protected with a minimum cover of 300 mm of compacted backfill material.

603.07.03 Removals

Removals shall be according to OPSS 610.

603.07.04 Locating Existing Ducts

The Contractor shall locate all existing ducts requiring modification or usage.

603.07.05 Excavation

603.07.05.01 General

Trenches shall be excavated to the widths, depths, and alignment as specified in the Contract Documents. Such dimensions may be adjusted to obtain proper clearances with Utilities or other works.

The trench bottom shall be free of sharp rock fragments or debris and uniformly graded to support the ducts.

603.07.05.02 Earth Excavation

When unsuitable earth material is encountered in the trench bottom, it shall be removed and replaced with suitable material, as directed by the Contract Administrator.

The trench bottom shall be undisturbed earth or suitable imported material compacted according to OPSS 501.

When trenches are to be constructed prior to the completion of final grades, the Contractor may excavate trenches to give a minimum temporary cover of 300 mm for the ducts.

603.07.05.03 Rock Excavation for Electrical Installations

Rock excavation for the installation of ducts shall be according to OPSS 206.

603.07.06 Flexible Ducts

Flexible ducts shall be laid loosely in the trench to allow for expansion and contraction. Ducts shall be installed free of kinks or flattening and without sharp objects in the trench.

Couplings used for flexible ducts made of PE shall be PVC serrated couplings or shall consist of a 450 mm piece of the duct, one size larger than the flexible duct, slotted, and centred over the butted joint and securely fastened using stainless steel strapping. When PE pipe is used, pulling points for cable shall be similarly constructed.

For the PE flexible ducts for communication fibre-optic cable, installation of runs between maintenance holes up to 120 m in length shall be done with a single run of non-spliced duct. For runs up to 240 m in length, one splice is allowed. For runs exceeding 240 m, one splice per 120 m maximum is allowed. Such duct splices shall be fully waterproofed using silicon sealant and plasticized waterproofing sealant and shall be inspected by the Contract Administrator prior to backfilling.

Couplings used for flexible ducts made of electrical non-metallic tubing (ENT) shall be according to manufacturer's drawings or instructions. When ENTs are used, pulling points for cable shall be at the electrical chambers.

High density polyethylene (HDPE) couplings shall be used for HDPE duct and shall be according to manufacturer's drawings or instructions. When HDPE ducts are used, pulling points for cable shall be at the electrical chambers.

Flexible ducts shall be installed so that stacking or crossovers within the trench are not required, except for the purpose of entering concrete encased rigid ducts or electrical chamber sleeves.

Flexible ducts shall be installed within all underpavement crossings not having an electrical chamber on each end.

At direct buried poles, flexible ducts shall be inserted into the wiring aperture and turned up to within 450 mm of the pole handhole.

At concrete footings for base mounted poles, flexible ducts shall be inserted through the sleeves to at least 750 mm above the foundation.

At entries to pad mounted substations and to pad mounted traffic signal controllers, flexible ducts shall be installed within the sleeves and cut off flush with the top of the sleeves. The void between the duct and the sleeve shall be sealed with an electrical sealant for pad mounted controllers.

When it is required to join flexible ducts with rigid ducts, serrated adapter couplings shall be installed.

When flexible ducts are brought into electrical chambers, the ducts shall remain free in the entry holes of handholes and grouted into entry holes of maintenance holes.

When flexible ducts are specified in the Contract Documents, the Contractor shall have the option of using rigid ducts of the same inside diameter.

603.07.07 Rigid Ducts, Concrete Encased

Plastic spacers, suitable to the size and type of ducts and the duct separation specified in the Contract Documents, shall be installed along the trench bottom at 1.5 m maximum intervals. When transitions in grade are required, the trench bottom shall be adjusted to allow the spacers to seat firmly and hold any required duct bends.

Steel reinforcement shall be installed according to OPSS 905. Rods shall overlap by at least 60 mm and shall be tied to the plastic spacers. Lengths of duct shall be connected using couplings suitable to the size and type of duct. Couplings shall be staggered to obtain a minimum of 50 mm clearance between ducts or couplings. Ducts shall be tied to the spacers. The assembly shall be anchored securely to prevent shifting during placing of concrete.

Concrete may be poured directly into the trench or form work installed along the sides of the duct bank. The method of transporting, placing, and consolidating the concrete shall be such as to prevent segregation. Concrete placing and transporting devices shall not be supported by the steel reinforcement. Concrete shall be deposited within 1.5 m of its final position. Chutes shall have sufficient slope to deliver concrete of the approved consistency and shall have a maximum length of 15 m. When concrete is to be dropped more than 1.5 m, fully enclosed vertical drop chutes extending to the point of deposit shall be used. Concrete shall be placed at a steady rate such that a monolithic concrete is obtained without the formation of cold joints. The finish shall be raked or trimmed to produce a flat surface.

Rigid ducts shall be installed with a minimum slope of 400H:1V. Where deviations in vertical grade are required to avoid Utilities or other works, ducts shall be installed so that water cannot accumulate in the ducts.

Except where connections to electrical maintenance holes are required, rigid ducts and casing crossing paved areas shall extend 1.0 m beyond the back face of the curb or to the back edge of the shoulder.

When it is required to install transition sections between different types of rigid duct installations, the Contractor shall use deflection couplings or bend the ducts as required over a maximum of two standard duct lengths to obtain the required configuration.

603.07.08 Rigid Ducts, Direct Buried

The trench bottom shall be shaped and uniformly graded to support the entire duct. Lengths of duct shall be connected using couplings suitable to the size and type of duct supplied.

603.07.09 Flexible and Rigid Ducts by Subsurface Installation

Pits required for subsurface installation operations shall be set back a minimum distance from the edge of pavement or back of curb so that excavation is not done within a 1H:1V slope from the edge of pavement or back of curb to the bottom of the pit.

Bore holes shall only be 50 mm larger in diameter than the rigid duct being installed. When rigid ducts are being installed using the push-pull method, the steel rod shall be accurately aligned and pushed through the target pit. The push cap shall be replaced by a suitably sized expander unit and pulled back to the operating pit.

Lengths of duct shall be connected using couplings suitable to the size and type of duct supplied.

All temporary piling or supports used for boring or jacking equipment shall be removed or cut off to a minimum of 1.0 m below finished grade. All excavations or holes shall be backfilled and all temporary fill shall be removed.

When steel encasements are being installed using the boring and jacking method, the steel encasement shall be advanced so that the bore hole wall is supported by the steel encasement to within 300 mm of the head of the auger.

For HDD method, no drilling pit is required. Installation shall be according to the HDD machinery and duct manufacturers' guidelines and recommendations.

603.07.10 Surface Mounted Duct Systems

The Contractor shall not drill through bridge reinforcing steel. The Contractor shall locate reinforcing steel with a cover meter and position anchors accordingly.

For surface mounted duct systems, when the runs exceed 50 m horizontally:

- a) The installation of the support systems and ducts shall be carried out according to the duct manufacturer's installation procedures.
- b) Rigid ducts shall be installed parallel to the structural surfaces, either horizontally or vertically, using offset bends or fittings where changes in alignment are necessary.

For surface mounted duct systems, when runs are 50 m or less horizontally:

- a) Conduit fittings and junction boxes shall be installed in neat straight lines in the locations specified in the Contract Documents
- b) Rigid conduits shall be installed parallel to the structural surfaces, either horizontally or vertically, using offset bends or fittings where changes in alignment are necessary.

Appropriate fittings and deflection couplings shall be used for the installation. PVC boxes shall be mounted to provide the least interference with at least two stainless steel bolts and expansion anchors. Duct connection shall be cemented to the PVC box adapters.

Conduits shall be secured at intervals using conduit straps according to the Ontario Electrical Safety Code.

Conduit straps and junction boxes shall be fastened to concrete surfaces by drilling and inserting concrete anchors and securing the equipment with stainless steel bolts.

Conduit straps and junction boxes shall be fastened to steel structural members using stainless steel hardware.

603.07.11 Utility Clearance

When Utilities interfere with the specified elevation of any ducts, the Contractor shall notify the Contract Administrator to arrange inspection of the crossing point. The Contractor shall adjust the location of the ducts to obtain the clearance required and shall construct any concrete saddle or alternative protection approved by the Utility company.

603.07.12 Breaking Into Concrete Structures

When specified in the Contract Documents, the Contractor shall break into existing electrical chambers and existing substation or controller pads for installing ducts.

The space between the duct and the opening shall be filled with mortar.

603.07.13 Extension of Existing Duct Bank

Extension of existing duct banks shall be as specified in the Contract Documents.

603.07.14 Cable and Duct Protection and Marking

The Contractor shall install cable bricks or concrete protection at locations specified in the Contract Documents. Marker tape shall be installed along the centreline of the trench approximately 250 mm below finished grade or asphalt or concrete surfaces.

Cable brick shall be seated on uniformly graded and compacted material and butted end to end. Multiple rows of bricks shall be installed in trenches with direct buried high-voltage cables and when the width of the trench exceeds 300 mm.

Concrete protection shall be poured on uniformly graded and compacted material occupying the full width of the excavated trench to a minimum depth of 50 mm.

603.07.15 Termination

All ducts shall be temporarily plugged or sealed until wiring is installed. All ducts with wiring installed that terminate in traffic signal control cabinets, Advanced Traffic Management Systems (ATMS) control cabinets, or distribution assemblies shall be sealed.

When ducts are specified in the Contract Documents as spare or intended for future use, the duct ends shall be plugged with plastic plugs.

603.07.16 Backfilling

Except when unshrinkable backfill is used, backfilling shall be according to OPSS 401. Backfill material containing rock fragments and stone larger than 50 mm in diameter shall not be placed within 300 mm of the duct.

Sand bedding shall be placed in trenches for flexible duct when the trench bottom contains sharp rock fragments and when crossover of flexible ducts is required.

Backfill for concrete encased rigid ducts shall be placed at least 24 hours after pouring concrete.

Unshrinkable or granular backfill in trench for rigid ducts crossing paved areas shall extend to the wall of maintenance hole when maintenance holes are required; otherwise, 1.0 m beyond the back face of curb or, when there is no curb, to the back edge of shoulder.

603.07.17 End Marking

The location of the ends of all ducts not terminating in electrical chambers or pole foundations shall be marked by a concrete marker that is flush with the finished grade and located 300 mm beyond the shoulder edge or by a 50 x 50 mm cut cross on curbs, sidewalks, or barriers. The marker shall have an impressed arrow indicating the position of the ducts.

Concrete 400 x 300 x 50 mm markers shall be installed over runs of ducts for communication cables deviating from a straight line. A marker shall be installed wherever a tangent section meets a circular section. When the circular section is more than 20 m in length, an intermediate marker shall be installed.

Concrete markers shall be installed within 72 hours of backfilling of the trench.

603.07.18 Fish Line and Trace Wire

Fish line and trace wire shall be installed in all ducts specified in the Contract Documents as being spare or intended for future use. A 1.5 m length of fish line and trace wire shall extend out of each end of the duct beside the plastic plug, remain coiled, and tied in an accessible location.

603.07.19 Quality Control

603.07.19.01 Pre-Installation Testing and Inspection

All ducts shall be inspected to ensure that they are as specified in the Contract Documents.

All ducts shall be inspected to ensure they are stamped with the appropriate CSA designation, strength, and type. During installation, all ducts shall be inspected to ensure they are properly bedded, have sufficient depth of cover, and are coupled or connected to electrical chambers, poles, or other devices as specified in the Contract Documents.

603.07.19.02 Proof of Performance Testing and Inspection

All ducts shall be inspected and tested to ensure that they are as specified in the Contract Documents. All ducts shall be tested to ensure that they are free of debris, water, breakage, or distortion.

603.07.20 Temporary Electrical Work

The work for temporary electrical installations shall be the same as for permanent installations of the same type of work, except that the work shall include the removal of the installations when they are no longer required.

603.07.21 Site Restoration

Site restoration shall be according to OPSS 492.

603.07.22 Management of Excess Material

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

603.08 QUALITY ASSURANCE

The Owner may perform field tests required for concrete according to OPSS 1350.

The Owner may perform tests for compaction according to OPSS 501.

603.09 MEASUREMENT FOR PAYMENT

603.09.01 Actual Measurement

603.09.01.01 Flexible Ducts Rigid Ducts, Concrete Encased Rigid Ducts, Direct Buried Rigid Ducts by Subsurface Installation Rigid Ducts, Steel Encased by Subsurface Installation Flexible Ducts by Subsurface Installation

Measurement of ducts shall be by length in metres horizontally along the longitudinal axis of the duct or trench; from centre to centre of poles, pole footings, electrical chambers, junction boxes, sign footings, and traffic signal controller cabinet pads; and to the face of bridge structures, retaining walls, and substation pads.

603.09.01.02 Rock Excavation for Electrical Installations

Measurement of rock excavation shall be by volume in cubic metres based on the quantity of rock below the upper limit and within the theoretical lines specified in the Contract Documents. The upper limit is the existing rock surface as measured after removal of overburden, but prior to rock excavation or the lowest elevation of all other excavation specified in the Contract Document, whichever is lower.

The volume of boulders in an excavation shall be based on 3 maximum rectilinear dimensions. When boulders classified as rock are measured for payment, only the amount 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.

603.09.01.03 Surface Mounted Duct Systems

Measurement of surface mounted duct systems shall be by length in metres horizontally along the duct, without deductions for junction boxes, from one point of attachment to other points of attachment.

603.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurements.

603.10 BASIS OF PAYMENT

**603.10.01 Flexible Ducts - Item
Rigid Ducts, Concrete Encased - Item
Rigid Ducts, Direct Buried - Item
Rigid Ducts by Subsurface Installation - Item
Rigid Ducts, Steel Encased by Subsurface Installation - Item
Rock Excavation for Electrical Installation - Item
Surface Mounted Duct Systems - Item
Flexible Ducts by Subsurface Installation - 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.

If the Contractor chooses to substitute flexible ducts with rigid ducts, payment for those rigid ducts shall be at the unit price bid for the tender item Flexible Ducts.

When drilling and blasting are required as a part of the work, progress payment shall be made according to OPSS 206.

The work of providing clearance for required Utility crossing shall be administered as Change in the Work.

**603.10.02 Flexible Ducts, Temporary - Item
Rigid Ducts, Concrete Encased, Temporary - Item
Rigid Ducts, Direct Buried, Temporary - Item
Rigid Ducts by Subsurface Installation, Temporary - Item
Rigid Ducts, Steel Encased by Subsurface Installation, Temporary - Item
Surface Mounted Duct Systems, Temporary - Item
Flexible Ducts by Subsurface Installation, Temporary - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Materials to do the work.

Progress payment for temporary installation of the above tender items shall be based on the following percentages of the Contract price:

80% for supply and installation

20% for removal

TABLE 1
Ducts and Fittings

Duct and Fitting Description	Type	Direct Buried	Concrete Encased	Subsurface Installation		Embedded Work	Surface Mounted	Standard
				In Ground	In Liner			
PE	Flexible	X	-	-	-	-	-	CSA B137.1 Series 75
ENT	Flexible	X	X	X	X	X	-	CAN/CSA C22.2 No. 227.1
HDPE	Flexible	X	-	X (Note 1)	-	-	-	UL 651A; ASTM F 2160, Schedule 40; and NEMA TC 7 for type EPEC
PVC	Rigid	X	X	X	X	X	X	CSA C22.2 No. 211.2
Polymeric PVC	Rigid	-	X Type DB2	-	-	X Type DB2	-	CSA C22.2 No. 211.1
RTRC	Rigid	X standard or heavy wall (Note 2)	X standard or heavy wall	X standard or heavy wall (Note 2)	X standard or heavy wall	X standard or heavy wall	X standard or heavy wall	CSA C22.2 No. 2515
Galvanized Steel	Rigid	X	-	X	X	-	X	CSA C22.2 No. 45.1
Notes: 1. HDPE duct may be used for subsurface installation for extra low-voltage cables only when ducts are 50 mm diameter or smaller. 2. Heavy wall shall be used when ducts are 100 mm diameter or greater.								

Appendix 603-A, November 2015 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 specify the following the Contract Documents:

- Duct locations and other installation requirements. (603.07.01)
- Trench widths, depths, and alignment. (603.07.05.01)
- Conduit fitting and junction box locations. (603.07.10)
- Duct break-in locations. (603.07.12)
- Existing duct bank locations requiring extension. (603.07.13)
- Cable brick or concrete protection locations. (603.07.14)
- Ducts as spare or future use. (603.07.15)

The designer should determine if the following is required and, if so, specify it in the Contract Documents:

- Need to break into existing electrical chambers and substation or controller pads. (603.07.12)

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 2100.050	Cable and Duct Protection and Marking
OPSD 2100.06	Rigid Ducts Encased in Concrete
OPSD 2101.01	Duct Installation in Trenches
OPSD 2101.020	Extension of Existing Rigid Ducts Encased in Concrete
OPSD 2102.01	Underground Rigid Duct Connection at Concrete Structure
OPSD 2103.01	Rigid Duct Termination for High Voltage Cables at Utility Poles
OPSD 2103.02	Duct Installation Profiles
OPSD 2103.030	Duct Installation in Existing Paved Area, Unshrinkable Backfill Method
OPSD 2103.04	Rigid Duct Installation in Existing Paved Area, Granular Backfill Method
OPSD 2103.05	Duct Installation at Utility Crossings
OPSD 2103.06	Augering Pits for Subsurface Installation of Ducts and Encasements
OPSD 2104.01	RE Ducts Surface Mounted on Structures
OPSD 2123.01	Electrical Maintenance Holes, Entry of Direct Buried Ducts
OPSD 2123.02	Electrical Maintenance Holes, Entry of Encased Ducts
OPSD 2123.03	Electrical Handholes, Entry of Direct Buried and Encased Ducts
OPSD 2126.010	Distribution Assembly, Concrete Pad and Ducts, Plan and Section A-A
OPSD 2126.020	Distribution Assembly, Concrete Pad and Ducts, Section B-B



**CONSTRUCTION SPECIFICATION FOR
CONCRETE FOOTINGS AND MAINTENANCE PLATFORMS
FOR HIGH MAST LIGHTING POLES**

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631.01 SCOPE

This specification covers the requirements for the installation of concrete footings and maintenance platforms for high mast lighting poles.

631.01.01 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.

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.

631.02**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 501	Compacting
OPSS 603	Installation of Ducts
OPSS 609	Grounding
OPSS 903	Deep Foundations
OPSS 904	Concrete Structures
OPSS 905	Steel Reinforcement for Concrete
OPSS 906	Structural Steel for Bridges

Ontario Provincial Standard Specifications, Material

OPSS 1010	Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1202	Bearings - Elastomeric Plain and Steel Laminated
OPSS 1350	Concrete - Materials and Production
OPSS 1440	Steel Reinforcement for Concrete
OPSS 1801	Corrugated Steel Pipe (CSP) Products
OPSS 2474	Anchorage Assembly - High Mast Lighting Pole

631.03 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.

Earth means as defined in OPSS 206.

Quality Verification Engineer (QVE) means an Engineer retained by the Contractor qualified to provide the services specified in the Contract Documents.

631.05 MATERIALS

631.05.01 Concrete

Concrete shall be according to OPSS 1350 with a nominal minimum 28-Day compressive strength of 30 MPa.

631.05.02 Steel Reinforcement

Steel reinforcement shall be according to OPSS 1440.

631.05.03 Structural Steel

Structural steel shall be according to OPSS 906.

631.05.04 Corrugated Steel Pipe

Corrugated steel pipe shall be according to OPSS 1801 and as specified in the Contract Documents.

631.05.05 Neoprene Pad

Neoprene pad shall be according to the plain bearing requirements specified OPSS 1202.

631.05.06 Granular A

Granular A shall be according to OPSS 1010.

631.05.07 Sleeves and Ducts

Sleeves and ducts shall be according to OPSS 603.

631.05.08 Anchorage Assemblies

Anchorage assemblies shall be according to OPSS 2474.

631.07 CONSTRUCTION

631.07.01 General

General requirements for electrical work shall be as specified in the Contract Documents.

Concrete footings and maintenance platforms for high mast lighting poles shall be as specified in the Contract Documents.

631.07.02 Concrete Footings for High Mast Lighting Poles

631.07.02.01 Earth Excavation

Excavation of the pole base shall be to the neat lines and grades specified in the Contract Documents. When additional excavation beyond the neat limits is required, such excavation shall be a minimum of 300 mm beyond the neat dimensions of the footing to accommodate backfill.

The Contractor is responsible for constructing excavations without disturbing the sides or bases of the excavation.

When rock is encountered, the earth excavation shall be widened to the dimensions suitable for rock excavation or rock drilling operations. Rock excavation shall be according to OPSS 603.

631.07.02.02 Caisson Pile

Caisson piles shall be as specified in the Contract Documents and placed according to OPSS 903.

The base of the caisson or shallow foundation shall be cleaned of loosened or softened materials or both and inspected prior to pouring concrete. Complete documentation of the inspection and installation of each caisson shall be maintained and submitted to the Contract Administrator.

631.07.02.03 Steel Reinforcement

Steel reinforcement shall be placed according to OPSS 905.

631.07.02.04 Anchorage Assemblies

Anchorage assemblies of the size, diameter, length, and type specified in the Contract Documents shall be positioned in footings to obtain the proper position and handhole orientation.

Anchorage assemblies shall be securely tied to the steel reinforcement and provided with supports to maintain the position of the anchorage assembly during the placing of concrete. The anchorage assembly shall not be welded to the steel reinforcement.

The anchorage setting templates shall remain in place until immediately prior to the installation of the poles.

631.07.02.05 Sleeves and Ducts

Sleeves and ducts for footings shall be located to suit incoming duct or cable systems and shall be securely tied to the steel reinforcement and supported prior to the placing of concrete.

The number of sleeves shall be as specified in the Contract Documents.

Sleeves shall be cut off cleanly above the footing to a minimum of 150 mm above the pole base plate.

Sleeves shall be temporarily plugged or sealed until wiring is installed.

631.07.02.06 Concrete

Concrete shall be placed according to OPSS 904, except as noted herein.

In earth, concrete may be placed directly against the undisturbed earth or may be formed in place such that a minimum of 300 mm all around the footing is available for the placing of granular backfill. The upper portion of the footing shall be formed to a minimum of 150 mm below grade level. Formwork shall be removed to a minimum depth of 150 mm below finished grade prior to placing granular backfill.

In rock, concrete shall be placed directly against the excavated rock surfaces. Portions of footings in earth above the top of the rock surface shall be formed as noted in the previous paragraph.

Prior to the installation of the pole, the concrete shall have reached the minimum strength specified in the Contract Documents.

Concrete for the high mast lighting pole footings shall be cured according to OPSS 904, except as noted herein.

- a) Wet burlap shall be applied to the top surface of the footing immediately after completion of the finishing operation without damaging or marring the surface of the concrete and shall be kept wet during the curing period.
- b) When white pigmented membrane is used as a curing compound on adjacent concrete barrier wall, a minimum of one coat of the curing compound shall be applied to the concrete footing immediately after completion of the curing cycle for the footing. Additional curing compound shall be applied as necessary to ensure colour uniformity with the adjacent concrete barrier wall.
- c) The curing compound shall only be used on the exposed final surfaces of the footing. Curing compound shall not be applied to construction joints.

631.07.02.07 Granular Backfill

Granular A backfill shall be placed around footings in earth and compacted according to OPSS 501.

631.07.02.08 Granular Apron

A granular apron consisting of Granular A shall be placed around each high mast lighting pole footing as specified in the Contract Documents.

631.07.02.09 Grading

Earth grading around the high mast lighting pole footings shall be as specified in the Contract Documents and OPSS 206.

631.07.03 Maintenance Platforms for High Mast Lighting Poles

631.07.03.01 Neoprene Pad

The size of the neoprene pad shall be as specified in the Contract Documents.

631.07.03.02 Fabrication, Delivery, and Installation

Fabrication, delivery, and installation of the platform and railing shall be according to OPSS 906 and the Contract Documents.

631.07.03.03 Grounding

Grounding shall be according to OPSS 609.

631.07.03.04 Mechanical Concrete Anchors

Mechanical concrete anchors shall be installed in accordance with the manufacturer's recommendations.

631.07.04 Quality Control

631.07.04.01 Submission of 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 that the following are in general conformance with the requirements of the Contract Documents:

- a) Work
- b) Material and installations
- c) Inspection, testing, and test results

The Certificate of Conformance shall include that:

- a) The excavation was carried out without causing instability to the base and walls of the excavation.
- b) The base of the caisson or shallow concrete foundation was cleaned of loosened or softened material or both prior to placing concrete.
- c) The anchorage assemblies, sleeves, and ducts were properly placed in the centre of the concrete footings within a 15 mm tolerance.
- d) The placement of concrete was completed according to OPSS 904.

631.07.05 Management of Excess Material

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

631.09 MEASUREMENT FOR PAYMENT

631.09.01 Actual Measurement

631.09.01.01 Concrete Footings for High Mast Lighting Poles

For payment purposes, a count shall be made of the number of concrete footings for high mast lighting poles installed.

631.09.01.02 Maintenance Platform for High Mast Lighting Poles

For payment purposes, a count shall be made of the number of maintenance platforms for high mast lighting poles installed.

631.09.02 Plan Quantity Measurement

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

631.10 BASIS OF PAYMENT

**631.10.01 Concrete Footings for High Mast Lighting Poles - Item
Maintenance Platform for High Mast Lighting Poles - 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.

631.10.02 Rock Excavation for Electrical Installation

Payment for rock excavation for electrical installation shall be according to OPSS 603.

Appendix 631-A, November 2015 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 specify the following in the Contract Documents:

- Pole base excavation lines and grades. (631.07.02.01)
- Caisson pile requirements. (631.07.02.02)
- Anchorage assembly size, diameter, length, and type. (631.07.02.04)
- Number of sleeves into the pole bases. (631.07.02.05)
- Minimum concrete strength for pole installation. (631.07.02.06)
- Grading around pole footing requirements. (631.07.02.09)
- Maintenance platform requirements. (631.07.03)

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 2210.030	High Mast Lighting Pole, Apron
OPSD 2218.010	High Mast Lighting Pole Anchorage Assembly Placement
OPSD 2456.010	High Mast Lighting Pole Anchorage Assembly Details for Double Base Plate
OPSD 2456.011	High Mast Lighting Pole Anchorage Assembly Details



CONSTRUCTION SPECIFICATION FOR MODIFIED OVERHEAD SIGNBOARDS

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707.09	MEASUREMENT FOR PAYMENT
707.10	BASIS OF PAYMENT

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707.01 SCOPE

This specification covers the requirements for the installation of new overlay signboards on existing overhead extruded signboards.

707.01.01 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.

707.01.02 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.

707.02 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 Ministry of Transportation Publications

Ontario Traffic Manual (OTM)
Sign Support Manual

707.07 CONSTRUCTION

707.07.01 General

All existing overlay signboard panels shall be removed by drilling out all pop rivets used to fasten it to the extruded sign.

New overlay signboard panels shall be installed according to the sign details.

Aluminum pop rivets, 1/8" X 7/16", shall be used to install the overlay panel directly on top of the existing extruded sign. The rivets shall be spaced around the perimeter of each overlay panel 25 mm (1") from the edge of the panel at 150 mm (6") centre to centre spacing.

Inside each 1220 mm (4') panel, 6 aluminum pop rivets shall be inserted equally spaced 610 mm (24") from the edge of the panel. Inside each 914 mm (3') panel, 6 aluminum pop rivets shall be inserted equally spaced 450 mm (18") from the edge of the panel. If the panel is over 1830 mm (6') in height, 6 pop rivets shall be installed equally spaced 450 mm (18") from the edge of the panel.

To ensure panels do not peel, ¼ " stainless steel self-tapping screws shall be attached to the corners of all overlay panels, regardless of size.

707.07.02 Sign Ordering

The following shall be submitted to the Contract Administrator a minimum of 12 weeks prior to the installation date:

- a) List of all required overlay signboards,
- b) Sign details for the overlay signboards, and
- c) Date for pick-up.

707.07.03 Sign Pick up

All ordered signboards shall be picked up at the location specified in the "Schedule of Materials to be Supplied by the Owner" within 10 Business Days of receiving notice from the Contract Administrator that the signs are ready for pick up.

707.07.04 Management of Excess Material

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

707.09 MEASUREMENT FOR PAYMENT

707.09.01 Actual Measurement

707.09.01.01 Modified Overhead Signboards

For measurement purposes, a count shall be made of each modified signboard installed.

707.09.02 Plan Quantity Measurement

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

707.10 BASIS OF PAYMENT

707.10.01 Modified Overhead Signboards - 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 707, November 2015
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 SODDING

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803.09	MEASUREMENT FOR PAYMENT
803.10	BASIS OF PAYMENT

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803-A	Commentary
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803.01 SCOPE

This specification covers the requirements for sodding.

803.01.01 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.

803.01.02

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.

803.02

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 802 Topsoil

Nursery Sod Growers Association of Ontario

Specifications, Classifications and Use of Turfgrass Sod for Ontario

Federal Statute

Fertilizers Act (R.S., 1985, c. F-10)

803.05 MATERIALS

803.05.01 Sod

Sod shall be a Commercial Grade Turfgrass Nursery Sod, either Kentucky Bluegrass or Kentucky Bluegrass/Fine Fescue as specified in the Contract Documents and according to the Specifications, Classifications and Use of Turfgrass Sod for Ontario.

Sod shall be seeded and established in nursery sod fields as a turfgrass sod. Sod shall be uniform in texture, and in good healthy condition with no sign of decay. There shall be no more than 5 broadleaf weeds per 40 m² of sod and up to 20% non-specified grass seed. Sod shall be of sufficient density that no surface soil is visible. The grass height shall be 30 mm minimum and 70 mm maximum.

The soil portion of the sod shall be a good mineral type soil with a thickness of 10 mm minimum and 15 mm maximum. Each sod piece shall be well permeated with roots. Individual sod pieces shall be in such condition so that each may be lifted, rolled, transported, and placed without breaking or tearing and without loss of soil under normal handling conditions.

Sod shall contain sufficient moisture to maintain its vitality during transportation and placement.

803.05.02 Stakes

Stakes for fastening sod to the earth grade shall be a minimum 150 mm in length.

803.05.03 Fertilizer

Fertilizer shall be according to the Canada Fertilizers Act. Fertilizer shall be supplied in bags bearing the manufacturer's label indicating net weight and guaranteed analysis.

Fertilizer shall be in granular form, dry, free flowing without lumps. Fertilizer shall be supplied with a minimum analysis of 16% nitrogen, 3% phosphorus, and 15% potash. The guaranteed analysis ratio shall be 3-1-2.

The total nitrogen component of the fertilizer shall be a minimum 30% water insoluble nitrogen (controlled, slow release nitrogen) by weight.

803.05.04 Water

Water shall not have contaminants or impurities that would adversely affect the germination and growth of vegetation.

803.07 CONSTRUCTION

803.07.01 Operational Constraints

Sodding shall not commence until the surface preparation has been approved in writing by the Contract Administrator.

Sodding shall commence within 7 Days of surface preparation.

The Contractor shall maintain the surface and control erosion until the sod is in place.

Sod shall not be placed when in a frozen condition, under adverse field conditions such as high wind, frozen soil or soil covered with snow, ice, or standing water.

803.07.02 Surface Preparation for Sodding

Where topsoil is specified, it shall be according to OPSS 802.

At the time of sodding, all surface areas designated for sodding shall be free of erosion and shall have a fine graded uniform surface. The surface shall be uniformly cultivated to a minimum depth of 50 mm and shall not have surface materials greater than 25 mm in size, such as stones and clods and weeds or other unwanted vegetation.

Surface litter and debris shall be removed immediately prior to sod placement.

803.07.03 Fertilizer Application

Fertilizer shall be applied uniformly to the surface area designated for sodding, a maximum of 48 hours prior to sod placement, at the rate specified on its bag by the manufacturer.

803.07.04 Placement of Sod

Sod shall be placed in locations and as specified in the Contract Documents. Voids shall not be left between the soil portion of the sod and the underlying ground surface. Sod shall be securely placed lengthwise across the face of slopes and parallel to the centreline of ditches. End joints of adjacent sod pieces shall be staggered. The edges of adjacent sod pieces shall be placed tightly against one another without overlapping. Sod shall be countersunk to existing grade level at all edges. Joints shall be tamped to a uniform surface. Sod shall be placed up to the subgrade elevation on the roadway front slope. Where required, sod should be staked to the grade to avoid movement.

Sod shall not be separated from its mineral soil base and not damaged during transportation, handling, and placement.

803.07.05 Maintenance of Completed Sodding

Sod shall be maintained for 30 Days following completion of placement. During this period, the placed sod shall be kept healthy, actively growing, and green in leaf colour. This requirement shall be suspended during the winter dormant period shown in Table 1.

803.07.06 Management of Excess Material

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

803.08 QUALITY ASSURANCE

803.08.01 Performance Measure

At the end of the 30-Day maintenance period, the Contract Administrator shall make an inspection of all placed sod. The condition of the sod shall be as specified in the Maintenance of Completed Sodding subsection. The sod shall be in the same location as originally placed and shall not have moved, eroded, slipped, or sloughed. Sod shall show evidence of rooting into the underlying soil. The sod shall be of sufficient density that no surface soil is visible and there shall be no competitive growth, beyond that specified in the Sod subsection, emerging from the sod or from between the sod joints.

803.08.02 Acceptance

When the work does not meet the requirements specified herein, the Contract Administrator shall notify the Contractor in writing, and the Contractor shall re-apply the specified materials according to this specification within 14 Days of receiving the notification.

The Contractor shall maintain the site and control erosion as specified in this specification until the sod has been replaced.

Replaced sod shall be subject to the requirements specified herein and to a further maintenance period of 30 Days.

803.09 MEASUREMENT FOR PAYMENT

803.09.01 Actual Measurement

803.09.01.01 Sod

Measurement shall be by area in square metres following the contours of the ground.

803.09.01.02 Plan Quantity Payment

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

803.10 BASIS OF PAYMENT

803.10.01 Sod - 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
Winter Dormant Period

SOUTHWESTERN ONTARIO	SOUTHERN ONTARIO	NORTHERN ONTARIO
That area of Ontario south of a line joining Grand Bend and Clarkson	That area of Ontario between the northern and southern boundaries of Southwestern Ontario and Northern Ontario respectively	That area of Ontario north of a line joining Waubesaushene, Severn Bridge, Bancroft and Ottawa
Nov 15 to April 15 inclusive	Nov 1 to April 30 inclusive	Oct 15 to May 15 inclusive

Appendix 803-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 should specify the following in the Contract Documents:

- The use of either Kentucky Bluegrass sod or a Kentucky Bluegrass/Fine Fescue sod. (803.05.01)
- Location of sod. (803.07.04)

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

None



CONSTRUCTION SPECIFICATION FOR TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

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805-A	Commentary
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805.01 SCOPE

This specification describes the requirements for the installation, maintenance, and removal of temporary erosion and sediment control measures.

805.01.01 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.

805.01.02

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.

805.02

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 518	Control of Water from Dewatering Operations
OPSS 804	Seed and Cover

Ontario Provincial Standard Specifications, Material

OPSS 1004	Aggregates - Miscellaneous
OPSS 1801	Corrugated Steel Pipe Products
OPSS 1840	Non-Pressure Polyethylene Plastic Pipe Products
OPSS 1860	Geotextiles

Canadian and Provincial Statutes

Ontario Water Resources Act, R.S.O. 1990, c. 0.40

Canadian General Standards Board (CGSB)

148.1 No 7.3-92	Methods of Testing Geosynthetics and Geomembranes - Grab Tensile Test for Geotextiles
148.1 No 10-94	Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size

805.03 DEFINITIONS

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

Diversion Ditch means a temporary channel to intercept and convey overland flow away from areas of disturbed or erodible soil and to minimize erosion of slopes from sheet flow.

Earth means as defined in OPSS 206.

Erosion means the physical removal or detachment of soil particles from an earth surface, followed by the transport of detached particles to another location by the action of a mobile agent including rain, flowing water, wind, equipment and vehicles.

Fibre Roll means an assembled or commercially available flexible, tubular structure that provides sediment control and may provide run-off filtration and includes wattles, filter socks and filter berms.

High Water Level means the highest point on the bank or floodplain of a waterbody where the water level reaches during high flow events or periods.

Riparian Vegetation means vegetation within 30 m of a waterbody.

Sediment means soil particles detached from an earth surface by erosion.

Waterbody means 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.

Waterbody Bank means the slope on or adjacent to a waterbody from the normal water level to the top of slope.

Watercourse means a stream, creek, river, or channel including ditches, in which the flow of water is permanent, intermittent, or temporary.

805.05 MATERIALS

805.05.01 Straw and Straw Bales

Straw shall be either wheat or oat straw.

Straw bales shall be dry and firm, be tied tightly in at least two places, show no evidence of straw or tie decay, and be free of sediment. They shall be of agricultural, rectangular formation and dimensions, as specified in the Contract Documents.

805.05.02 Geosynthetics

805.05.02.01 Geotextile

Geotextile shall be free of holes, tears, and punctures.

805.05.02.02 Silt Fence Geotextile

Geotextile for silt fence shall be according to OPSS 1860, Table 3.

Geotextile for silt fence may be separate from the stakes used to install it as a sediment barrier.

805.05.02.03 Berm Barrier and Rock Flow Check Dam Geotextile

Geotextile for berm barriers and rock flow check dams shall be a woven, Class II geotextile according to OPSS 1860. The filtration opening size (FOS) shall be no greater than 300 µm.

805.05.02.04 Turbidity Curtain Geosynthetic

Turbidity curtain geosynthetics shall have a grab tensile strength of at least 990 N, meeting CAN/CGSB 148.1, No. 7.3 and be one of geotextile or geomembrane.

Geotextile shall be a woven material. The filtration opening size (FOS) shall be no greater than 300 µm, meeting CAN/CGSB 148.1, No. 10.

Geomembrane shall be a low-permeability synthetic material or a geotextile impregnated with elastomeric spray.

805.05.02.05 Filter Bags

Geotextile for filter bags shall be non-woven, polypropylene, Class I according to Table 1 of OPSS 1860 unless otherwise specified in the Contract Documents.

805.05.03 Plastic Sheeting

Plastic sheeting used to wrap berm barriers or other sediment control measures shall be 6 mm polyethylene of maximum available width.

805.05.04 Stakes

Stakes shall be of sufficient strength and length to satisfy control measure installation, performance and maintenance requirements.

805.05.05 Control Measure Support

Control measure support for heavy-duty silt fence barrier shall be a separate product or one bonded to silt fence geotextile and be either plastic snow fence mesh, 0.81 mm diameter galvanized wire mesh or 1.63 mm diameter galvanized steel fence with a 5 cm by 10 cm weave and a 0.91 m height.

When a heavy-duty silt fence barrier is installed using a product manufactured with the control measure support bonded to the geotextile it shall be installed with the geotextile on the upstream side or front of the control measure support.

805.05.05.01 Posts

Posts to support heavy duty wire-backed silt fence barriers shall be metal T-posts. Metal ties shall be used to secure the silt fence to the metal T-posts.

805.05.06 Berm Barriers

Berm barriers shall be constructed using earth, sand, gravel, brush or compost.

805.05.07 Sandbags

Sandbags shall be made from heavy gauge plastic, agricultural burlap, or silt fence geotextile. Heavy gauge plastic shall contain stabilizers or inhibitors resistant to deterioration by ultraviolet radiation. Sandbags shall be filled with clean sand, 19 mm gravel or 6 mm pea gravel, containing no silt or clay.

805.05.08 Fibre Rolls

Fibre rolls shall be of a consistent internal thickness with even fibre distribution throughout the roll.

Fibre rolls shall be covered on the outside with an open-weave, biodegradable and photodegradable mesh or netting that securely contains the fibres within the rolls.

Fibre rolls shall be filled with 100% organic, biodegradable material such as shredded straw, wood fibres or compost and may contain seed.

805.05.09 Turbidity Curtain Hardware

805.05.09.01 Floatation

Turbidity curtain floatation shall be a material that has sufficient buoyancy to provide the curtain with continuous support, and a minimum of freeboard as specified in the Contract Documents.

805.05.09.02 Load Lines

Turbidity curtain load lines shall be 8 mm diameter steel cable or 19 mm diameter nylon or polypropylene rope.

805.05.09.03 Ballast

Turbidity curtain ballast shall be 8 mm steel chain.

805.05.09.04 Anchors

Turbidity curtain anchors shall be mushroom or kedge anchors with a minimum mass of 34 kg for firm mud bottoms or self-burying anchors with a minimum mass of 5 kg for sandy bottoms.

805.05.09.05 Mooring Buoys

Turbidity curtain mooring buoys shall have provision for the mooring line to be securely attached and be sufficiently buoyant to remain afloat under normal load conditions.

805.05.09.06 Mooring Lines

Turbidity curtain mooring lines shall be 19 mm diameter nylon or polypropylene rope.

805.05.09.07 Adjustment Lines

Turbidity curtain adjustment lines shall be 13 mm diameter nylon or polypropylene rope.

805.05.10 Rock

Rock for rock flow check dams shall be according to the requirements for rip-rap and gabion stone according to OPSS 1004.

805.05.11 Corrugated Pipe

Corrugated pipe slope drains shall be non-perforated, corrugated steel pipe according to OPSS 1801 or polyethylene plastic pipe according OPSS 1840. Pipe diameter shall be as specified in the Contract Documents.

805.05.12 End Sections

End sections for the inlet and outlet of slope drains shall be according to OPSS 1801, regardless of the material type of the pipe used.

805.05.13 Erosion Control Blankets

Erosion control blankets for diversion ditches shall be as specified in OPSS 804.

805.07 CONSTRUCTION

805.07.01 Operational Constraints

805.07.01.01 Retention of Riparian Vegetation

The area over which vegetation is removed on site shall affect no more than one third (1/3) of the total woody vegetation in the right-of-way within 30 m of the high water level of any waterbody unless otherwise specified in the Contract Documents.

805.07.01.02 Protection of Stockpiled Materials

All stockpiles of erodible construction materials and excess or surplus materials shall be protected from erosion and sediment transport within 48 hours of being built unless otherwise specified in the Contract Documents.

805.07.01.03 Dewatering

Dewatering effluent shall be controlled to prevent passage of sediment into waterbodies and other sensitive environmental features as specified in the Contract Documents or onto adjacent properties. Discharge of dewatering effluent to sediment traps for dewatering shall be controlled to avoid exceeding trap capacity and to prevent scour and washout.

Discharge of water from sediment traps for dewatering shall be according to OPSS 518.

805.07.01.04 Slope Drains

When slope drains are specified in the Contract Documents, the slope drain and associated berm barrier shall be constructed in the same day.

805.07.01.05 Turbidity Curtains and Cofferdams

Equipment shall not be operated in a waterbody outside a turbidity curtain or cofferdam other than hand held equipment or boats.

805.07.01.06 Construction and Removal of Measures

The construction and removal times for temporary erosion and sediment control measures shall be as specified in the Contract Documents.

805.07.02 Light-Duty Sediment Barriers, General

Light-duty sediment barriers are light-duty straw bale barriers, light-duty silt fence barriers, or light duty fibre roll barriers.

Light-duty sediment barriers shall be constructed as specified in the Contract Documents.

Light-duty sediment barriers shall not be installed in or across waterbodies.

When the Light-Duty Sediment Barriers item is specified in the Contract Documents, any light-duty sediment barriers may be used. When a specific light-duty sediment barrier is specified in the Contract Documents, there shall be no option of substitution for the control measure.

Light-duty sediment barriers shall include protection placed against the downslope side at the low points of the barrier so that any overflow of the barrier is prevented from causing soil scour and erosion.

805.07.02.01 Light-Duty Straw Bale Barriers

Light-duty straw bale barriers shall be constructed as specified in the Contract Documents.

When specified to be installed around catch basins, straw bales shall be placed completely around catch basins and ditch inlets without gaps. When a double row of straw bales is specified in the Contract Documents, the straw bales shall be placed such that the joints between the straw bales of each row are not in-line with the joints of the straw bales of the adjacent row.

Stakes securing the bales shall be driven through the bales without breaking the bale ties or otherwise disturbing bale firmness and shape.

Maintenance shall include the replacement of each bale at intervals not exceeding 45 Days.

805.07.02.02 Light-Duty Silt Fence Barriers

Light-duty silt fence barriers shall be constructed as specified in the Contract Documents.

Light-duty silt fence barriers shall not be used for perimeter control or property line delineation unless specified in the Contract Documents.

Light-duty silt fence barriers shall be installed within a trench excavated along the contour of the ground such that the elevation of the above ground portion of the fence is the same along its entire length except at the ends. Light-duty silt fence barriers shall be installed without breaks or gaps along their entire length. Light-duty silt fence barriers shall only be installed on flat ground with a minimum offset of 2 m from the toe of the slope being protected. When a longer sediment barrier is required, another light-duty silt fence barrier shall be installed as specified in the Contract Documents.

The geotextile shall be attached firmly, without sagging, to the upslope side of the stakes. Stakes shall be spaced to ensure the geotextile remains vertical. Where the geotextile is joined to provide a continuous run, the ends shall be overlapped a minimum of 500 mm and securely fastened to the stakes using cable ties or soft wire at the top of the geotextile only. The geotextile shall be angled upslope at the ends of each run in a "J" pattern and so that the ends are at a higher elevation than the bottom of the run.

When geotextile is supplied without stakes attached, the geotextile shall be installed into the trench in the ground first, the stakes shall be driven into the ground behind the geotextile, and the geotextile shall be attached to the upslope side of the stakes using cable ties or soft wire at the top of geotextile only.

805.07.02.03 Light-Duty Fibre Roll Barriers

Light-duty fibre roll barriers shall be sized and constructed as specified in the Contract Documents.

Light-duty fibre roll barriers shall be installed along the contour of the ground into trenches that have been excavated into the soil perpendicular to the slope face to a depth of approximately one half the roll diameter and width across the width of the slope.

Any rills and gullies shall be filled in where light-duty fibre roll barriers are to be installed. Light-duty fibre roll barriers shall only be installed on flat ground with a minimum offset of 2 m from the toe of the slope being protected. When a longer sediment barrier is required, another light-duty fibre roll barrier shall be installed tightly butted against the first one.

Light-duty fibre roll barriers shall be installed so that their base is in continuous contact with the underlying soil along their entire length without gaps and angled upslope at each end run in a "J" pattern. The ends of adjacent fibre roll segments shall be tightly butted against each other and shall not be overlapped vertically or horizontally.

A metal bar shall be used to make pilot holes perpendicular to the slope face through the centre of the fibre rolls as specified in the Contract Documents. Pilot holes shall also be made at the ends of each fibre roll segment angled towards the next abutting fibre roll to hold adjacent rolls together.

Wooden stakes shall be driven into the pilot holes as specified in the Contract Documents.

Soil excavated from the trenches shall be placed along the upslope side of the fibre rolls and compacted into the front of the trench to minimize possible undermining by runoff.

The soil on the upslope and downslope sides of the fibre rolls shall be seeded according to OPSS 804.

805.07.03 Heavy-Duty Sediment Barriers, General

Heavy-duty sediment barriers are heavy-duty silt fence barriers, heavy-duty wire-backed silt fence barriers, berm barriers, or sandbag barriers.

Heavy-duty sediment barriers shall be constructed as specified in the Contract Documents, without gaps and without undermining to prevent sediment passage through, under, or around the barrier.

When heavy-duty sediment barriers are specified in the Contract Documents, the Contractor has the option to select any of the heavy-duty sediment barriers or any combination of them. When a specific heavy-duty sediment barrier is specified in the Contract Documents, there shall be no option of substitution for the control measure.

Heavy-duty silt fence barriers shall include control measure support placed against the downstream side at the low points of the barrier so that any overflow of the barrier is prevented from causing soil scour and erosion.

805.07.03.01 Heavy-Duty Silt Fence Barriers

Heavy-duty silt fence barriers shall be constructed as specified in the Contract Documents.

Heavy-duty silt fence barriers shall not be used for perimeter control or property line delineation unless specified in the Contract Documents.

Heavy-duty silt fence barriers shall be installed within a trench excavated along the contour of the ground such that the elevation of the bottom of the fence is the same along its entire length except at the ends. Heavy-duty silt fence barriers shall be installed without breaks or gaps along their entire length. Heavy-duty silt fence barriers shall only be installed on flat ground with a minimum offset of 2 m from the toe of

the slope being protected. When a longer sediment barrier is required, another heavy-duty silt fence barrier shall be installed as specified in the Contract Documents.

The geotextile shall be attached firmly to the upstream side of the control measure support and the stakes. Stakes shall be spaced to ensure the geotextile and the control measure support remains vertical. Where the geotextile or the control measure support is joined to itself to provide a continuous run, the ends shall be overlapped a minimum of 500 mm and securely fastened to stakes using wire ties at the top of the geotextile or the control measure support only. The geotextile and control measure support shall be angled upslope at the ends of each run in a "J" pattern and so that the ends are at a higher elevation than the bottom of the run.

When geotextile is supplied without the control measure support or stakes attached, the control measure support shall be installed into the trench in the ground first, the geotextile shall be installed into the trench on the upslope side of the control measures support, the stakes shall be driven into the ground behind the geotextile and the control measure support, and the geotextile and control measure support shall be attached to the stakes using wire ties at the top of the geotextile and control measure support and only.

805.07.03.02 Heavy-Duty Wire-Backed Silt Fence Barriers

Heavy-duty wire-backed silt fence barriers shall be constructed as specified in the Contract Documents.

Heavy-duty wire-backed silt fence barriers shall not be used for perimeter control or property line delineation unless specified in the Contract Documents.

Heavy-duty wire-backed silt fence barriers shall be installed in a trench excavated along the contour of the ground such that the elevation of the bottom of the fence is the same along its entire length except at the ends. Heavy-duty wire-backed silt fence shall be installed without breaks or gaps along their entire length. Heavy-duty wire-backed silt fence barriers shall only be installed on flat ground with a minimum offset of 2 m from the toe of the slope being protected. When a longer sediment barrier is required, another heavy-duty wire-backed silt fence barrier shall be installed as specified in the Contract Documents.

The wire control measure support shall be installed into the trench in the ground. The geotextile shall be installed into the trench on the upslope side of the wire control measure support. T-posts shall be installed into the ground behind the geotextile and wire control measure support and spaced to ensure the geotextile and wire control measure support remain vertical. The geotextile and the wire control measure support shall be attached securely to the T-posts using wire ties at the top of the geotextile and wire control measure support only. Where the geotextile or the wire control measure support is joined to itself to provide a continuous run, the ends shall be overlapped a minimum of 500 mm and securely fastened to T-posts using wire ties at the top of the geotextile or wire control measure support only. The geotextile wire control measure support shall be angled upslope at the ends of each run in a "J" pattern and so that the ends are at a higher elevation than the bottom of the run.

805.07.03.03 Berm Barriers

Berm barriers shall be constructed and wrapped in geotextile or plastic sheeting as specified in the Contract Documents. The geotextile or plastic sheeting shall be secured to the ground.

805.07.03.04 Sandbag Barriers

Sandbags shall be securely tied at the top.

Sandbag barriers shall be constructed as specified in the Contract Documents

Sandbags within each row shall be placed with the sides of the bags butted tightly against one another without gaps. The ends of sandbags in adjacent rows shall be butted tightly against one another without gaps.

When sandbag barriers are constructed on earth surfaces, the trench into which the sandbags are placed shall be backfilled around the sandbags to existing grade and compacted.

When sandbag barriers are to be constructed on sod, erosion control blanket, existing turf, or bedrock, they shall be placed so there are no gaps between the sandbags and the underlying surface.

Sandbag barriers shall be maintained with undamaged bags that are firmly seated.

805.07.04 Fibre Roll Grade Breaks

Fibre roll grade breaks shall be constructed as specified in the Contract Documents.

Fibre rolls shall be installed horizontally starting from the toe of the slope and working up to the top of the slope. Any rills and gullies on the slope face shall be filled in as the fibre rolls are installed.

Fibre rolls shall be installed along the contour of the ground into trenches that have been excavated into the soil perpendicular to the slope face and width across the slope.

Fibre rolls shall be installed so that their base is in continuous contact with the underlying soil along their entire length without gaps and angled upslope at each end run in a "J" pattern. The ends of adjacent fibre roll segments shall be tightly butted up against each other and shall not be overlapped vertically or horizontally.

A metal bar shall be used to make pilot holes perpendicular to the slope face through the centre of the fibre rolls as specified in the Contract Documents. Pilot holes shall also be made at the ends of each fibre roll segment angled towards the next abutting fibre roll to hold adjacent rolls together.

Wooden stakes shall be driven into the pilot holes perpendicular to the slope face to secure the fibre rolls to the slope along their entire length. Additional stakes shall be driven into the fibre rolls along the downslope side at every grade change or if soils are very loose and uncompacted or the slope is steep.

Soil excavated from the trenches shall be placed along the upslope side of the fibre rolls and well compacted into the front of the trench to minimize possible undermining by runoff.

The soil on the upslope and downslope sides of the fibre rolls shall be seeded as specified in the Contract Documents.

805.07.05 Flow Check Dams - General

Flow check dams are straw bale flow check dams, fibre roll flow check dams, sandbag flow check dams, or rock flow check dams.

Flow check dams shall be constructed as specified in the Contract Documents such that the spillway level of the downstream flow check dam is the same as the base of the upstream flow check dam when they are specified in series. Flow check dams shall be constructed without gaps and without undermining to prevent sediment passage through, under, or around the flow check dam.

When the Flow Check Dams item is specified in the Contract Documents, any of the flow check dams or any combination of them may be used. When a specific flow check dam is specified in the Contract Documents, there shall be no option of substitution for the control measure.

Flow check dams shall include protection placed against the downstream side at the lowest point of the flow check dam so that any overflow of the flow check dam is prevented from causing soil scour and erosion.

805.07.05.01 Straw Bale Flow Check Dams

Straw bale flow check dams shall be constructed as specified in the Contract Documents and shall be replaced every 45 days.

805.07.05.02 Fibre Roll Flow Check Dams

Fibre roll flow check dams shall be constructed as specified in the Contract Documents.

805.07.05.03 Sandbag Flow Check Dams

Sandbag flow check dams shall be constructed as specified in the Contract Documents.

805.07.05.04 Rock Flow Check Dams

Rock flow check dams shall be constructed as specified in the Contract Documents.

805.07.06 Sediment Traps

Sediment traps shall be constructed as specified in the Contract Documents to prevent sediment passage from the upstream to the downstream side of the trap and so that the majority of the sediment is collected in the excavated basin.

Sediment traps shall be constructed as a single control measure consisting of an excavated basin and a rock flow check dam.

A temporary fence shall be erected around the sediment trap to restrict public access.

805.07.07 Slope Drains

Slope drains shall be constructed as specified in the Contract Documents.

Slope drains shall be constructed as a single control measure consisting of a corrugated pipe, two end sections including an inlet and an outlet, and a sediment trap constructed at the outlet end of the pipe.

The pipe inlet shall be placed through a berm barrier in such a manner that flow is directed to the pipe inlet without scouring of the berm. The toe plate of the inlet end section shall be fully imbedded into the ground surface.

Pipes shall be maintained in place without gaps and without undermining so that water is conveyed from the upstream side of the berm and collected in the sediment trap.

805.07.08 Diversion Ditches

Diversion ditches shall be constructed as specified in the Contract Documents.

When diversion ditches are specified to be lined with rolled erosion control blanket along their entire length it shall be according to OPSS 804.

Flow check dams shall be installed at regular intervals along the entire length of diversion ditches as specified in the Contract Documents.

Where diversion ditches are specified to be lined with rip-rap or granular it shall be according to OPSS 1004.

805.07.09 Sediment Traps for Dewatering

Sediment traps for dewatering shall be constructed as specified in the Contract Documents.

Sediment traps for dewatering shall be constructed a minimum of 30 m away from waterbodies or as far away as practicable from the top of the bank of any waterbody.

The shape of the excavated basin may be varied to suit the characteristics of the area surrounding it.

The sediment barrier and rock flow check dam shall be constructed as specified in the Contract Documents.

Construction of the sediment barrier shall be according to the requirements for light-duty sediment barriers with the following exceptions:

- a) End runs are not required.
- b) The rock flow check dam shall be located at the low point of the light-duty sediment barrier.

A temporary fence shall be erected around the sediment trap to restrict public access.

Discharge of water from sediment traps for dewatering shall be according to OPSS 518.

805.07.10 Filter Bags

Filter bags, hoses and pumps shall be sized appropriately to the volume as specified in the Contract Documents of water to be filtered. Bags shall have a FOS as specified in the Contract Documents.

Filter bags shall be situated in a vegetated area or placed on a permeable surface on a slight slope with the opening of the bag facing upslope a minimum of 30 m away from waterbodies or as far as practicable from the top of the bank of any waterbody.

The opening of the filter bag shall be securely attached with mechanical connections to the discharge hose using commercially available hose couplers and placed in the retention facility to be dewatered.

Discharge of water from filter bags shall be according to OPSS 518.

805.07.11 Turbidity Curtains

Turbidity curtains shall be constructed as specified in the Contract Documents. Turbidity curtains shall be free of tears and gaps, and the bottom edge of the curtain shall be continuously in contact with the waterbody bed so that sediment passage from the enclosed area is prevented.

Turbidity curtains shall be constructed according to the following:

- a) Breaks may be made in the lower sleeve to facilitate pulling of the ballast, provided they are a maximum 100 mm in size and spaced at minimum 3 m intervals.
- b) Where turbidity curtain geosynthetic is joined to provide a continuous run, the sections shall be connected to provide a continuous seal to prevent the escape of turbid water between the sections.
- c) The turbidity curtain shall be of sufficient width to account for water depth and wave action.

- d) The turbidity curtain shall be prepared for installation by furling and tying securely with furling ties every 1.5 m for the entire length of the curtain.
- e) Anchor locations shall be established as necessary to maintain the turbidity curtain in place and functioning.

The sequence of installation shall be according to the following:

- a) Tie-downs shall firmly anchor the turbidity curtain to the shoreline.
- b) One end of the furled curtain shall be firmly attached to the upstream tie-down.
- c) The furled curtain shall be launched and placed.
- d) The other end of the furled curtain shall be attached to the downstream tie-down.
- e) Each anchor shall be attached to the turbidity curtain load line with a mooring line.
- f) Mooring buoys shall be attached to the mooring line at a distance of 1 m from the load line to keep the turbidity curtain in place at locations where it changes direction.
- g) The furling ties shall be released to allow the turbidity curtain ballast to sink to its maximum depth.
- h) The location and depth of the ballast shall be adjusted as necessary using the adjustment lines.

Equipment is permitted in the working area enclosed by the turbidity curtain.

Folds in the turbidity curtain that form next to the floatation collar shall be regularly monitored and cleared of collected sediment.

805.07.12 Cofferdams

Cofferdams shall be constructed as specified in the Contract Documents to:

- a) Isolate the working area from the waterbody.
- b) Prevent the release of sediment and debris into the surrounding waterbody.

Equipment is permitted in the working area enclosed by the cofferdam.

805.07.13 Monitoring

All temporary erosion and sediment control measures shall be monitored to ensure they are in effective working order. Monitoring shall be once a week, at minimum, prior to any forecast rain event and following any rain event.

805.07.14 Maintenance

All temporary erosion and sediment control measures constructed under this specification shall be maintained in an effective, functioning, stable condition.

805.07.15 Sediment Removal

The work shall consist of the removal and management of accumulated sediment.

Sediment that is accumulated by the temporary erosion and sediment control measures shall be removed in a manner that avoids escape of the sediment to the downstream side of the control measure and avoids damage to the control measure. Sediment shall be removed to the level of the grade existing at the time the control measure was constructed and be according to the following:

- a) For light-duty sediment barriers and flow check dams, accumulated sediment shall be removed once it reaches the lesser of the following:
 - i. A depth of one-half the effective height of the control measure. For flow check dams, the effective height shall be determined relative to the lowest point of the flow check dam.
 - ii. A depth of 300 mm immediately upstream of the control measure.
- b) For heavy-duty sediment barriers, sediment traps, and sediment traps for dewatering, accumulated sediment shall be removed once it reaches one-half the effective height or depth of the control measure.
- c) For all control measures, accumulated sediment shall be removed as necessary to perform maintenance repairs.
- d) Accumulated sediment shall be removed immediately prior to the removal of the control measure.

805.07.16 Control Measure Removal

Ditch, permanent slope, and any other embankment cover specified elsewhere in the Contract Documents to be placed within the area controlled by the temporary erosion and sediment control measure shall be in place and established prior to the removal of such control measure.

Temporary erosion and sediment control measures shall be removed and associated excavations backfilled and compacted when the measures are no longer required.

Temporary erosion and sediment control measures shall be removed in a manner that:

- a) Prevents entry of equipment, other than hand-held equipment or boats, to any waterbody.
- b) Prevents release of sediment and debris to any waterbody.

Prior to removal of the in-water control measures, the area enclosed by turbidity curtains and cofferdams shall be cleaned of all debris. For cofferdams, accumulated sediment shall be removed prior to removal of the sediment control measure.

Any seeding and mulching, temporary cover, sod, other surface application, or original turf cover disturbed by removal or backfilling of erosion and sediment control measures and removal of accumulated sediment, shall be brought to final grade and restored as specified in the Contract Documents.

805.07.17 Management of Excess Material

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

805.07.18 Protection of Waterbodies and Waterbody Banks

Protection of waterbodies and waterbody banks shall be as specified in the Contract Documents.

805.09 MEASUREMENT FOR PAYMENT

805.09.01 Actual Measurement

805.09.01.01

- Light-Duty Sediment Barriers**
- Light-Duty Straw Bale Barriers**
- Light-Duty Silt Fence Barriers**
- Light-Duty Fibre Roll Barriers**
- Heavy-Duty Sediment Barriers**
- Heavy-Duty Silt Fence Barriers**
- Heavy-Duty Wire-Backed Silt Fence Barriers**
- Berm Barriers**
- Sandbag Barriers**
- Fibre Roll Grade Breaks**

Measurement shall be the length in lineal metres from end to end of the barrier constructed, maintained, and removed, following the contours of the ground.

805.09.01.02

- Flow Check Dams**
- Straw Bale Flow Check Dams**
- Fibre Roll Flow Check Dams**
- Sandbag Flow Check Dams**
- Rock Flow Check Dams**

For measurement purposes, a count shall be made of the flow check dams constructed, maintained, and removed.

805.09.01.03

- Sediment Traps**
- Slope Drains**
- Diversion Ditches**
- Sediment Traps for Dewatering**
- Filter Bags**

For measurement purposes, a count shall be made of the number of sediment traps, slope drains, diversion ditches, sediment traps for dewatering and filter bags constructed or installed, maintained, and removed. Component parts shall not be counted separately for payment.

805.09.01.04 Turbidity Curtains

Measurement of turbidity curtain shall be made in lineal metres along its length from end to end between tie-downs for each turbidity curtain installed, maintained, and removed.

805.09.01.05 Cofferdams

For measurement purposes, a count shall be made of the number of cofferdams constructed, maintained, and removed.

805.09.01.06 Sediment Removal

Measurement shall be as specified in the Contract Documents by the volume of sediment excavated in cubic meters or by the number of hours required for excavation of sediment.

805.09.02 Plan Quantity Measurement

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

805.10**BASIS OF PAYMENT****805.10.01**

Light-Duty Sediment Barriers - Item
Light-Duty Straw Bale Barriers - Item
Light-Duty Silt Fence Barriers – Item
Light-Duty Fibre Roll Barriers - Item
Heavy-Duty Sediment Barriers - Item
Heavy-Duty Silt Fence Barriers – Item
Heavy-Duty Wire-Backed Silt Fence Barriers – Item
Berm Barriers - Item
Sandbag Barriers - Item
Fibre Roll Grade Breaks – Item
Flow Check Dams - Item
Straw Bale Flow Check Dams - Item
Fibre Roll Flow Check Dams - Item
Sandbag Flow Check Dams - Item
Rock Flow Check Dams – Item
Sediment Traps - Item
Slope Drains – Item
Diversion Ditches - Item
Sediment Traps for Dewatering – Item
Filter Bags - Item
Turbidity Curtains - Item
Cofferdams - Item

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material required to do the work.

Progress payments for the temporary erosion and sediment control measures shall be made as follows:

- a) 30% for initial construction.
- b) 50% for maintenance.
- c) 20% for removal.

805.10.02**Sediment Removal - 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 Contract Documents do not have a separate item for sediment removal, payment at the Contract price for the appropriate tender item for the installation of the sediment control measures shall be full compensation for all labour, Material, and Equipment to do the work of sediment removal.

Appendix 805-A, November 2015
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 specify the following in the Contract Documents:

- Installation and removal times for temporary erosion and sediment control measures. (805.07.01.06)
- Grading requirements for control measure removal. (805.07.16)
- Sediment removal measurement for payment. (805.09.01.06)

The designer should determine the need for barrier installation. The desirable slope grade is maximum 5%. (805.07.02 and 805.07.03)

The designer should determine the following and, if they are required, the requirements should be included in the Contract Documents:

- Sensitive environmental features. (805.07.01.03)
- The need for a specific light-duty sediment barrier. Where the light-duty sediment barrier is to be built using fibre rolls, the diameter of the fibre rolls to be used and whether and how they may be stacked vertically. (805.07.02)
- The type of seed mix to be applied to the upslope and downslope sides of fibre roll grade breaks. (805.07.02.03)
- The need for a specific heavy-duty sediment barrier. Where the heavy-duty sediment barrier is to be built using fibre rolls, the diameter of the fibre rolls to be used and whether and how they may be stacked vertically. (805.07.03)
- The need for wire backing for a heavy-duty silt fence barrier. (805.07.03.02)
- The need for fibre roll grade breaks and the number, diameter and spacing of fibre rolls required. (805.07.04)
- The need for a specific flow check dam, the number of flow check dams in series required and the spacing of the flow check dams. (805.07.05)
- The need for a sediment trap(s). When a sediment trap is to be constructed in a ditch the outside edge shall be sized to extend beyond the base of the ditch. (805.07.06)
- The need for a slope drain(s). (805.07.07)

Identify the need for a diversion ditch(s). Design dimensions and direction of flow along contour of ground. Outlet details including scour protection and sediment control. The need for, type and number of flow check dam(s), and type of erosion control lining. (805.07.08)

- The need for a sediment trap(s) for dewatering. Ensure that sediment traps for dewatering are sized appropriately for the catchment area and that there is enough space available to construct them. (805.07.09)
- The need for filter bags, and the type, Class and filtration opening size (FOS) of geotextile to be used. (805.07.10)
- Appropriate volume of water to be filtered. (805.07.10)
- The need for a turbidity curtain(s). (805.07.11)
- The need for and design of a cofferdam(s). (805.07.12)
- Whether sediment removal is to be measured by volume or time. (805.09.01.06)

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 219.120	Light-Duty Fibre Roll Barrier
OPSD 219.130	Heavy-Duty Silt Fence Barrier
OPSD 219.131	Heavy-Duty Wire-Backed Silt Fence Barrier
OPSD 219.150	Sandbag Barrier
OPSD 219.160	Fibre Roll Grade Breaks
OPSD 219.180	Straw Bale Flow Check Dam
OPSD 219.191	Fibre Roll Flow Check Dam
OPSD 219.200	Sandbag Flow Check Dam
OPSD 219.210	Temporary Rock Flow Check Dam V-Ditch
OPSD 219.211	Temporary Rock Flow Check Dam Flat Bottom Ditch
OPSD 219.220	Sediment Trap In Ditch
OPSD 219.230	Temporary Slope Drain For Sediment Trap
OPSD 219.231	Temporary Berm Barrier
OPSD 219.240	Sediment Trap for Dewatering
OPSD 219.260	Turbidity Curtain
OPSD 219.261	Turbidity Curtain Seam Detail



CONSTRUCTION SPECIFICATION FOR LOCAL SEED BANK

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830.01 SCOPE

This specification covers the requirements for the installation of local seed banks.

830.01.01 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.

830.01.02 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.

830.02 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

Ontario Ministry of the Environment and Climate Change Publications

Ontario Water Resources Act, - R.S.O. 1990, c O.40

830.03 DEFINITIONS

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

Normal Water Level means the average water level that occurs between high water level events or periods and low water level events or periods.

Local Seed Bank means all the seeds existing in the highest quality topsoil, stripped from the top 100 - 300 mm of the site, in a riparian vegetation area containing species native to the project site.

Riparian Vegetation Areas means vegetation areas within 30 m of the top of a waterbody bank.

Waterbody means 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.

Waterbody Bank means the slope on or adjacent to a waterbody from the normal water level to the top of slope.

Watercourse means a stream, creek, river, or channel including ditches, in which the flow of water is permanent, intermittent, or temporary.

830.05 MATERIALS

830.05.01 Local Seed Bank

Local seed bank shall be sourced on-site from existing topsoil in riparian vegetation areas removed to a depth as specified in the Contract Documents.

830.07 CONSTRUCTION

830.07.01 Salvaging Seed Bank

Removal of local seed bank shall occur by the removal of the topsoil layer prior to any other construction activities occurring within the areas specified in the Contract Documents.

Areas designated to have seed bank salvaged shall be excavated to a depth of 50 – 300 mm.

Areas that show evidence of non-native or invasive species shall not be used.

830.07.02 Seed Bank Stockpiles

The collected local seed bank shall be stockpiled in the locations specified in the Contract Documents.

Stock piles should not exceed 1500 mm in height. Avoid compacting the seedbank stockpiles. If possible strip and spread on receiving sites immediately, If stored, Storage shall be for less than 6 months. Cover with tarps or woven geotextile material to prevent soil erosion and contamination by weeds during storage. Alternatively, topsoil stockpiles can be stabilized by temporarily establishing groundcover vegetation composed of non-invasive species. Installation of ground cover seeds shall be by application of seeded compost or seeded biodegradable mats.

Surround stockpile with silt fencing or compost filter socks.

No machinery shall be allowed on the top of any stockpiles.

Local seed bank stockpiles are to be kept moist to prevent drying of seeds.

D. 830.07.03 Installation

Application of stockpiled local seed bank to the areas specified in the Contract Documents shall occur during the growing season (May – September).

The areas to be treated with local seed bank shall be graded prior to placement according to OPSS 206. Scarification to a depth of 150 mm is required prior to placement. Apply topsoil to a depth of 150 mm.

The stockpiled local seed bank shall be spread out in an even layer ontop of the topsoil to a thickness of 150 mm.

If any areas treated with local seed bank is subsequently re-graded for any reason, local seed bank shall be re-collected and re-applied according to this specification. Should local seed bank no longer be available, the area should be reseeded with a seed mix specified by the Contract Administrator

830.07.04 Protection of Waterbodies and Waterbody Banks

Protection of waterbodies and waterbody banks shall be according to the Contract Documents.

830.07.05 Management of Excess Materials

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

830.09 MEASUREMENT FOR PAYMENT

830.09.01 Actual Measurement

830.09.01.01 Local Seed Bank

Measurement of local seed bank shall be by area in square metres.

804.09.02 Plan Quantity Measurement

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

830.10 BASIS OF PAYMENT

830.10.01 Local Seed Bank – 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 830-A, November 2015
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 following should be specified in the Contract Documents:

- Specify the removal depth of existing topsoil in riparian vegetation areas (830.05.01)
- Natural heritage survey to identify evidence of a native seed bank; (830.07.01)
- Specify the location(s) where local seed bank is to be sourced on-site; (830.07.01)
- Specify the duration and location(s) of where local seed bank is to be stockpiled on-site; (830.07.01)
- Specify the locations where local seed bank is to be installed on-site; (830.07.04)
- Specify the thickness of spread local seed bank stockpile. (830.07.04)
- Specify erosion and sediment control measures as necessary to protect waterbodies during grading and installation of local seed bank. (830.07.05)

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.

