

Administration and Inspection Activities for Precast Concrete Culverts with Spans Greater than 3.0 m

(As Specified in OPSS 912)

912.01 SCOPE

This CAIS covers the construction administration and inspection requirements for [the construction of single and adjacent side-by-side \(multi-cell\) precast concrete box culverts with spans greater than 3.0 m, and associated precast concrete appurtenances, in open cut, for both new culverts and replacement of existing culverts](#) as specified in OPSS 912, November ~~2020~~**2025**.

912.02 REFERENCES

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

Ontario Provincial Standard Specifications, Construction:

[OPSS 904 Concrete Structures](#)

OPSS 912 Precast Concrete Culverts with Spans Greater than 3.0 m

Ontario Provincial Standard Specifications, Material:

[OPSS 1205 Clay Seal](#)

[OPSS 1350 Concrete – Materials and Production](#)

[OPSS 1355 Precast Concrete – Materials and Production](#)

Standard Special Provisions:

[599S30 Waterproofing of Precast Concrete Culverts](#)

Construction Administration and Inspection Specifications (CAIS):

CAIS 209	Embankments Over Swamps
CAIS 404	Support Systems
CAIS 501	Compacting
CAIS 517	Dewatering
CAIS 539	Temporary Protection Systems
CAIS 599-30	Waterproofing of Precast Concrete Culverts
CAIS 902	Excavating and Backfilling - Structures
CAIS 904	Concrete Structures
CAIS 905	Concrete Reinforcement
CAIS 905	Steel Reinforcement for Concrete
CAIS 909	Prestressed Concrete - Precast Girders
CAIS 910	Stressing Systems for Post Tensioning
CAIS 919	Formwork and Falsework

CAIS 929 Abrasive Blast Cleaning - Concrete Construction
 CAIS 930 Structure Rehabilitation - Concrete Patches, Refacing, and Overlays
 CAIS 932 Crack Repair - Concrete
 CAIS 1002 Aggregates - Concrete
 CAIS 1004 Aggregates - Miscellaneous
 CAIS 1010 Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
 CAIS 1205 Clay Seal
 CAIS 1302 Water
 CAIS 1306 Burlap
 CAIS 1350 Concrete - Materials and Production
 CAIS 1440 Steel Reinforcement for Concrete
 CAIS 1860 Geotextiles

[CAIS 999-29 Installation of Metallic Dowels Into Concrete](#)

MTO Forms:

PH-CC-322 Concrete Construction Report
 PH-CC-433A Concrete Mix Design Form A
 PH-CC-701 Request to Proceed
 PH-CC-702 Notice to Proceed

[MTO Structural Manual](#)

912.03 DEFINITIONS

For the ~~purpose~~[purposes](#) of this CAIS, the definitions shall be as specified in OPSS 912.

912.04 DESIGN AND SUBMISSION REQUIREMENTS

[912.04.01 Design Requirements](#)

[912.04.01.01 Culvert](#)

Administrative Activities:

<u>1</u>	<u>M</u>	Check that any culvert design is according to CSA S6, the MTO Structural Manual Division 1, and as specified in the Contract Documents.	<u>=</u>
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912.04.02 Submission Requirements

912.04.02.01 Working Drawings

Administrative Activities:

1	M	Check <u>Verify</u> that the one electronic copy in PDF format of fabrication Working Drawings and <u>including</u> supporting documents are submitted and <u>received at least 7 Days prior to commencement of fabrication of the elements, or 35 Days when other authorities are involved in the information listed as specified in OPSS 912 and</u> <u>approval of the Contract Documents</u> design or construction.	-
2	M	Verify that three sets of fabrication Working Drawings including supporting documents are received at least 7 Days prior to commencement of fabrication of the culverts, or 35 Days when <u>When</u> other authorities are involved in the approval of the design or construction, <u>verify that one additional copy of the Working Drawings and supporting documentation submission is provided for each authority.</u>	-
3	M	Check that the Working Drawings <u>bear the seal</u> and <u>supporting documents</u> signature of an Engineer certifying they are submitted and contain the information listed in <u>according to</u> the Contract Documents.	-
4	M	Check that the design of <u>Working Drawings and supporting documents are submitted and contain the precast culvert is according to CAN/CSA S6 and information listed in the Structural Manual</u> <u>Contract Documents.</u>	-
5	-	Check that the waterproofing of the precast culvert is as specified in the Contract Documents.	-
6	M	Review <u>After reviewing the Working Drawings and provide a written response of acceptability</u> <u>technical documentation submissions, submit with comments, to the Contractor, MTO CSA and MTO Structural within 402 Business Days for any design proposals that are submitted of receipt.</u>	-
7	M	After reviewing the Contractor's submissions, submit with comments, to MTO CSA and MTO Regional Structural Section within 2 days of receipt. Ensure a final copy of all Contractor submissions is shared with inspection staff and available <u>to perform on-site for enforcement and ensure a final copy is sent to the MTO Regional Structural Section</u> <u>administration and inspection duties.</u>	-
<u>7</u>	<u>-</u>	<u>Ensure a final copy is sent to MTO Structural Section.</u>	<u>-</u>

912.04.02.02 Concrete Mix DesignsPreformed Joint Seal

~~Administrative Activities:~~

4	M	Receive and Review the concrete mix design according to CAIS 1350.	-
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~~912.04.02.03~~ **Precast Plant Certification Submissions**

Administrative Activities:

4	M	Receive the precast plant's certificates with the concrete mix design submission.	-
21	M	Verify that the precast concrete culvert is fabricated at a precast plant certified according to OPSS 912 Clause 7.01.01. If concrete will be supplied by a ready-mixed concrete supplier check that documentation has been submitted verifying that the plant is certified by RMCAO. Receive the manufacturer's recommended installation procedures for the preformed joint seal a minimum of 5 Days prior to the commencement of installation.	-

~~912.04.02.04~~ **Control of Concrete Temperature**

Administrative Activities:

4	-	Receive the concrete temperature control plan seven days prior to the commencement of the fabrication, for information purposes.	-
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~~912.04.02.05~~ **Notification of Placement**

~~Administrative Activities:~~

4	M	Receive the Notification of Placement at least seven days prior to the commencement of the fabrication of the precast culverts.	-
2	M	Receive any changes in the fabrication schedule in writing.	-

~~912.04.02.06~~ **Mill Certificates**

~~Administrative Activities:~~

4	-	Receive mill certificates according to CAIS 1440.	-
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~~912.04.02.07~~ **Manufacturer's Certificate of Conformance and Precast Report**

~~Administrative Activities:~~

4	M	Receive the Contractor's Manufacturer's Certificate of Conformance, and precast report for each shipment of precast culverts at least 5 Business Days prior to shipping from the pre-casting plant.	-
2	M	Receive the Request to Proceed from the Contractor, before the delivery of the precast culverts to the site.	-

3	M	Check that the submissions by the Contractor, including the Manufacturer's Certificate of Conformance, precast report and Request to Proceed meet the requirements of the Contract Documents.	-
4	M	Check that the precast culvert is fabricated according to the Contract Documents, prior to delivery to the site.	-
5	M	Check that defects and deficiencies repairable by standard methods are repaired according to the Contract Document.	-
6	M	Check that precast culverts with defects and deficiencies causing rejection according to the Contract Documents, are not included in the Work.	-
7	M	Issue a Notice to Proceed, in a timely manner, and prior to delivering the precast culvert to the site.	-

Tasks related to MTO's Centralized Precast Retainer

Administrative Activities:

4	M	Provide the following information to MTO Concrete Section's centralized retainer inspector: <ul style="list-style-type: none"> • Precast concrete plant's contact information for the centralized retainer to coordinate inspection. • Shop drawings of culverts. • Contract specific specifications. • Change orders relating to manufacturing process, drawing, etc. • Production schedule. • Approved repair proposal. 	-
2	M	Upload the inspection report from the centralized retainer to WBCMS for each Contract.	-
3	M	Review the inspection report and issues emails from the centralized retainer and act on the non-conformances identified by the centralized retainer.	-

912.05 MATERIALS

912.05.01 Backfill

912.05.01.01 Backfill to Structure

Inspection Activities:

1	-	Check that backfill material is as specified in OPSS 912.05.01.01 and the Contract Documents.	<u>100%</u>
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912.05.01.02 **Backfill Beyond Structure**

Inspection Activities:

<u>1</u>	-	<u>Check that backfill material beyond the structure is as specified in OPSS 912.05.01.02 or the Contract Documents.</u>	<u>100%</u>
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~~Inspection Activities:~~

4	-	Check that backfill material is as specified in OPSS 912.05.01 or the Contract Documents.	100%
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912.05.02 **Bedding**

Inspection Activities:

1	-	Check that bedding material is as specified in OPSS 912.05.02 or the Contract Documents.	-
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912.05.03 **BurlapClay Seal**

Administrative Activities:

<u>1</u>	-	<u>Check that clay seal is according to OPSS 1205 and CAIS 1205.</u>	-
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~~Administrative Activities:~~

4	-	Check burlap according to CAIS 1306.	-
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912.05.04 **Clay SealConcrete**

Administrative Activities:

4	-	Check clay seal, when specified, according to CAIS 1205.	-
<u>1</u>	-	<u>Check that concrete is as specified in OPSS 912.</u>	-
<u>2</u>	-	<u>For precast concrete culverts and appurtenances, Check that precast concrete is as specified in OPSS 1355 in its entirety. For precast concrete, additional inspection and administrative activities shall be as specified in CAIS 1355.</u>	-
<u>3</u>	-	<u>Check that cast-in-place concrete, including concrete appurtenances, protections slabs and distributions slabs, are according to OPSS 1350 in its entirety. Additional inspection and administrative activities shall be as specified in CAIS 1350.</u>	-

912.05.05 **Concrete Geotextile**Inspection Activities:

<u>1</u>	-	<u>Check that geotextile is as specified in OPSS 912.05.05 and the Contract Documents.</u>	<u>50%</u>
<u>2</u>	-	<u>Check geotextile is according to CAIS 1860 and the Contract Documents.</u>	-

912.05.06 **Granular Cover**Inspection Activities:

<u>1</u>	-	<u>Check that granular cover material is as specified in OPSS 912.05.06 and the Contract Documents.</u>	-
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912.05.07 **Grout**Administrative Activities:

<u>1</u>	-	<u>Check that grout material is as specified in OPSS 912.05.07 and the Contract Documents.</u>	-
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912.05.08 **Levelling Course**Administrative Activities:

<u>1</u>	-	<u>Check that the concrete mix design submitted levelling course fine aggregate material is as specified in OPSS 912.05.08 and the Contract Documents and OPSS 912.05.05.</u>	-
<u>2</u>	-	<u>Check that cast-in-place concrete appurtenances, protections slabs and distributions slabs are according to CAIS 1350.</u>	-

912.05.06 **Concrete Sealers** **09 Native Material**Administrative Activities:

<u>1</u>	-	<u>Receive the Owner's list of acceptable sealers from MTO Quality Assurance Section. Check all native and imported material is as specified in OPSS 912.05.09, the recommendations in the Foundations Investigation and Design Report for this site and approve their use.</u>	-
<u>2</u>	-	<u>Verify that the concrete sealers are from the Owner's list of acceptable sealers. If native or imported material is not specified in the contract but is requested by the Contractor submit request to MTO's Quality Assurance Section and MTO's Structures Office, Foundations Section for review.</u>	-

~~912.05.07~~ Formwork

~~Administrative Activities:~~

4	-	Check formwork according to CAIS 919.	-
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~~912.05.08~~ Geotextile

~~Inspection Activities:~~

4	-	Check geotextile according to CAIS 1860 and the Contract Documents.	-
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~~912.05.09~~ Granular Cover

~~Inspection Activities:~~

4	-	Check that granular cover material is as specified in OPSS 912.05.09 and the Contract Documents.	-
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~~912.05.10~~ Hardware Preformed Joint Seal

Administrative Activities:

1	-	Check that <u>hardware preformed joint seal</u> is as specified in <u>OPSS 912.05.10</u> and the Contract Documents.	-
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~~912.05.11~~ Moisture Vapour Barrier

~~Administrative Activities:~~

4	-	Check that moisture vapour barrier is as specified in OPSS 912.05.11.	-
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~~912.05.12~~ Native Material

~~Administrative Activities:~~

4	-	Verify all native and imported material is as specified in OPSS 912.05.12 and approve their use.	-
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~~912.05.13~~ Preformed Joint Seal

~~Administrative Activities:~~

4	-	Check that preformed joint seal is as specified in OPSS 912.05.13.	-
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912.05.14**Proprietary Patching Materials**Administrative Activities:

1	-	Receive the Owner's list of proprietary concrete patching materials from MTO Quality Assurance Section and provide to the Contractor, when required.	-
2	-	Verify that the selected proprietary patching materials are from the Owner's List of Acceptable Concrete Patching Materials.	-

Administrative Activities:

4	-	Receive the Owner's list of proprietary patching materials from MTO Quality Assurance Section.	-
2	-	Verify that proprietary patching materials are from the Owner's List of Acceptable Concrete Patching Materials.	-

912.05.15**Steel Reinforcement**Administrative Activities:

4	-	Check steel reinforcement according to CAIS 1440.	-
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912.05.16**Water**Administrative Activities:

4	-	Check water according to CAIS 1302.	-
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912.06**EQUIPMENT**Administrative Activities:

4	-	Check that the temperature and monitoring and recording system is as specified in OPSS 912.06.02.	-
2	-	Check that chipping hammers are according to OPSS 912.06.03.	-

912.07 CONSTRUCTION

912.07.01 ~~Production of Precast Concrete Culverts~~Foundations

~~Inspection~~912.07.01.01 General

Administrative Activities:

1	M	Check that markings of the precast culverts are as specified in OPSS 912.07.01.02, CAIS 1350, and CAIS 905. If unsuitable material is encountered during excavation consult the Foundations Engineering Specialist for recommendations.	-
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Inspection Activities:

Administrative Activities:

4	M	Receive Contractor's written notification a minimum of 7 Days prior to commencement of precast element fabrication.	-
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912.07.02 ~~Installation~~

1	M	Check the foundation is prepared as specified in the Contract Documents and according to 912.07.01.01.	100%
2	M	Check the final elevation of the top of the levelling course is as specified in the Contract Documents.	100%

912.07.02.01 ~~Foundations – General~~

Inspection Activities:

4	M	Check the foundation is prepared as specified in the Contract Documents and according to 912.07.02.01.	100%
2	M	Check the final founding elevations are as specified in the Contract Documents or approve in writing the final elevation.	100%

912.07.02.01.0102 Support Systems

Inspection Activities:

1	M	Check support systems <u>is</u> according to <u>OPSS 404 and</u> CAIS 404.	50%
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912.07.02.01.02 Temporary Protection Systems

Inspection Activities:

<u>4</u>	<u>M</u>	<u>Check temporary protection systems according to CAIS 539.</u>	<u>50%</u>
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912.07.02.01.03 Temporary Protection Systems

Inspection Activities:

<u>1</u>	<u>M</u>	<u>Check temporary protection systems is according to OPSS 539 and CAIS 539.</u>	<u>50%</u>
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912.07.01.04 Excavation

Inspection Activities:

<u>1</u>	<u>M</u>	<u>Check excavation <u>is</u> according to <u>OPSS 902 and</u> CAIS 902.</u>	<u>100%</u>
<u>2</u>	<u>M</u>	<u>Check swamp excavation <u>if required is</u> according to <u>OPSS 209</u> CAIS 209.</u>	<u>100%</u>

912.07.02.01.04 Dewatering

Inspection Activities:

<u>4</u>	<u>M</u>	<u>Check dewatering according to CAIS 517.</u>	<u>100%</u>
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912.07.02.01.05 Dewatering

Inspection Activities:

<u>1</u>	<u>M</u>	<u>Check dewatering is according to OPSS 517 and CAIS 517.</u>	<u>100%</u>
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912.07.01.06 Bedding

Inspection Activities:

<u>1</u>	<u>-</u>	<u>Check <u>that</u> bedding placement <u>is</u> as specified in the Contract Documents <u>and</u> <u>compaction according to CAIS 501.</u></u>	<u>-100%</u>
<u>2</u>	<u>:</u>	<u>Check compaction is according to OPSS 501 and CAIS 501.</u>	<u>100%</u>
<u>3</u>	<u>:</u>	<u>Check that bedding provides uniform support under the full width and length <u>if the culvert.</u></u>	<u>100%</u>
<u>4</u>	<u>:</u>	<u>Check that bedding and subgrade material is protected from disturbance <u>during construction.</u></u>	<u>50%</u>

912.07.02.01.0607**Levelling Course**

Inspection Activities:

1	-	Check leveling course material is as specified in OPSS 912.07.02.01.0607.	50%
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912.07.02.02 **Delivery****912.07.02** **Placement of Geotextile at Joints Prior to Installation of Elements**

Inspection Activities:

1	M	<u>Check lifting, storing, and transporting are as specified in the Working Drawings. Check that geotextile at joints placed prior to installation of elements is as per OPSS 912.07.02.</u>	100%
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Administrative Activities:

4	M	<u>Receive Contractor's written notification a minimum of 3 Business Days prior to delivery of the element.</u>	-
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912.07.02.03 **Inspection of Elements Prior to Installation of Precast Concrete Culvert**

Inspection Activities:

<u>1</u>	<u>M</u>	<u>If any defects or deficiencies are present on the elements receive notification from the contractor.</u>	<u>-</u>
<u>2</u>	<u>M</u>	<u>If no defects or deficiencies are present or have been repaired, receive the MTO form PH-CC-701, Request to Proceed from the Contractor, after delivery of the elements to site before installation.</u>	<u>-</u>
<u>3</u>	<u>M</u>	<u>Check the elements for defects and deficiencies prior to installation, and that the repairs have been completed according to the Defects and Deficiencies clause of OPSS 1355.</u>	<u>-</u>
<u>4</u>	<u>M</u>	<u>If defects or deficiencies are found, Notify the Contractor of the type, size, and quantity and which element that they occur on.</u>	<u>-</u>
<u>5</u>	<u>-</u>	<u>Check that the repairs have been completed according to the Defects and Deficiencies clause of OPSS 1355 when applicable.</u>	<u>-</u>
<u>6</u>	<u>M</u>	<u>Once all repairs have been made, and the elements are acceptable issue a MTO form PH-CC-702, Notice to Proceed, in a timely manner, and prior to installation of the elements on site.</u>	<u>-</u>

912.07.04 Installation of Elements

912.07.04.01 General

Inspection Activities:

1	M	Check that the Working installation of the elements is according to the Working Drawings meet the requirements of the and Contract Documents and are on site and are being followed during installation of the precast culverts.	100%
2	M	Check that precast culverts with defects and deficiencies causing rejection according to the Contract Documents, are not included in the Work.	100%
<u>3</u>	<u>M</u>	<u>Check that the precast elements are not overstressed, unstable or unsafe at any time during installation.</u>	<u>100%</u>
<u>34</u>	M	Check that the installation of culvert is installed true to the precast elements meets the requirements of elevations and alignment in the Contract Documents.	100%

Administrative Activities:

1	M	Receive Contractor's written notification a minimum of 3 Business Days prior to the commencement of installation.	-
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912.07.02.04 ~~Cast-in-Place Concrete Appurtenances, Protection Slabs and Distribution Slabs~~

<u>2</u>	<u>M</u>	<u>Receive report from Contractor documenting any culvert installation requirements that were not met, if applicable.</u>	<u>-</u>
<u>3</u>	<u>M</u>	<u>If repairs to erected elements are required, receive and Review repair procedures from the Contractor. Depending on the nature of the repair forward the submission to the Quality Assurance Section.</u>	<u>-</u>

912.07.04.02

~~Inspection Activities:~~

<u>4</u>	<u>M</u>	<u>Check the construction of cast-in-place concrete appurtenances, protection slabs or distribution slabs according to CAIS 904 and reinforcement placement according to CAIS 905.</u>	<u>100%</u>
<u>2</u>	<u>M</u>	<u>Check the protection slabs or distribution slab are placed without any damage or movement of the culvert.</u>	<u>100%</u>

~~Administrative Activities:~~

<u>4</u>	<u>M</u>	<u>Check if protection slabs or distribution slabs are specified in the Contract Documents.</u>	<u>-</u>
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912.07.02.05**Joints Between Elements**Inspection Activities:

4	M	<u>Check all the joints between elements of the culverts are constructed and treated as specified in the Contract Documents and OPSS 912.07.02.05.01.</u>	100%
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Inspection Activities:

1	M	<u>Check all the joints between elements of the culverts are constructed and treated as specified in the Contract Documents and OPSS 912.07.04.02.</u>	100%
2	-	Check all connection plates are installed between units in accordance with the Contract Drawings.	100%

912.07.02.06 **Alignment****912.07.04.03** **Additional Requirements for Side-By-Side Culverts**Inspection Activities:

1	M	Check that the <u>alignment is as specified in gap between the culverts meets the requirements of</u> the Contract Documents and <u>OPSS clause 912.07.02.0604.03.</u>	100%
2	M	<u>Check that the vertical faces between the side-by-side culverts was not waterproofed.</u>	100%
3	M	<u>Check that grout was placed according to clause 912.07.04.03 and the Contract Documents.</u>	100%

912.07.05 **Filling of Holes for Lifting Devices**Inspection Activities:**02.07**

1	-	<u>Check that the holes for lifting devices are patched after installation with a proprietary patching material as per OPSS 912.07.05.</u>	100%
2	-	<u>Check proprietary patching material according to CAIS 904.</u>	100%

912.07.06**Inspection after the Installation of the Culvert and Prior to Waterproofing**Administrative Activities:Administrative Activities:

1	M	Receive and check a Request to Proceed from the Contractor, after the installation of all elements of a culvert within a construction stage, prior to waterproofing.	-
2	M	Issue a Notice to Proceed, in a timely manner, and prior to the next operation.	-
<u>1</u>	<u>M</u>	<u>Receive and Check a MTO form PH-CC-701, Request to Proceed from the Contractor, after the installation of all elements of a culvert within a construction stage, prior to waterproofing.</u>	<u>-</u>
<u>2</u>	<u>M</u>	<u>Check that culverts have been installed according to the Contract Documents and any defects or deficiencies have been repaired according to OPSS 1355.</u>	<u>-</u>
<u>3</u>	<u>M</u>	<u>Issue a MTO form PH-CC-702, Notice to Proceed, in a timely manner, and prior to the next operation.</u>	<u>-</u>

912.07.07**Cast-in-Place Concrete Appurtenances, Protection Slabs, and Distribution Slabs**Inspection Activities:**02**

<u>1</u>	<u>-</u>	<u>Check cast-in-place concrete appurtenances, protection slabs, and distribution slabs are according to OPSS 904 in its entirety. Additional administration and inspection activities shall be as specified in CAIS 904.</u>	<u>100%</u>
<u>2</u>	<u>-</u>	<u>Check reinforcing steel is according to OPSS 905 in its entirety. Additional administration and inspection activities shall be as specified in CAIS 905.</u>	<u>100%</u>
<u>3</u>	<u>-</u>	<u>Check abrasive blast cleaning is according to OPSS 929 and CAIS 929.</u>	<u>100%</u>
<u>4</u>	<u>-</u>	<u>Check that protection slabs or distribution slabs, when required, are according to the requirements of the Contract Documents.</u>	<u>100%</u>

912.07.08**Waterproofing of the Culvert**Inspection Activities:

1	M	Check waterproofing <u>is</u> as specified in the <u>SSP 599S30 and</u> CAIS 599-30.	100%
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912.07.02.09 **Geotextile at Joints**Inspection Activities:

4	-	Check that geotextile covering is as specified in OPSS 912.07.02.09.	50%
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912.07.02.10 **Inspection after the Waterproofing of the Culvert and Prior to Backfilling**Administrative Activities:Administrative Activities:

4	-	Receive and check a Request to Proceed from the Contractor, after the waterproofing of all elements of a culvert within a construction stage, prior to backfilling.	-
2	-	Issue a Notice to Proceed, in a timely manner, and prior to the next operation.	-
1	-	Receive and Check a MTO form PH-CC-701, Request to Proceed from the Contractor, after the waterproofing of all elements of a culvert within a construction stage, prior to backfilling.	-
2	-	Issue a MTO form PH-CC-702, Notice to Proceed, in a timely manner, and prior to the next operation.	-

912.07.10 **Placement of Geotextile at Joints After Waterproofing**Inspection Activities:**02**

1	-	Check that all joints are covered with geotextile after completion of waterproofing and placement of protection board is according to OPSS 912.07.10.	100%
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912.07.11 **Backfilling**Inspection Activities:

4	M	Check backfilling according to CAIS 902.	100%
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Inspection Activities:

1	M	Check backfilling is according to OPSS 902 and CAIS 902.	100%
2	M	Check that the uncompacted lift thickness does not exceed 300 mm.	50%
3	M	Check that backfill is placed without any damage or movement of the elements.	100%

912.07.02.12 Granular Cover

Inspection Activities:

1	M	Check granular cover placement and compaction according to OPSS 501 and CAIS 501.	100%
2	M	Check that granular cover is placed with maximum uncompacted lift thickness of 200 mm.	50%
3	M	Check that cover material is placed without any damage or movement of the elements.	100%

912.07.02.13 Clay SealsInspection Activities:

1	M	Select representative sample of clay for maximum dry density test according to LS-706.	100%
2	-	Check that clay seal placement is according to OPSS 912.07.12.	100%

Administrative Activities:~~Inspection Activities:~~

4	M	Check that clay seal placement is according to OPSS 912.07.02.13.	100%
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912.07.03 Repair of Defects and Deficiencies Repairable by Standard Methods~~Administrative Activities:~~

4	-	Receive repair proposal from the Contractor when more than one of the defects or deficiencies listed in OPSS 912 Table 2 is located in the same area in the element.	-
2	-	Check that the repair proposal is submitted in the precast report.	-
3	-	For defects and deficiencies that are not repairable by standard methods and that are not rejectable, provide a written response to the Contractor indicating whether the Engineer's assessment is deemed acceptable and if deemed unacceptable, the precast elements shall be rejected and replaced by the Contractor.	-
4	-	Consult with MTO as necessary.	-

5	-	Provide a written response to the Contractor indicating whether the Engineer's assessment is deemed acceptable and if deemed unacceptable, the precast and pre-stressed elements shall be rejected and replaced by the Contractor.	-
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912.07.04 Sampling of Hardened Concrete for Acceptance Testing

1	-	Select a single representative sample from the clay seal for testing by the Contractor according to LS-706, as per OPSS 912.07.12.	-
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912.07.14

Inspection Activities:

4	-	Sample steel reinforcement according to CAIS 905; water, admixtures and cementing materials according to CAIS 1350 when requested by the Owner.	-
2	M	Receive submission from the Contractor, a list of elements and their identification numbers within 24 hours of completion of a lot.	100%
3	M	After all the precast elements in the Lot have been fabricated, randomly select one member from each Lot for acceptance testing, and randomly select a location for core removal within that precast element. Advise the Contractor which element is to be cored and the coring location.	100%
4	M	Obtain from the Contractor the planned time and site of coring (job site or precast plant) for each Lot. (Note: One precast element type in each lot is to be cored at an age of 7 to 10 days, to remove 5 cores, for air void system, rapid chloride permeability and compressive strength testing respectively. Coring may take place at the job site or at the precast plant, wherever the precast element is at 7 to 10 days of age).	100%
5	M	Prior to coring, witness the detection of reinforcing steel by covermeter and Check that cores do not contain reinforcement or other embedded material. Check cores are not taken through waterproofing system.	100%
6	M	Witness the removal of cores when core removal is to take place on site. When coring is conducted at the precast plant, witness or have a representative witness the coring.	100%
7	M	Upon removal of the core samples, verify that cores are properly labelled and placed in the security bags provided by the MTO. Immediately take possession of the cores and deliver them to the designated laboratory for testing by the MTO.	100%

912.07.05 Access for Quality Assurance

Inspection Activities:

1	M	Check that access for quality assurance is provided according to OPSS 912.07.0513.	100%
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912.07.06Administrative Activities:

<u>1</u>	-	<u>Receive written notification from Contractor when the culvert is ready for verification measurements and inspection according to OPSS 912.07.14.</u>	-
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912.07.15**Management of Excess Materials**Administrative Activities:

<u>4</u>	-	<u>Check that management of excess material is done according to the Contract Documents.</u>	-
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Administrative Activities:

<u>1</u>	-	<u>Check that management of excess material is as specified in the Contract Documents.</u>	-
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912.08**QUALITY ASSURANCE****912.08.01****General**Inspection Activities:

<u>1</u>	-	<u>Confirm acceptance of precast concrete culverts is according to OPSS 912.08.01.</u>	<u>100%</u>
<u>2</u>	-	<u>For precast concrete culverts and appurtenances, Inspect the elements for defects or deficiencies as specified in OPSS 1355. Additional inspection activities shall be as specified in CAIS 1355.</u>	<u>100%</u>
<u>3</u>	-	<u>For cast-in-place concrete appurtenances, protection slabs and distribution slabs, additional inspection activities shall be as specified in CAIS 904 and CAIS 1350.</u>	<u>100%</u>
<u>4</u>	M	<u>Conduct inspection for dowels as specified in the Contract Documents.</u>	<u>100%</u>
<u>5</u>	-	<u>Confirm acceptance of reinforcing steel according to CAIS 905.</u>	<u>100%</u>

Administrative Activities:

<u>1</u>	-	<u>Check that quality assurance and acceptance of precast concrete culverts is as specified in OPSS 912.</u>	-
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<u>2</u>	-	<u>For precast concrete culverts and appurtenances, Check that quality assurance and acceptance is as specified in OPSS 1355. Check that precast concrete culverts and appurtenances meet the quality assurance requirement as specified in OPSS 1355, including acceptable 28-Day compressive strength, air void system parameters, and rapid chloride permeability. For precast concrete, additional administrative activities shall be as specified in CAIS 1355.</u>	-
<u>3</u>	-	<u>For cast-in-place concrete, including appurtenances, protection slabs and distribution slabs, Check that quality assurance and acceptance is as specified in OPSS 904 and OPSS 1350. For cast-in-place concrete, additional administration activities shall be as specified in CAIS 904 and CAIS 1350.</u>	-
<u>4</u>	-	<u>Notify MTO's Quality Assurance Section for any concrete culverts, appurtenances, protection slabs or distribution slabs that fail to meet the acceptance requirements. Provide written notification to the Contractor, after consultation with MTO, for rejectable work.</u>	-

912.08.02 Acceptance of Installation Tolerances

Inspection Activities:

~~Inspection Activities:~~

4	M	After delivery and prior to installation, Check for any surface defects not repaired adequately or dimensional measurements not appearing within tolerance.	100%
2	M	If referee testing of compressive strength, air void system, or rapid chloride permeability is invoked, witness the removal of the core(s) for referee testing from the same precast element from which the disputed acceptance core was obtained.	100%
3	M	Check that the referee core is properly labelled. Take possession of the core and deliver it to the referee laboratory designated by MTO.	100%
4	M	After delivery, but prior to installation, conduct a visual inspection deemed necessary to assess the effectiveness of surface finish and repairs.	100%
5	M	After delivery, but prior to installation, randomly select a minimum of one element from each lot for verification of concrete cover and dimensional measurements, before any waterproofing or backfilling operations. If the concrete cover measurements of the element measured does not meet the tolerances of the Contract Documents, inform MTO immediately.	100%
6	M	Conduct inspection for dowels as specified in the Contract Documents.	100%
7	M	Check core holes are repaired in accordance with the Contract Documents.	100%
<u>1</u>	<u>M</u>	<u>Check measurements on the culvert after installation but prior to waterproofing or backfilling operations to confirm compliance with the requirements of OPSS 912.08.02.</u>	<u>100%</u>

912.08.03 Dowels

Inspection Activities:

<u>1</u>	<u>M</u>	<u>Check that dowels, if required, are installed according to SP999F29 and CAIS 999-29</u>	<u>100%</u>
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912.08.04 Field Inspection

Inspection Activities:

Administrative Activities:

<u>4</u>	<u>M</u>	<u>Obtain and review acceptance test results for compressive strength, air void system and rapid chloride permeability.</u>	<u>-</u>
<u>2</u>	<u>M</u>	<u>Obtain and review acceptance test results for water, admixtures and cementing materials.</u>	<u>-</u>
<u>1</u>	<u>M</u>	<u>Inspect the culverts and the work for any defects and deficiencies. Notify MTO's Quality Assurance Section of any defects or deficiencies.</u>	<u>100%</u>

912.09 MEASUREMENT FOR PAYMENT

Administrative Activities:

1	-	Measurement for payment shall be as specified <u>in OPSS 912.09.</u>	-
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912.10 BASIS OF PAYMENT

Administrative Activities:

1	-	Basis of payment shall be as specified <u>in OPSS 912.10.</u>	-
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~~WARRANT: Always with OPSS 912, Construction Specification for Precast Concrete Culverts with Spans Greater than 3.0 m.~~