



CONSTRUCTION SPECIFICATION FOR REPAIRING **RIGIDCONCRETE** PAVEMENT
AND CONCRETE BASE WITH PRECAST CONCRETE SLABS

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363.01 SCOPE

This specification covers the requirements for repairing **rigidconcrete** pavement **and concrete base** with precast concrete slabs using either the Fort Miller Super-Slab[®] Method or the Michigan Method. The work may include both continuous and intermittent slab repairs.

~~363.01.01~~ **Specification Significance and Use**

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

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

~~363.01.02~~ ~~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.~~

363.02 REFERENCES

~~When the Contract Documents indicate that provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial-oriented specification, the references below shall be considered to be to the OPSS listed, unless use of a municipal-oriented specification is specified in the Contract Documents.~~

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

Ontario Provincial Standard Specifications, Construction

OPSS 350	Concrete Pavement and Concrete Base
OPSS 360	Full Depth Repair of 366 Repairing Concrete Pavement and Concrete Base
OPSS 369	Sealing or Resealing of Joints and Cracks in Concrete Pavement and Concrete Base
OPSS 510	Removal
OPSS 904	Concrete Structures
OPSS 905	Steel Reinforcement for Concrete
OPSS 929	Abrasive Blast Cleaning - Concrete Construction

Ontario Provincial Standard Specifications, Material

OPSS 1002	Aggregates - Concrete
OPSS 1301	Cementing Materials
OPSS 1302	Water
OPSS 1303	Admixtures for Concrete
OPSS 1350	Concrete - Materials and Production
OPSS 1355	Precast Concrete - Materials and Production
OPSS 1440	Steel Reinforcement for Concrete
OPSS 1441	Load Transfer Assemblies

OPSS 1442 Epoxy Coated Reinforcing Steel Bars for Concrete

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:

LS-407 Compressive Strength of Moulded Cylinders

LS-449 Method of Test for Load Transfer Test of Concrete Pavement Using a Falling Weight Deflectometer

LS-602 Sieve Analysis of Aggregates

LS-619 Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus

LS-704 Plastic Limit and Plasticity Index of Soils

MTO Designated Sources of Materials Engineering and Research (DSM)

MTO Forms:

PH-CC 322 Concrete Construction Report:

MERO-019 Falling Weight Deflectometer (FWD) Testing Guideline (ISBN 0-7794-8720-6 Print)

CSA Standards

A23.2-3C Making and Curing Concrete Compression and Flexural Test Specimens*

A23.2-1D Moulds for Forming Concrete Test Cylinders Vertically*

A3000 Cementitious Materials for Use in Concrete**

A3004-C2 Test Method for Determination of Compressive Strengths**

* [Part of A23.1/23:24/A23.2-04 :24 - Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete]

A3000-03 Cementitious Materials Compendium

A3004-C2 Test Method for Determination of Compressive Strengths** [Part of CAN/CSA A3000-03;23 - Cementitious Materials Compendium]

ASTM International

C 939-02C939-10 Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)

363.03 DEFINITIONS

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

Bedding Grout means a thin non-structural grout pumped into the grout distribution system that is cast in the bottom of the Fort Miller Super-Slab[®] Method to fill voids beneath the slabs to provide uniform support to the slab.

~~**Cement Treated Base** means granular base material stabilized with Portland cement.~~

Concrete Base means a rigid pavement structure, which is overlaid with asphaltic concrete, and may include concrete shoulders.

Concrete Pavement means a rigid pavement structure with an exposed concrete surface and may include concrete shoulders.

Continuous ~~**Precast Concrete Slab Repair**~~ means the continuous replacement of multiple consecutive slabs of concrete pavement or concrete base with inter-connecting precast concrete slabs.

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

Flowable Fill means a mixture of cementing materials, fine aggregate, water and admixtures, used as a leveling material with the Michigan Method.

Intermittent ~~Precast Concrete Pavement~~ Slab Repair means a 2 to 4.5 m long repair of concrete pavement or concrete base carried out using a single precast concrete slab.

Micro-grinding means the process of removing a thin layer (< 5 mm) of the treated base surface by grinding.

Slabs means precast concrete elements used to repair concrete pavement or concrete base. Where requirements for concrete base and concrete pavement slabs differ, the terms precast concrete pavement slabs and precast concrete base slabs are used, respectively.

363.04 DESIGN AND SUBMISSION REQUIREMENTS

363.04.01 Design Requirements

363.04.01.01 General

The design of the precast concrete slabs shall be either:

- a) Fort Miller Super-Slab® Method, or
- b) Michigan Method.

363.04.01.02 Flowable Fill Mix Design - Michigan Method

For flowable fill used as a levelling material, the mix shall be designed to provide adequate strength and durability for its intended use.

363.04.01.03 Bedding Grout Mix Design - Fort Miller Super-Slab® Method

For bedding grout, the mix shall be designed to provide adequate strength and durability for its intended use.

363.04.01.04 Proprietary Patching Materials

The proprietary patching material (PPM) selected for use shall be suitable for the application.

PPM shall be used to fill the dowel slots for the Michigan Method and the inverted dovetail slots for the dowel and tie bars for the for the Fort Miller Super-Slab® Method.

The PPM selected for use for the Fort Miller Super-Slab® Method shall be a non-shrink grout capable of being pumped into and completely filling the inverted dovetail slots to encompass dowels or tie bars completing the structural connection between slabs.

363.04.02 Submission Requirements

363.04.~~01~~02.01 Precast Concrete ~~Pavement~~ Slab Repair Plan

At least 2 weeks prior to the start of the trial or start of the work, details on ~~if the method of trial is not required,~~ the following ~~operations~~ shall be submitted to the Contract Administrator:

- a) Method of precast concrete slab repair for intermittent and continuous slab repairs. If an alternative

continuous precast method is proposed, the following supporting documentation shall be submitted for acceptance by Owner:

- i. Demonstration and documentation of good field performance under similar conditions, such as precast, prestressed concrete, and
- ii. Design details.

b)a) — Fabrication Details of fabrication, transportation, and installation of ~~each~~ precast concrete slab ~~repair method repairs.~~

~~b) — Removal~~ c) Details on the method of removal of existing ~~concrete pavement~~ (i.e., sawcutting, removal, equipment, and disposal).

~~c) — Removal of hot mix asphalt repair.~~

d) ~~Base~~ Details on the method of base preparation.

e) Details on the method of installing precast concrete slab.

f) — Precast slab Details on the method of grouting or placement of proprietary patching material (including =

~~f) — Grouting (i.e., equipment to be used for mixing and installing).~~

363.04.01.02 — Precast Concrete Mix Design

g) Details of joint forming and sealing.

363.04.02.02

~~The precast concrete mix design shall be submitted to the Contract Administrator at least 2 weeks prior to the start of the work.~~

~~Documentation shall be included with the submission of the mix design that demonstrates the proposed mix design and materials meet the requirements of this specification, including the air void system in the hardened concrete and the minimum specified 28-Day compressive strength.~~

~~All supporting test data shall not be more than 12 months old at the time the concrete mix design is submitted to the Contract Administrator.~~

363.04.01.03 Flowable Fill Mix Design - Michigan Method

When flowable fill is used as a levelling material, a concrete mix design for flowable fill, according to the Mix Design subsection of OPSS 1350, shall be submitted to the Contract Administrator at least 2 weeks prior to the start of the work. ~~Trial batch documentation shall also be submitted to the Contract Administrator for review a minimum of 7 Days prior to placement~~ trial or start of the work if the trial is not required.

363.04.01.0402.03 Proprietary ~~Concrete Repair Material (PCRM)~~ Patching Materials - Product Details

363.04.02.03.01 General

At least ~~7-Days~~ 2 weeks prior to ~~commencement~~ the start of the trial or start of the work ~~if the trial is not required~~, the name of the PCRMPPM selected for use and the manufacturer's specifications and recommendations for placement and the strength gain charts shall be submitted to the Contract Administrator. The submission shall also include documentation verifying the suitability of the product for the application and evidence of successful performance in a similar application. The PCRMPPM and supporting information provided shall be acceptable to the Owner.

363.04.02.03.02 Strength Gain Charts

Strength gain charts for the PPM shall be developed to determine the rate of strength gain. The minimum length of time for the strength gain chart shall be the period of lane closure specified in the Contract Documents.

The size, preparation and testing of grout cubes shall be according to Testing for Early Strength of PPM section of this specification.

For the development of the strength gain chart, a minimum of six sets of cubes shall be tested for compressive strength. The Contractor is responsible for the timing and frequency of the testing of the cubes.

The PPM strength gain chart shall be developed and submitted to the Contract Administrator at the time of submission of the mix design for PPM.

The above data shall be accompanied by a covering letter, signed by an Engineer, identifying the curing method and test method, and detailing the development of the strength gain chart.

All supporting test data shall not be more than 12 months old at the time the ~~04~~PPM product detail and mix design is submitted to the Contract Administrator.

If the ambient air temperature at time of placement differs from the ambient air temperature during the development of the strength gain charts by more than 10 °C, new strength gain charts shall be submitted.

In the event that field performance or conditions are no longer representative of the conditions under which the submitted strength gain charts were developed, a new mix design and charts shall be resubmitted prior to proceeding with precast concrete slab repairs.

363.04.02.04 Bedding Grout Mix Design - Fort Miller Super-Slab® Method

When bedding grout is used, a concrete mix design for the bedding grout, according to the Mix Design subsection of OPSS 1350, shall be submitted to the Contract Administrator at least 2 weeks prior to the start of the trial or start of the work if the trial is not required.

363.04.02.05 Chipping Hammer

At least ~~one week~~7 Days prior to commencement of the work, a copy of the manufacturer's published specifications on the chipping hammers to be used shall be submitted to the Contract Administrator.

363.04.02.06 Test Results for the Trial Precast Concrete Slab Repair

Test results from the trial precast concrete slab repair shall be submitted to the Contract Administrator, as they become available, and shall include the following:

- a) Test results for 28-Day compressive strength of flowable fill, if used.
- b) Test results for compressive strength of PPM at the anticipated time of opening of the repair to traffic.
- c) Test results for 28-Day compressive strength of PPM.
- d) Test results for 12-hour compressive strength of bedding grout, if used.

363.05 MATERIALS

363.05.01 Precast Concrete Slabs Admixtures

~~363.05.01.01~~ General

~~Air entraining and chemical admixtures for flowable fill, bedding grout and bonding agent shall be according to OPSS 1303.~~

~~363.05.02~~ Bedding Grout - Fort Miller Super-Slab® Method

~~Bedding grout shall be a mixture of cementing materials, fine aggregate, water and admixtures.~~

~~The minimum bedding grout shall have a flow rate of 17 to 22 seconds when measured according to ASTM C939.~~

~~The compressive strength of concrete at 28 Days shall be 30 MPa. Testing of the concrete compressive strength shall be carried out according to CSA A23.2.~~

~~the bedding grout~~

~~The air void parameters of the hardened concrete shall be a minimum of 2.0 MPa at 12 hours.~~

~~363.05.03~~ Bond Breaker for Dowel Bars

~~Dowel bars shall be coated with RC-250, Tectyl 506, or an air content of 3% and a maximum spacing factor alternative type of 0.230 mm material acceptable to the Owner. Concrete~~

~~363.05.04~~ Bonding Agent

~~Bonding agent shall meet the requirements consist of the materials section of OPSS 350 and OPSS 1350 with the following exceptions and additions:~~

~~Concrete aggregates Portland cement, Type GU or Portland limestone cement, Type GUL. Sand shall be according to OPSS 1004. Cementing material shall be according to OPSS 4002/1301.~~

~~a) The nominal maximum size of coarse aggregate shall be 19 mm.~~

~~363.05.01.02~~ Finishing05 Cementing Material

~~Finishing of precast concrete slabs Cementing materials for flowable fill, bedding grout and bonding agent shall be according to OPSS 350.1301.~~

~~363.05.01.03~~ Texturing of Surface06 Epoxy Adhesives

~~Texturing of the precast concrete slab surface Epoxy adhesives shall be according to OPSS 350 except that manual devices may be used to provide of the type approved for horizontal dowel applications and mixed in the required tined texture.~~

~~nozzle (cartridge). Epoxy adhesive~~

~~363.05.01.04~~ Dimensions

~~Precast concrete slabs shall be full lane width and length of 2 to 4.5 m. Prior to fabrication, from the concrete thickness at each repair location DSM list. Cementitious grouts shall be determined. Slabs may be cast a maximum of 15 mm thinner than the existing concrete to be repaired to accommodate the bedding material not be permitted for this application.~~

~~363.05.07~~ Expansion Caps for Dowel Bars

~~Caps shall be tight-fitting and made of compressible, non-absorptive, closed cell polyethylene that will allow approximately 6 mm movement at the end of the dowel bar.~~

363.05.0208

Fine Aggregate for Base Preparation - Fort Miller Super-Slab® Method

Fine aggregate for base preparation shall be ~~100% crushed fine aggregate produced from a quarry or talus only, with a plasticity index of 0%, when tested~~ according to LS-703 and LS-704 and a maximum micro-Deval abrasion loss of 35, ~~when tested~~ according to LS-619.- Fine aggregate means that portion of aggregate material passing the 4.75 mm sieve when tested according to LS-602. Recycled materials shall not be permitted.

363.05.0309

Flowable Fill - Michigan Method

Flowable fill shall consist of ~~a mixture of Portland cement, coarse and cementing materials, fine aggregate, fly ash, and water, and may contain air entraining admixture or ground granulated blast furnace slag or both and admixtures.~~

~~Portland cement~~ Fine aggregate for flowable fill shall be ~~Type GU cement~~ according to ~~CSA A3000.~~

~~Fly ash shall be according to CSA A3000.~~

~~Coarse and fine aggregate shall meet the requirements of OPSS 1002 and shall have a maximum aggregate size of 12.5 mm.~~

The compressive strength of the flowable fill mixture shall not be less than 0.5 MPa or greater than 1.0 MPa at 28 Days.

~~If an air entraining admixture is used, then~~ **363.05.10 Joint Sealing Compound**

Joint sealing compound shall be according to OPSS 369.

363.05.11 Precast Concrete Slabs

Precast concrete slabs shall be according to OPSS 1355 with the air content following additions:

- a) The minimum compressive strength of concrete at 28 Days shall be 30.0 MPa.
- b) The nominal maximum size of coarse aggregate shall be 19 mm.
- c) For precast concrete pavement slabs and precast concrete base slabs, after all finishing operations are completed and before curing and protection of the flowable fill concrete, the plastic surface of the concrete shall receive an initial texturing. The initial texturing shall be performed with a longitudinal burlap drag to produce a uniform textured surface. The burlap shall be kept in a clean and damp condition, free from tears and encrusted mortar. Burlap shall not exceed 35% of the flowable fill volume. add excessive water to the concrete surface.
- d) Precast concrete pavement slabs and precast concrete base slabs that will be exposed to traffic shall receive a final texturing while in a plastic state using equipment manufactured to produce longitudinal tines 3 mm ± 1 mm wide on 16 mm ± 3 mm centres with a tine depth of 4 mm ± 1 mm. Tining shall not extend within 75 mm ± 15 mm of the pavement edge. The surface of the concrete shall be free in all cases from displaced aggregate particles and local projections.
- e) Slabs shall be full lane width and shall be 2 to 4.5 m in length. Prior to fabrication, the concrete pavement or concrete base thickness at each repair location shall be determined. Slabs may be cast a maximum of 15 mm thinner than the existing concrete to be repaired to accommodate the bedding material.

363.05.04 Bedding Grout - 12 Proprietary Patching Materials

Proprietary patching material used for the Michigan Method shall be from the Owner's List of Acceptable

Concrete Patching Materials. The list of proprietary patching materials shall be obtained from the Contract Administrator.

Proprietary patching material used for the Fort Miller Super-Slab® Method shall be a product recommended for use by Fort Miller Co., Inc.

~~Bedding grout shall be a mixture of cement, water, and plasticizing admixture. The grout mixture shall have a flow rate of 17 to 22 seconds as measured by ASTM C 939 to ensure fluidity. The minimum compressive strength of the PPM prior to opening to traffic shall be 20 MPa.~~

~~The minimum compressive strength of the bedding grout PPM at 28 Days shall be a minimum of 2.030 MPa at 12 hours.~~

363.05.0513 Tie Bars and Dowel Bars

Tie bars and dowel bars shall be according to OPSS 1440. ~~Dowel~~ Tie bar and dowel bars shall be epoxy coated according to OPSS ~~1444~~ 1442.

~~363.05.06~~ **Expansion Caps for Dowel Bars**

~~Caps shall be tight fitting and made of compressible, non-absorptive, closed cell polyethylene that will allow approximately 6 mm movement at the end of the dowel bar.~~

~~363.05.07~~ **Bond Breaker**

~~14~~

~~Dowel bars shall be coated with RC-250, Tectyl 506, or an approved equivalent.~~

~~363.05.08~~ **Proprietary Concrete Repair Material (PCRM)**

~~The PCRM selected shall be suitable for the application.~~

~~The minimum compressive strength of the PCRM at 28 Days shall be 30 MPa.~~

~~The PCRM for use in the dowel grout of the Fort Miller Super-Slab® Method shall be capable of being pumped into the inverted dovetail slots.~~

~~363.05.09~~ **Epoxy Adhesives**

~~Epoxy adhesives shall be from the Owner's approved product list and shall be of the type intended for horizontal dowel application and mixed in the cartridge nozzle.~~

~~363.05.10~~ **Joint Materials**

~~The joint sealant material shall be according to OPSS 369.~~

~~363.05.11~~ **Water**

Water ~~Water used for flowable fill, PPM, bedding grout, bonding agent and proprietary patching materials~~ shall be according to OPSS 1302.

363.06 EQUIPMENT

363.06.01 Air Compressor

The compressor for air blasting shall have a minimum capacity of 3.5 m³/min. The compressed air shall be free from oil and other contaminants.

363.06.02 Chipping Hammer

Chipping hammers shall be hand-held and have a maximum weight of 9.0 kg prior to any handle modification, where applicable, and a maximum piston stroke of 102 mm. All hammers shall have the manufacturer's name and part or model number engraved on them by the manufacturer. All information shall be clearly legible. The manufacturer's published specifications shall be the sole basis for determining weight and piston stroke.

363.06.03 Consolidating Equipment

Internal vibrators used to consolidate the PPM in the dowel bar slots shall have a maximum diameter of 25 mm and shall have a resilient covering that will not damage the epoxy coated dowels during use.

363.06.04 Gang Drill

Gang drills shall consist of not less than three independently powered pneumatic drills. The gang drill shall be capable of drilling through steel and shall not damage adjacent concrete.

363.06.05 Gang Saw

The gang saw shall have gang-mounted diamond saw blades and shall be capable of cutting at least 3 parallel slots simultaneously at a slot spacing of 300 mm within a tolerance of 3 mm.

363.06.06 Screeding Device for Base Preparation

The screeding device used for fine grading for base preparation shall be laser or otherwise mechanically controlled and shall be capable of fine grading fully compacted fine aggregate or flowable fill to a tolerance of 3 mm.

~~363.06.02 Gang Drill~~

~~The gang drill shall consist of not less than three independently powered pneumatic drills.~~

~~363.06.03 Chipping Hammer~~

~~Chipping hammers shall be hand held and have a maximum weight of 9.0 kg prior to any handle modification, where applicable, and a maximum piston stroke of 102 mm. All hammers shall have the manufacturer's name and parts or model number engraved on them by the manufacturer. All information shall be clearly legible. The manufacturer's published specifications shall be the sole basis for determining weight and piston stroke.~~

~~363.06.04 Gang Saw~~

~~The gang saw shall have gang-mounted diamond saw blades and shall be capable of cutting at least 3 parallel slots simultaneously at a slot spacing of 300 mm within a tolerance of 3 mm.~~

~~363.06.05 Compressor - Air Blasting~~

~~The compressor for air blasting shall have a minimum capacity of 3.5 m³/min. The compressed air shall be free from oil and other contaminants.~~

~~363.06.06 Consolidating Equipment~~

~~Internal vibrators used to consolidate the PCRM in the dowel bar slots shall have a maximum diameter of 25 mm and shall have a resilient covering that will not damage the epoxy coated reinforcement during use.~~

363.06.07 Hand Finishing Equipment

Hand finishing equipment shall be according to OPSS 904.

~~363.06.08~~ Straight Edges

Straight ~~edges~~edge shall be ~~according to OPSS 904~~commercially made of metal, and 3 m long.

363.07 CONSTRUCTION

363.07.01 General

Precast concrete ~~pavement~~ slab repairs shall be carried out at the locations identified in the Contract Documents. ~~The work may include both continuous and intermittent slab repairs.~~

~~Acceptable~~The work may include the following acceptable methods of ~~intermittent~~ slab ~~repair~~are repairs:

a) Intermittent Slab Repair - the Fort Miller Super-Slab® Method and the Michigan Method, as modified by the requirements of this specification; and

~~Acceptable methods of continuous slab repair are b)~~ Continuous Slab Repair - the Fort Miller Super-Slab® Method, as modified by the requirements of this specification, or an alternative continuous precast method with demonstrated and documented good field performance under similar conditions, such as precast, prestressed concrete that is acceptable to the Owner.

Precast concrete slab repairs shall have a load transfer efficiency of greater than or equal to 70%, when testing using a falling weight deflectometer (FWD).

363.07.01.01 Fort Miller Super-Slab® Method

~~In~~For the Fort Miller Super-Slab® Method, the work shall consist of fabricating precast concrete ~~pavement slab repairs~~slabs (i.e., Super-Slab®), sawcutting and removing the existing concrete pavement or concrete base, repairing and compacting the existing subbase, underlying material as necessary, placing and grading fine aggregate base material, drilling holes and inserting and securing dowel bars and tie bars, placing precast concrete slabs, installing PCRMPPM in inverted dovetail slots, installing bedding grout beneath the slabs, and sealing of joints.

363.07.01.02 Michigan Method

~~In~~For the Michigan Method, the work shall consist of fabricating precast concrete ~~pavement slab repairs~~slabs with dowel bars, sawcutting and removing the existing concrete pavement or concrete base, repairing and compacting the existing underlying material as necessary, constructing dowel bars slots in adjacent existing concrete, placing of flowable fill levelling material, placing precast concrete slabs, installing PCRMPPM in dowel bar slots, and sealing of joints.

363.07.02 Trials

~~363.07.02.01.03~~ Proprietary Patching Material Strength Gain Charts

For precast concrete repairs, strength gain charts shall be developed for the purpose of determining the rate of strength development of the PPM. Strength charts shall be developed prior to commencement of the trial precast concrete slab repair. If a trial area is not required, strength gain charts shall be developed prior to construction of the precast concrete slab repair.

363.07.02.02

Trial Precast Concrete Slab Repair

Prior to carrying out the precast concrete ~~pavement~~ slab repair, the ability to successfully carry out the slab repair according to this specification shall be demonstrated to the Contract Administrator by ~~placing~~completing a trial precast concrete slab repair ~~slab~~ within the Contract limits, including all material testing required by specification.

~~In lieu of a trial slab repair, the Contract Administrator may accept evidence demonstrating the ability to successfully conduct the slab repair with the same equipment, placing crew, and methodology to meet the Contract requirements for conducting the slab repair on any Contract within the last 12 months.~~

The trial slab repair shall ~~be conducted on~~include both ~~the~~ intermittent slab and continuous slab ~~repairs~~. The location of the trial slab repair shall be proposed to the Contract Administrator for approval. The Contract Administrator shall be given a minimum of 48 hours notice prior to the trial slab repair.

The strength gain chart for the PPM strength versus time, according to this specification, shall be verified during the trial.

The Contract Administrator shall allow the slab repair work to continue based on an acceptable visual assessment of the trial ~~and acceptable test results~~. When the slab repair is rejected ~~by visual assessment~~, additional trial slab repairs shall be performed until the trial slab repair meets the requirements of this specification.

Unacceptable trial ~~repair slabs~~precast concrete slab repairs shall be ~~repaired, removed, or reinstalled, as and replaced.~~

A trial slab repair is not required if the Contractor has demonstrated successful placement of a slab repair using the same equipment, placing personnel and methodology, meeting all specification requirements, within the last 12 months on another MTO Contract.

363.07.0203

Operational Constraints

The Contract Administrator shall be notified in writing of the intent to repair the concrete pavement or concrete base 7 Days prior to the commencement of the repairs.

Vehicles shall not be permitted to drive on areas where the concrete pavement or concrete base has been removed, in whole or part.

Perimeter sawcutting of the removal area shall not be carried out more than ~~4-week~~7 Days in advance of the expected date of repair.

Bedding~~Placement of bedding~~ grout and ~~dowel grout~~PPM shall be carried out as soon as possible after the installation of the precast concrete ~~pavement~~ slab.

The temperature of the flowable fill mixture used for the Michigan Method, as manufactured and delivered, shall be ~~at least a minimum of~~ 10 °C. Placement of flowable fill shall not be allowed if the anticipated air temperature will be 2 °C or less in the 24 hour period following the proposed time of placement.

The ~~PCR~~MPM shall not be placed when the air temperature is outside the manufacturer's recommended temperature range or is likely to fall or rise outside the range throughout the duration of the material placing operation. Prior to placing the ~~PCR~~MPM, it shall be demonstrated to the Contract Administrator that the existing concrete temperature in the repair area meets the manufacturer's requirements by measuring and recording the substrate temperatures using a contact thermometer or infrared thermometer with an accuracy of ± 1°C.

Construction vehicles, equipment, or traffic shall not be permitted to travel on the precast repair until the

PCRMPPM has attained a minimum compressive strength of 20 MPa.

~~Each repair~~Repairs at each location shall be completed within the time period specified in the Contract Documents. ~~- If the repair is not progressing at a rate that will permit the full restoration of traffic within the allowable time period, appropriate measures acceptable to the Contract Administrator shall be undertaken to allow opening of the road to traffic. Full depth precast concrete slab repairs,~~ according to the Repairs clause of this specification, shall replace the above temporary work during the next scheduled closure.

363.07.0304 Removals

Repair areas shall be as specified in the Contract Documents or as demarcated by the Contract Administrator.

A template shall be used to precisely delineate the limits of the areas to be repaired within a tolerance of 12 mm. Repairs shall be the full width of the lane and full depth of the concrete pavement or ~~hot mix asphalt repair~~concrete base.

Concrete removal shall be carried out according to OPSS 510. The outer limits of the concrete removal area shall be sawcut full depth ~~and~~. Where exposed concrete pavement or concrete base conditions are sufficient to support traffic loading, advanced sawcutting is permitted up to 7 Days in advance of the expected date of removal. Sawcuts shall not be overcut by extend no more than 250/100 mm into the existing adjacent concrete that is to remain in place. Overcuts~~Sawcuts in concrete that are to remain in place~~ shall be filled with a ~~proprietary product~~an epoxy resin acceptable to the Owner.

Concrete removal shall be by a lift-out method. ~~Removals shall be carried out without damaging the adjacent concrete pavement or rather than breaking in place. Adjoining concrete, asphalt shoulder or disturbing the and underlying base- shall remain undisturbed.~~ Heavy breaking equipment such as hoe rams shall not be used in the removal operation. ~~The concrete pavement~~ or base shall not be broken in place.

If during the removal, the underlying material below the concrete pavement or concrete base is disturbed, removed, or damaged, the underlying materials shall be repaired and/or replaced at no additional cost to the Owner.

When the underlying material is open graded drainage layer (OGDL), repair and/or replacement shall be with Granular O meeting the requirement of OPSS 1010 or 100% crushed 9.5 mm clear stone meeting the requirement of OPSS 1004.

When the underlying material is granular, the material requirements shall be according to OPSS 1010. Compaction of the granular materials shall be by means of:

- a) A plate tamper with a minimum mass of 80 kg, or
- b) A self-propelled (walk-behind) single or tandem steel drum with a minimum static mass of 500 kg used in vibration mode.

If the concrete removal operation causes damage, cracks or displacement of the adjacent concrete is damaged or cracked due to the removal procedure, the or asphalt:

- a) Corrective action shall be taken immediately; and
- b) The damaged concrete shall be repaired according to OPSS 360. Asphalt surfaces damaged during the removal processor asphalt shall be repaired. A proposal for repairs shall be provided according to the Contract Administrator for approvalRepairs subsection of this specification.

363.07.0405 Base Preparation

363.07.0405.01 General

Levelling material shall be either a flowable fill for the Michigan Method or fine aggregate for the Fort Miller Super-Slab[®] Method meeting the requirements of this specification.

Micro-grinding of the existing ~~ement~~-treated base is recommended if minor adjustment for the base level is required.

363.07.0405.02 Flowable Fill - Michigan Method

The batching equipment shall have devices designed to measure the specified quantities of each component material and mixing shall be of sufficient duration to ensure uniform consistency of the ~~mixture-flowable fill~~. Water content shall be maintained so that compressive strengths are achieved and a uniform, flowable mixture is developed that is ~~essentially~~ self-levelling when placed.

363.07.0405.03 Fine Aggregate - Fort Miller Super-Slab[®] Method

Fine aggregate shall be compacted then fine graded using a screeding device capable of grading the fully compacted bedding material to the required tolerance.

~~363.07.05 Steel Reinforcement~~

~~Steel reinforcement shall be according to OPSS 905.~~

363.07.06 Dowel Bar Precast Concrete Slab Installation - Michigan Method

363.07.06.01 Sawcutting Dowel Bar Slots

~~Slots~~Dowel bar slots shall be created using gang saws.- The slots shall be 65 mm wide by 450 mm long and to a maximum depth to allow the dowel bar to be placed at mid-~~slab~~-depth of the slab with 12 mm cover under the bar.- The slots shall be parallel to the centreline of the roadway with a maximum tolerance of 3 mm from a parallel line. Over-cutting dowel bar slots shall not be permitted.

Equipment shall not cause damage to the existing pavement. Immediately after the sawing operation, slots and joints shall be flushed with water under pressure in one direction to remove the slurry. All slurry from the sawcutting operation shall be removed from the slot and pavement. ~~Over-cutting dowel bar slots is not permitted.~~

363.07.06.02 Concrete Removal in Dowel Bar Slots

Chipping hammers shall be used to remove concrete within the slots.- Concrete shall be removed to ensure the bottom of the slot is level and in such a manner as to prevent damage to the concrete remaining in place. The chipping hammers shall not be permitted to break through the concrete. ~~If the concrete removal operation causes damage to the adjacent concrete pavement, corrective action shall be taken immediately.~~

If ~~during the removal process~~ concrete removal operation causes damage, cracks or displacement of the adjacent concrete ~~is or~~ asphalt:

a) Corrective action shall be taken immediately; and

b) The damaged due to the removal operation, the damaged concrete or asphalt shall be repaired as a partial depth repair according to OPSS 360 the Repairs subsection of this specification.

~~The chipping hammers shall not be permitted to break through the concrete. In the event of a break through or if a crack develops within a slot, the repair shall be treated as a full depth repair and the entire joint within the lane shall be removed and replaced with a 2 m full depth concrete repair according to OPSS 360.~~

363.07.06.03 Slot Cleaning

All concrete surfaces within the slot shall be solid, free from loose or unsound fragments. All concrete surfaces shall be abrasive blast cleaned according to OPSS 929 and all dust and loose material shall be removed from the prepared surface by using compressed air.

363.07.06.04 ~~Placing the PCRM in Dowel Bar Slots – Michigan Method~~ Precast Concrete Slab Installation

The installation of precast concrete slabs shall not damage the adjacent concrete or asphalt.

Immediately prior to placement of each slab, bond breaker shall be applied to the vertical face of the transverse joints of the existing concrete.

The use of pry bars or wedges in joints for alignment purposes shall not be permitted.

The vertical differential between adjacent pavement shall be less than 6 mm. If the vertical differential is greater than 6 mm, the surface shall be brought to the required tolerance by diamond grinding.

The maximum allowable transverse joint width shall be 12 mm and the maximum allowable longitudinal joint width shall be 20 mm.

363.07.06.05 Placing the PPM in Dowel Bar Slots

All concrete surfaces within the slot shall be ~~in accordance with prepared according to the PPM manufacturer's requirements. Care~~ The slot shall be taken to prevent clean and free of standing water in the slot. Prior to placing the PCRM, all excess immediately prior to placement of the bonding agent, if used, and PPM. Standing water shall be removed with from the slots using compressed air.

~~The treatment of the concrete surfaces within the slot with a~~ A bonding agent, if shall be used to treat the existing concrete surface when required by the PPM manufacturer.

~~The bonding agent and the mixing, placing, finishing, and curing of the PCRM~~ PPM shall be done mixed, placed and finished according to the manufacturer's recommendations. requirements of the PPM manufacturer with the following exceptions or additions:

a) A metering or measuring device shall be used to establish the correct amount of mixing water. for the PPM;

b) All batches of PCRMthe PPM shall be consistent.;

~~PCRM shall not be spilled onto the adjacent concrete surface when placing in slots. The PCRM~~

c) The temperature of the plastic PPM at the time of discharge from the mixer, shall be between 10 and 25°C;

d) The PPM shall be vibrated to consolidate the material into the slot and around the dowel bar.;

e) The PCRMPPM shall be finished flush with the surface of the concrete and all excess material removed immediately. Hand finishing shall be minimized to prevent overworking of the repair. The PCRM shall be cured according to the manufacturer's recommendations. immediately;

f) Moist curing using wet burlap according to OPSS 904 to maintain 100% relative humidity shall be immediately applied after finishing of the PPM and shall be maintained for at least 24 hours or until the time of opening to traffic;

363.07.07.07 Precast Concrete Slab Installation - Fort Miller Super-Slab® Method

363.07.07.01 Dowel Bar and Tie Bar Installation -Fort Miller Super-Slab® Method

Tie bars and dowel bars shall be installed as specified in the Contract Documents. ~~Tie bars are only required for continuous repairs.~~

Gang drills shall be used to drill holes in the existing concrete for insertion of dowel bars-- and tie bars. Where existing dowel bars are encountered, the gang drill shall be used to drill through the steel. The diameter of the drill holes shall be no more than 5 mm larger than the diameter of the dowel bars or tie bars. -Drill holes shall be thoroughly cleaned by using a wire brush and compressed air blowing from the back of the drill hole outwards.- Drilling equipment shall be used in a manner to ensure adjacent pavement is not damaged.

Dowel bars and tie bars shall be secured into the existing concrete with an epoxy adhesive. -The epoxy adhesive shall be injected into the back of the cleaned drill hole and the dowel bar or tie bar with grout retention disks attached, and shall be inserted to ensure the bars are completely encased with epoxy adhesive for the full depth of the hole. ~~Tie bars and dowel bars shall be installed as specified in the Contract Documents.~~ ~~Tie bars are only required for continuous repairs.~~

363.07.08 07.02 Precast Concrete Slab Installation -Fort Miller Super-Slab® Method

Slabs~~Immediately prior to placement of each new slab, bond breaker shall be applied to the vertical face of the transverse joint of the previously placed slab or existing concrete and dowels that protrude from it. Precast concrete slabs shall be guided into position during installation using guide bars inserted in bedding grout port holes to align slabs during setting. -The use of pry bars or wedges in joints for alignment purposes shall not be permitted. The installation shall not damage the adjacent concrete or asphalt.~~

The vertical differential between adjacent slabs shall be less than 6 mm.- If the vertical differential is greater than 6 mm, the slab shall be removed, the base re-graded, and the slab reset until the differential is less than 6 mm prior moving on to the next slab.

The maximum allowable longitudinal and transverse joint widths shall be 12 mm for continuous repairs. For intermittent slab repair, the maximum allowable transverse joint width shall be 12 mm and the maximum allowable longitudinal joint width shall be 20 mm.

If precast concrete slabs are to be opened to traffic before they are grouted, incompressible shims shall be placed at approximate ¼ points in both the transverse and longitudinal joints to maintain horizontal alignment of the new precast slabs until they are grouted.

If un-grouted slabs are vertically displaced so that the vertical differential is greater than 6 mm as described above, the slab shall be removed, the base re-graded, and the slab reset prior to grouting, or the surface shall be brought to the required tolerance by diamond grinding ~~as required by this specification.~~

363.07.0907.03 Placing the Dowel Grout and Bedding Grout -Fort Miller Super-Slab® Method **Proprietary Patching Material**

Foam grout dams shall be installed at the open ends of the transverse joint to be grouted to prevent dowel grout~~PPM~~ from escaping during the installation. ~~Dowel grout~~

PPM shall be mixed ~~in strict accordance with~~according to the instructions provided by the manufacturer.- The volume of water shall be measured accurately for each batch by weighing the batch water or by using calibrated pails that are perforated at a level to ensure the correct amount of water is mixed with each bag of

grout. ~~Dowel grout~~PPM shall be pumped in the back port of each dowel slot until it comes out the second port in the same slot. Foot shall be placed over the second port and pumping shall be continued until the grout flows along the joint to the next slot. The same procedure shall be repeated for the back port of the next slot. The ~~grout~~PPM level in the previously filled ports shall be continually monitored. ~~Grout to ensure the PPM is flush with the slab. PPM shall be addedpumped into the ports, as necessary, to keepensure the grout-level of the PPM in the portsjoints and slots is even with the top of the slab-and in the joints above the top of the slots.~~

363.07.07.04 Placing the Bedding Grout

Bedding grout shall be placed after the ~~dowel grout~~PPM has been installed. ~~Bedding grout shall be mixed in strict accordance with the instructions provided by the manufacturer of the viscosity reducing admixture.~~ Bedding grout shall be pumped in the lowest port of the slab until it comes out the corresponding port at the other end of the slab. While filling the remaining ports in the slab, the grout level shall be continually monitored in previously filled ports and grout added, as required, to keep the grout level in the ports even with the top of the slab. ~~This will maintain a safe and adequate~~The head pressure ~~on~~shall be adequately maintained during the grouting operation to ensure the bedding grout ~~untilfills~~ all voids under the slab ~~are filled.~~

Before the bedding grout fully sets, the top 50 \pm 5 mm of bedding grout in each port shall be removed and replaced with ~~PCRM-PPM, mixed and cured according to the Placing the Proprietary Patching Materials clause.~~ The ~~PCRM-PPM~~ in all ports shall be finished flush ~~and matching~~ with the surface of the concrete and all excess material removed immediately.

363.07.4008 Tolerances

363.07.4008.01 Dowel Bar and Tie Bar Tolerances

Dowel bars shall be installed mid-depth of the concrete slab in a plane with the pavement or base surface and parallel to the centreline of the road. Tie bars shall be installed mid-depth of the concrete slab in a plane with the pavement or base surface and perpendicular to the longitudinal lane edge sawcut face. The tolerance for the alignment of dowel bars and tie bars shall be \pm 15 mm along the length of the bar in both the vertical and horizontal planes of the pavement or base and parallel to the direction of traffic.

363.07.4008.02 Surface Tolerances

The surface of the precast concrete slab repair shall join flush with the existing concrete pavement. ~~Surface tolerance or concrete base.~~

The surface of intermittent ~~repairs~~slab repairs shall be ~~so~~such that when tested with a 3 m long straight edge placed in ~~the longitudinal~~any direction, there shall ~~not~~ be ~~no~~ gap greater than 6 mm between the bottom of the straight edge and the surface of the pavement. ~~Surface tolerance~~

The surface of continuous ~~slabs~~slab repairs shall be ~~so~~such that ~~the gap is not greater than 6 mm~~ when ~~the tested with a 3 m long straight edge is~~ placed in any location and direction, including the edge of pavement, except across the crown or drainage gutters, there shall be no gap greater than 6 mm.

363.07.4409 Joint Sealing

All longitudinal and transverse joints shall be sealed according to OPSS 369.

363.07.12 — 10 Material Sampling and Testing

363.07.1210.01 General

~~All samples, including those handled by a commercial carrier shall be accompanied by a sample data sheet and any additional documents as specified elsewhere in the Contract Documents. When not specified or not included on the sample data sheet, samples shall be delivered with a transmittal form identifying the following information:~~

~~a) — Contract Number~~Field sampling and testing shall be performed by a person certified according to the Testing of Plastic Concrete clause of OPSS 1350.

~~All samples shall be accompanied by a copy of the completed MTO form PH-CC-322, Concrete Construction Report.~~

~~b) — Name of Contractor, name of contact person and telephone numbers.~~

~~c) — Name of Contract Administrator, and telephone numbers.~~

~~d) — Quantity and type of sample. When a sample consists of more than one item, each item shall be individually identified.~~

~~e) — Date sampled.~~

~~f) — Date shipped.~~

~~g) — Sample, lot, and subplot number.~~

~~h) — Sample location.~~

363.07.1210.02 Compressive Strength of ~~Concrete in Precast Slab~~Flowable Fill

~~Concrete test~~One set of two 150 x 300 mm cylinders per lot shall be cast, cured, ~~handled, and delivered and transported according to CSA A23.2-3C, for 28-Day~~day compressive strength testing according to OPSS 1350 based on 1 set of 2 cylinders taken for each batch of concrete by the Owner.

~~All concrete test cylinders shall be cast in moulds. The moulds shall be single use moulds according to CSA A23.2-1D and made of plastic with a lid. The lids shall be chemically and physically compatible with the concrete and shall provide watertight closure for the moulds.~~

~~The air temperature immediately adjacent to the cylinders shall be continuously recorded and monitored during the field-curing period. The maximum time interval for recording the temperature shall be every 15 minutes.~~

363.07.1210.03 Bedding Grout

363.07.10.03.01 Flow Rate

~~The bedding grout shall be sampled and tested for the flow rate according to ASMT C939. The bedding grout shall acceptable if the flow rate is between 17 and 22 seconds. Unacceptable bedding grout shall not be used in the work.~~

363.07.10.03.02 Compressive Strength ~~of Flowable Fill~~

~~The Sets of cubes for 12-hour compressive strength determination of the flowable fill bedding grout shall be determined by casting cylinders. Two sets of two standard 150 x 300 mm cylinders to represent a day's placement shall be cast, cured, and delivered. Cylinders for testing the 3-Day and 28-Day compressive strengths shall be stored and cured according to OPSS 1350, then transported to a quality assurance (QA) laboratory designated by the Owner in the Contract Documents. prepared.~~

~~Testing for 28-Day of the 12-hour compressive strength shall be conducted according to OPSS 1350, except that done by the Owner and the stainless steel molds shall be provided by the Contract Administrator.~~

~~Determination of the 12-hour compressive strength shall be according to CSA A3004-C2, with the following amendments:~~

- ~~a) A set of cubes shall consist of 6 test specimens for the determination of compressive strength at 12-hours.~~
- ~~b) The specimens shall be air-cured in their moulds stored on site at a temperature between 15 °C and 25 °C until they are to transportation to the designated laboratory.~~
- ~~c) The specimens shall be tested cured on site for as long as possible and transported to the laboratory in the moulds, immediately prior to testing at 12-hours.~~

~~The test specimens shall be accompanied by a transmittal form and MTO Form PH-CC-322, Concrete Construction Report.~~

363.07.1210.04 Compressive Strength of Proprietary ~~Concrete Repair Materials and Bedding Grout~~ Patching Material

Samples 363.07.10.04.01 General

~~Sets of PCRM shall be taken from the mixer in the field for the cubes for early strength determination of the early strength and 28-Day compressive strength. The PCRM shall be moulded into cubes according PPM, in addition to CAN/CSA A3004-C2.~~

~~Cubes shall be prepared on-site from the PCRM to be used to fill the slots. For the 28-Day compressive strength, the PCRM shall be sampled once for every 4 hours of production or a minimum of once per day, whichever is greatest. One set of six the cubes shall be made from each sample of PCRM.~~

~~Additional cubes required for determination of strength at 28 Days, shall be prepared.~~

~~Testing of early strength shall be prepared. One done by the Contractor and the stainless steel moulds shall be provided by the Contractor. Testing of 28-Day strength shall be done by the Owner and the stainless steel moulds shall be provided by the Contract Administrator.~~

~~Determination of compressive strength shall be according to CSA A3004-C2, with the following amendments:~~

- ~~a) A set of six cubes shall be made for the final repair area of each closure. These cubes shall be tested to verify that the PCRM in the repair area has attained a consist of 6 test specimens for the determination of compressive strength of 20 MPa. These test results shall be communicated immediately to the Contract Administrator prior to opening to traffic for each test age.~~

~~The timing of testing and frequency of testing of the early strength cubes shall be determined when the PCRM has attained a minimum compressive strength of 20 MPa.~~

- ~~b) The specimens shall be stored on site at a temperature between 15 °C and 25 °C and shall not be moved prior to demoulding. ~~The~~~~
- ~~c) For early strength determination, the Contractor shall be responsible for the timing of demoulding and transportation of the test specimens to the designated laboratory.~~
- ~~d) For 28-day strength determination, the specimens shall be demoulded and transported to the ~~QA~~designated laboratory ~~designated by the Owner~~ within 24 hours ± 4 hours. ~~The samples shall be transported~~~~
- ~~e) For 28-day strength determination, the test specimens shall be demoulded on site and shall be placed in a sealed white opaque plastic bag containing at least 250 ml of water and maintained at a temperature between 15 °C and 25 °C, for transportation to the designated laboratory.~~

~~The test specimens shall be accompanied by a transmittal form and MTO Form PH-CC-322, Concrete Construction Report.~~

363.07.10.04.02 Early Strength

~~Prior to early loading and opening to traffic, it shall be demonstrated that the PPM has attained a minimum compressive strength of 20 MPa.~~

~~The laboratory conducting the early compressive strength tests shall be certified as a concrete testing laboratory by the Canadian Council of Independent Laboratories (CCIL) that has successfully participated in the MTO correlation program.~~

~~A minimum of two sets of six cubes shall be cast from the final repair area of each closure.~~

~~The test results shall be immediately provided to the Contract Administrator prior to opening the repair to traffic.~~

363.07.10.04.03 28-Day Compressive Strength

~~Two sets of 6 cubes shall be cast per lot, one set for acceptance testing and one set for referee testing, if invoked. The Contract Administrator shall randomly select the batch from which the acceptance and referee samples are taken.~~

363.07.11 Repairs

~~Precast concrete slabs that do not meet the surface tolerance requirements shall be removed and replaced, or repaired by diamond grinding. Diamond grinding shall be according to OPSS 350.~~

~~Concrete pavement or concrete base adjacent to precast concrete slab repairs, that is damaged, cracked or displaced during removals or installation of the precast concrete slab shall be removed and replaced with new concrete. The damaged concrete shall be cut back full depth to sound concrete and repaired according to OPSS 366.~~

~~Asphalt surfaces damaged during the removal process shall be repaired at no additional cost to the Owner.~~

~~All repairs shall be at no additional cost to the Owner. A repair proposal shall be submitted to Contract Administrator for approval. Repairs shall not proceed until written acceptance of proposal has been received.~~

363.07.12 Access for Quality Assurance

Electrical power, scaffolding, protection from the weather, and unhindered access for inspection and testing of all the work, including assessment of repairs, shall be provided to the Contract Administrator or Owner's representative.

Any debris and obstructions shall be removed to allow access for the purposes of inspection.

363.07.13 Management of Excess Material

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

363.08 QUALITY ASSURANCE

363.08.01 Field Inspection

The Contract Administrator will inspect the precast concrete slabs prior to and after installation to determine if the work contains any of the following defects:

- a) Cracking, voids, honeycombing, delaminations or spalling of the concrete or PPM.
- b) Unrepaired sawcuts in the adjacent pavement or base from the removal process.
- c) Rocking or lack of support of precast concrete slab.
- d) Precast concrete slabs that do not meet the specified surface tolerance.
- e) Tining that does not meet the requirements of this specification.
- f) Any other defects and deficiencies, not meeting the requirements of this specification.

Any work that does not meet the requirements of this specification and contains defects or deficiencies shall be deemed rejectable.

363.08.02 Acceptance of Water, Admixtures, and Cementing Materials

Acceptance of water, admixtures and cementing materials shall be according to OPSS 1350.

363.08.03 Acceptance of 28-Day Compressive Strength of Flowable Fill

A lot shall consist of all the flowable fill from one Day's placement. One set of two 150 x 300 mm cylinders shall be tested for 28-day compressive strength per lot to determine the acceptance of the lot. The compressive strength of a lot shall be the average of the set of the 2 acceptance cylinders.

Compressive strength shall be determined according to LS-407, with the exception that specimens shall be air cured in their moulds until they are tested.

Compressive strength shall be considered acceptable when the lot strength is not less than 0.5 MPa or greater than 1.0 MPa.

Unacceptable flowable fill shall be deemed rejectable.

363.08.04 Acceptance of Compressive Strength of Bedding Grout

A lot shall consist of all the bedding grout from 4 hours of production or if the production period is less than 4 hours, all the bedding grout from one Day's placement. One set of six cubes shall be tested for 12-hour compressive strength per lot to determine the acceptance of the lot. The compressive strength of a lot shall be the average of the set of the 6 cubes.

Compressive strength shall be determined according to CSA A3004-C2.

Compressive strength shall be considered acceptable when the lot strength is greater than or equal to 2.0 MPa at 12 hours.

Unacceptable bedding grout shall be deemed rejectable.

363.08.05 Acceptance of 28-Day Compressive Strength of Proprietary Patching Material

A lot shall consist of all the PPM from 4 hours of production or if the production period is less than 4 hours, all the PPM from one day's placement. One set of six cubes shall be tested for 28-day compressive strength per lot to determine the acceptance of the lot. The compressive strength of a lot shall be the average of the set of the 6 cubes.

Compressive strength shall be determined according to CSA A3004-C2.

Compressive strength shall be considered acceptable when the lot strength is greater than or equal to 30.0 MPa at 28 days.

Unacceptable PPM shall be deemed rejectable.

363.08.05.01 Referee Testing

The referee testing process for proprietary patching material compressive strength is based on duplicate cubes cast at the same time as the acceptance cubes.

Referee testing of compressive strength for a lot may only be invoked by the Contractor within 3 Business Days of receiving the test results for that lot.

The referee laboratory shall be designated by the Owner. Referee test results shall be forwarded to the Contractor as they become available.

If the difference between the referee test result and the acceptance test result is less than or equal to the confirmation value, then the acceptance test result is confirmed, and the acceptance test result shall be used in the determination of acceptance for the proprietary patching material. If the difference between the referee test result and the acceptance test result is greater than the confirmation value, the acceptance test result is not confirmed, and the acceptance test result shall be disregarded and the referee results shall be used in the determination of acceptance. The confirmation value for confirming the acceptance test result shall be the greater of 10% of the specified strength or 10% of the strength of the acceptance cubes, expressed to one decimal place.

363.08.05.01.01 Referee Testing Cost

The cost of compressive strength referee testing shall be as specified in the Contract Documents.

When the referee result confirms the acceptance test result, the Contractor shall be charged the cost of compressive strength referee testing. When the referee result does not confirm the acceptance test result, the Owner shall bear the cost.

363.08.06 ~~_____~~ **Falling Weight Deflectometer Acceptance Testing**

Falling weight deflectometer (FWD) testing shall be carried out on the approach and leave joints of each precast concrete slab to determine the load transfer efficiency across the transverse joints. ~~FWD testing, equipment calibration, and reporting shall be according to MERO-019 using the Load Transfer test with a Detailed Project Level data collection scenario and a JCP Test Plan configuration. OPSS 366.~~

363.07.13 ~~_____~~ **Repair or Removal of Unacceptable Concrete**

~~Precast concrete pavement slabs that arrive on the job site cracked, honeycombed, or showing any other visually detectable deficiencies. The new joint shall be rejected and not used in the work.~~

~~Precast concrete pavement slabs that do not meet the surface tolerance requirements shall be removed and replaced, or corrected by diamond grinding.~~

~~Concrete pavement adjacent to precast concrete slab repair, damaged or displaced during installation of the precast repair shall be removed and replaced with new concrete as specified.~~

363.07.14 ~~_____~~ **Management of Excess Material**

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

363.08 ~~_____~~ **QUALITY ASSURANCE**

363.08.01 ~~_____~~ **Inspection**

~~Prior to installation and with notification, access shall be provided to the Contract Administrator to inspect the precast concrete pavement slabs to ensure that they are properly textured and crack-free without any honeycombing or other visually detectable deficiencies.~~

363.08.02 ~~_____~~ **Acceptance or Rejection**

~~Prior to opening to traffic, access shall be provided to the Contract Administrator to inspect the precast concrete slab repairs to determine acceptable if the completed work contains:~~

- ~~a) Cracking or spalling.~~
- ~~b) UngROUTED saw over-cuts from the removal process.~~
- ~~c) Rocking of precast concrete pavement slab.~~
- ~~d) Precast concrete pavement slab that does not meet surface tolerance.~~

~~Precast concrete pavement slab repairs shall be rejected based on the presence of one or more of the defects identified above or one or more of the following conditions:~~

- ~~a) FWD ~~testing~~ test results for both the approach and leave slabs indicate ~~a~~ load transfer efficiency of 70% or greater. The new joint with a load transfer efficiency less than 70%.~~
- ~~b) Compressive strength of the precast slab less than 30 MPa at 28 Days.~~
- ~~c) Air content of the hardened concrete in the precast slab is less than 3% or spacing factor is greater than 0.230 mm.~~

~~A detailed remedial plan shall be submitted to the Contract Administrator for approval to address identified deficiencies% shall be deemed rejectable.~~

363.09 MEASUREMENT FOR PAYMENT

363.09.01 Actual Measurement

363.09.01.01 Precast Concrete Slab Repair

Measurement of the precast concrete slab repair placed shall be by area in square metres. -The total area shall be calculated to the nearest 0.1 m².

363.09.02 Plan Quantity Measurement

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

363.10 BASIS OF PAYMENT

363.10.01 Precast 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, subject to payment adjustments according to OPSS 1355.

Measures taken to permit full restoration of traffic within the allowable time period shall be at no additional cost to the Owner.

~~Precast concrete pavement slabs that do not meet surface tolerance requirements shall be either removed and replaced or repaired by diamond grinding at no additional cost to the Owner.~~

Precast concrete

~~Precast concrete pavement~~ slabs rejected by the Contract Administrator shall be removed and replaced with new concrete as specified elsewhere in the Contract Documents at no additional cost to the Owner.

Concrete adjacent to and damaged by the removal or installation process shall be ~~cut back full depth to sound concrete and replaced~~ repaired at no additional cost to the Owner.

~~Asphalt surfaces damaged during the removal process shall be repaired at no additional cost to the Owner.~~

~~Full depth repairs required as a result of chipping hammers breaking through the concrete~~ Repairs, including grinding, shall be at no additional cost to the Owner.

~~Asphalt surfaces damaged during the removal or a crack developing as a result of chipping operations~~ installation process shall be ~~carried out~~ repaired at no additional cost to the Owner.

Appendix 363-A, November 2014
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

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

Designer Action/Considerations

~~No information provided here.~~

Related Ontario Provincial Standard Drawings

~~No information provided here.~~