



**CONSTRUCTION SPECIFICATION FOR
PRESTRESSED CONCRETE - PRECAST MEMBERS**

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909.01 SCOPE

This specification covers the construction requirements for fabrication, delivery, and installation of precast prestressed concrete members with steel reinforcement.

909.01.01 Specification Significance and Use

This specification has been developed for use in municipal oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities in Ontario.

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

909.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

909.02 REFERENCES

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

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

Ontario Provincial Standard Specifications, Construction

| | |
|----------|---|
| OPSS 904 | Concrete Structures |
| OPSS 905 | Steel Reinforcement for Concrete |
| OPSS 910 | Stressing Systems for Post Tensioning |
| OPSS 919 | Formwork and Falsework |
| OPSS 929 | Abrasive Blast Cleaning - Concrete Construction |

Ontario Provincial Standard Specifications, Material

| | |
|-----------|---|
| OPSS 1002 | Aggregates - Concrete |
| OPSS 1213 | Hot Applied Rubberized Asphalt Waterproofing Membrane |
| OPSS 1350 | Concrete - Materials and Production |
| OPSS 1440 | Steel Reinforcement for Concrete |
| OPSS 1442 | Epoxy Coated Steel Reinforcement for Concrete |

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:

| | |
|--------|---|
| LS-407 | Method of Test for Compressive Strength of Moulded Cylinders |
| LS-426 | Method of Test for Compressive Strength of High Performance Concrete Cylinders |
| LS-432 | Method of Test for Microscopical Determination of Air Void System Parameters in Hardened Concrete |
| LS-433 | Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration |

Structural Manual

CSA Standards

| | |
|-----------------------------|---|
| A23.2-3C | Making and Curing Concrete Compression and Flexural Test Specimens* |
| A23.2-1D | Moulds for Forming Concrete Test Cylinders Vertically * |
| A23.4-16 (R2021) | Precast Concrete - Materials and Construction |
| G40.20-13/G40.21-13 (R2018) | General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel |
| G164-18 | Hot Dip Galvanizing of Irregularly Shape Articles |
| G189-1966 (R2003) | Sprayed Metal Coatings for Atmospheric Corrosion Protection |
| S6:19 | Canadian Highway Bridge Design Code |
| W47.1-09 (R2014) | Certification of Companies for Fusion Welding of Steel Structures |
| W59-18 | Welded Steel Construction (Metal Arc Welding) |
| W186-M1990 (R2016) | Welding of Reinforcing Bars in Reinforced Concrete Construction *[Part of A23.1-09/A23.2-09 - Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete] |

ASTM International

| | |
|---------|---|
| B633-19 | Electrodeposited Coatings of Zinc on Iron and Steel |
| C171-20 | Sheet Materials for Curing Concrete |

American Association of State and Highway Transportation Officials (AASHTO)

| | |
|----------------|--|
| M182-05 (2017) | Burlap Cloth made from Jute or Kenaf and Cotton Mats |
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909.03 DEFINITIONS

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

Bed means the assembly consisting of platform, forms and end blocks in which the members are cast.

Certificate of Conformance means a form issued by an Engineer confirming that the specified components of the Work are in general conformance with the Contract Documents as shown in OPSF 539-1.

Concrete Construction Report means a form used by the Contractor to report concrete test information as shown in OPSF 909-1.

Design Proposal means a submission of proposed changes when engineering design is required.

Laitance means a layer of weak and nondurable material on the surface of the concrete containing cement and fines from aggregates, brought by bleeding water to the top surface concrete.

Lot means all the members of the same member type, cast during 7 consecutive Days.

Manufacturer's Certificate of Conformance means a letter issued by an Engineer confirming that the fabrication and required testing has been carried out on a component or product in general conformance with the Contract Documents as shown in OPSF 906-1.

Member means a precast concrete prestressed girder.

Member Type means a member differentiated by its cross-section shape such as box, I, or T.

Notice to Proceed means a form issued by the Contract Administrator notifying the Contractor to proceed to the next operation as shown in OPSF 906-3.

Post-Tensioning means a method of prestressing in which tendons are tensioned after the concrete has reached a predetermined strength.

Precaster means the party who produces the members.

Prestressed Concrete means reinforced concrete in which internal stresses have been initially introduced so that subsequent stresses resulting from dead load and superimposed loads are counteracted to a desired degree. This may be accomplished by pretensioning or post-tensioning.

Pretensioning means a method of prestressing in which tendons are tensioned before the concrete is placed.

Repair Proposal means a submission when repairs to the members are required.

Request to Proceed means a form issued by the Contractor notifying the Contract Administrator that a component or stage of the work has been completed in general conformance with the Contract Documents. Form is OPSF 906-2.

Strand means a group of wires laid helically over a central core-wire.

Sweep means the lateral deviation from straightness of a member with respect to its design centre line.

Tendon means a high strength steel element consisting of one or more wires, strands or bars; used to impart prestress to the concrete.

909.04 DESIGN AND SUBMISSION REQUIREMENTS

909.04.01 Design Requirements

909.04.01.01 General

The design shall be according to CAN/CSA S6 and the Structural Manual.

909.04.01.02 Permissible Changes from the Contract Drawings

909.04.01.02.01 General

Changes from the Contract Drawings are permitted and may be implemented by the precaster, without prior approval from the Owner, provided they meet the requirements of this specification.

909.04.01.02.02 Permissible Changes to Prestressing of Members

The prestressing strand pattern may be adjusted to suit production requirements provided all changes meet the original design strength without adversely affecting other components of the structure. If the centre of gravity of the strands at the interior hold down closest to mid-span is within ± 10 mm of the original design, then one or more of the following adjustments shall be permitted provided that both the serviceability and ultimate limit states capacities are not adversely affected:

- a) Provide additional strands with a lower jacking stress provided the total prestress force is within $\pm 2\%$ of the original design.

- b) Use of imperial strand spacing in lieu of metric, where 25 mm = 1" and 50 mm = 2".
- c) Addition of one hold-down per end is added towards the member end at the same spacing as the original design.
- d) One less hold-down per end when the hold-down closest to mid-span is deleted.
- e) Increase or decrease the number of strands in each hold-down group.
- f) Increase of vertical strand spacing between hold-down points from 25 mm up to 50 mm.

909.04.01.02.03 Permissible Changes to Reinforcing of Members

The stirrup projection may be adjusted from that shown on the original design, based on details such as the predicted camber, provided it meets the deck embedment range indicated elsewhere in the Contract Documents.

Spacing of stirrups around blockouts for diaphragms may be adjusted, as long as the minimum spacing requirements of CAN/CSA S6 are satisfied, and up to two stirrups may be added in order to maintain the total reinforcement requirements.

909.04.01.02.04 Other Design Details

Details limited to those below may be adjusted to suit production requirements, provided all changes meet the original design without adversely affecting other components of the structure:

- a) Dowel holes and inserts may be adjusted vertically within ± 75 mm from the location shown on the original design to avoid any conflict with tendons.
- b) Undercut dimensions may be adjusted to accommodate the predicted camber.
- c) Additional pockets and hardware for temporary bracing may be added.
- d) Additional temporary post-tensioning or pre-tensioning for shipping and handling may be added provided they do not adversely affect the members at any stage.

The production length of the member may be adjusted to account for elastic shortening.

909.04.01.03 Temporary Bracing

Temporary bracing for members shall be designed according to CAN/CSA S6 using a wind load specific for the location and having a return period of 10 years if the members are to be permanently connected within the same construction season. If the members are not to be permanently connected within the same construction season, the return period to be used in the design shall be 25 years.

909.04.02 Submission Requirements

909.04.02.01 Working Drawings

Three sets of Working Drawings, including supporting documentation, shall be submitted to the Contract Administrator at least 7 Days prior to commencement of fabrication of the members, for information purposes only. Prior to making a submission, the design Engineer and the design-checking Engineer shall affix their seals and signatures on the Working Drawings verifying that the drawings are consistent with the Contract Documents.

When other authorities are involved in the approval of the design or construction of a highway structure, submissions shall be made at least 5 weeks prior to commencement of work and one additional copy of the submission shall be provided for each authority. The requirements of each authority and the Owner, as specified in the Contract Documents, shall be satisfied prior to commencement of the Work.

The Working Drawings shall include the following information:

- a) Member details.
- b) Prestressing reinforcing steel size, grade, location, and jacking force as required by the design.
- c) Hold-down locations and forces.
- d) Reinforcing steel schedules.
- e) Lifting point locations.
- f) Details and location of all temporary supports.
- g) All other applicable details.

The supporting documents shall include the following information:

- a) A letter signed and sealed by an Engineer listing all permitted changes made along with supporting calculations. The letter shall state that the changes have not adversely affected the member capacities.
- b) Handling and installation procedures, including calculations and lifting point locations.
- c) Details of bracing installed to provide adequate support and stability to the member during construction.

909.04.02.02 Concrete Mix Design

The concrete mix design shall be according to OPSS 1350 and shall be submitted to the Contract Administrator.

909.04.02.03 Concrete Plant Certification

The precast concrete plant certificate verifying compliance with the certification requirements of the Canadian Standards Association (CSA) under the category Precast Concrete Products-Structural, Prestressed; or by the Canadian Precast Concrete Quality Assurance Certification Program (CPCQA), Group B, Category D, shall be submitted to the Contract Administrator as part of the concrete mix design submission.

Documentation verifying certification of the concrete production facility by the Ready-Mixed Concrete Association of Ontario shall be submitted when concrete is supplied by an external concrete supplier.

909.04.02.04 Control of Concrete Temperature

One week prior to the commencement of fabricating the members, a description of the method for monitoring and effectively controlling the temperature of the concrete shall be submitted to the Contract Administrator, for information purposes only. The description shall include the method of controlling the concrete temperature during the curing and protection period.

909.04.02.05**Manufacturer's Certificate of Conformance and Precast Report**

A Manufacturer's Certificate of Conformance and a precast report shall be submitted to the Contract Administrator for each shipment of members at least 5 Business Days prior to shipping from the precasting plant.

The precast report shall contain the following information:

- a) List of members in the shipment, including their ID number and description.
- b) The mill certificates for the strands, along with the elongation calculations based on the actual material properties specified in the mill certificate of the strands used in the work.
- c) Record of the jacking force, elongations, and corrections used for temperature variation.
- d) Temperature control records, including location of thermocouple wires.
- e) Summary of material test results for plastic concrete: air content, slump, and concrete temperature.
- f) Summary of material test results for hardened concrete: transfer strength, confirmation of the projected 28-Day compressive strength, and air void system parameters. If test results are not available at the time of shipping, they may be submitted within 4 Business Days following completion of testing.
- g) Summary of all measurements and inspections required herein, including the concrete cover, crack measurement summary, tolerances, and surveys for geometric control.
- h) Documentation that all repairable defects have been identified, evaluated, and corrected, as detailed under the clause on Repair of Defects and Deficiencies Repairable by Standard Methods.

A Request to Proceed shall be submitted to the Contract Administrator before the delivery of each shipment of members to the site.

The members shall not be delivered to the site until the Contract Administrator has received the Manufacturer's Certificate of Conformance, the precast report, Request to Proceed, and issued a Notice to Proceed.

909.04.02.06**Design Proposals**

Five copies of the design proposal shall be submitted to the Contract Administrator for acceptance. The design proposals shall bear the seal and signature of the design Engineer and the design checking Engineer. The proposed changes shall not proceed until the design proposal has been accepted by the Contract Administrator.

The Contract Administrator shall respond within ten Business Days of receiving the design proposal.

909.05**MATERIALS****909.05.01****Bearing Plate**

The bearing plate shall be according to CSA G40.20/G40.21, Grade 300W or greater.

Anchor studs shall be a headed type and shall be according to CSA W59. Anchor studs shall be welded to the bearing plates prior to galvanizing.

All surfaces shall be hot dipped galvanized and shall be according to CAN/CSA G164 or shall be zinc metallised and shall be according to CSA G189.

909.05.02 Burlap

Burlap shall be according to AASHTO M182, Class 4, and shall be free from substances that are deleterious to concrete. The burlap shall have no tears or holes.

909.05.03 Concrete

Concrete materials and production shall be according to OPSS 1350 with the following exceptions and amendments:

- a) Compressive strength shall be as specified in the Contract Documents.
- b) The air void system in hardened concrete when tested according to LS-432 shall be:
 - i. Air Content: 3.0% minimum
 - ii. Spacing Factor: 0.200 mm maximum
- c) Rapid chloride permeability of concrete containing silica fume at 28 to 32 Days shall be equal to or less than 1,000 coulombs and rapid chloride permeability of all other concrete at 28 Days shall be equal to or less than 2,500 coulombs.
- d) Aggregates shall be according to OPSS 1002 with the exception that the maximum nominal size of coarse aggregate shall not exceed 19.0 mm.
- e) Slag aggregate shall not be used.
- f) Superplasticizer may be added to the mix at time of batching for all types of concrete.

909.05.04 Concrete Sealers

Concrete sealers shall be from the Owner's list of acceptable sealers.

909.05.05 Elastomeric Coating

Elastomeric coating shall be according to OPSS 1213.

909.05.06 Formwork

All formwork shall be according to OPSS 919 and CAN/CSA A23.4. Forms shall be fabricated to meet the dimensional tolerances and finishes required herein.

909.05.07 Hardware

All hardware shall be non-corroding or be galvanized according to CAN/CSA G164.

The hold down device may be black steel, however, the surfaces of the hold down device located within 40 mm of the concrete surface shall be chromate coated over an electrodeposited coating of zinc according to ASTM B633.

909.05.08 Moisture Vapour Barrier

The moisture vapour barrier shall be a white opaque polyethylene film according to ASTM C171 and shall not be less than 100 µm thick.

909.05.09 Post-Tensioning Material

Post-tensioning material, including grout shall be according to OPSS 910.

909.05.10 Proprietary Patching Materials

Proprietary patching materials shall be from the Owner's pre-qualified list of concrete patching materials. The list of proprietary patching material shall be obtained from the Contract Administrator.

909.05.11 Steel Reinforcement

Steel reinforcement shall be according to OPSS 905, OPSS 1440, and OPSS 1442.

909.05.12 Strand Splices

Strands shall not be spliced.

909.06 EQUIPMENT

909.06.01 Chipping Hammers

Chipping hammers shall have a maximum weight of 9.0 kg and a maximum piston stroke of 102 mm. All hammers shall have the manufacturer's name and model number engraved on them by the manufacturer. All information must be legible.

909.06.02 Pretensioning and Post-Tensioning

Pretensioning equipment shall be according to CSA A23.4. Post-tensioning equipment shall be according to OPSS 910.

909.06.03 Thermocouples and Dataloggers

Thermocouples and associated instrumentation shall have an accuracy of ± 1.5 °C and shall be capable of recording temperature and instantaneously displaying the temperature.

909.07 CONSTRUCTION

909.07.01 General

The Contract Administrator shall be notified in writing at least 7 Days prior to commencement of fabrication.

Each member shall be identified with a unique number and the date of casting. The information shall be marked on the members and shall remain visible for the duration of construction. When the information is stencilled, indelible ink or paint shall be used.

909.07.02 Precast Plant Certification

Members shall be fabricated by a plant certified by the Canadian Standards Association (CSA) under the category Precast Concrete Products-Structural, Prestressed; or by the Canadian Precast Concrete Quality Assurance Certification Program (CPCQA), Group B, Category D.

909.07.03 Pretensioning

Tendons shall not be tensioned in the deflected position, unless the hold-down device used permits free movement of the strand and the use of the device has been tested by its manufacturer to ensure that the final stress along the full length of the tendon is uniform.

909.07.04 Welding

Welding of steel hardware including shear studs shall be according to CSA W59 and shall be performed by a qualified welder working for a company certified by the Canadian Welding Bureau according to CSA W47.1.

Welding of reinforcing steel bars shall be according to CSA W186 and performed by a qualified welder working for a company certified by the Canadian Welding Bureau according to CSA W186.

909.07.05 Steel Reinforcement

The placement of steel reinforcement shall be according to OPSS 905, with the exception or addition or both of the placing tolerances listed below:

- a) Vertical position of prestressing tendons: + 5/-10 mm
- b) Length of debond on prestressing tendons: \pm 50 mm
- c) Projection of positive moment connection reinforcing steel at member ends: \pm 25 mm
- d) Stirrup spacing: \pm 15 mm when spacing is 100 mm or less
 \pm 25 mm when spacing is greater than 100 mm
 \pm 30 mm when spacing is 300 mm or greater

909.07.06 Formwork

Formwork shall be according to OPSS 919.

909.07.07 Placing of Sheaths and Anchorages

When members are to be post-tensioned, the sheaths and anchorages shall be placed according to OPSS 905 except that the placing tolerances shall be \pm 5 mm at splice points and \pm 10 mm elsewhere.

909.07.08 Placing Concrete

The temperature of formwork, steel reinforcement, or the material on which the concrete is to be placed shall not exceed 30 °C.

The placing of concrete shall be according to OPSS 904, with the exception that the temperature of the formwork, steel reinforcement, or the material on which the concrete is to be placed shall be at a minimum temperature of 5 °C, prior to the placing operation. After discharging of concrete has started, one addition of superplasticizer shall be allowed, provided there is sufficient remaining time for mixing and testing. The slump and air content shall be re-tested if the mix is re-dosed.

During the placing operation, all exposed concrete surfaces shall be covered with water saturated burlap, within 2 to 4 m of the concrete reaching the top of the forms.

909.07.09 Concrete Finishing

The top surface of prestressed members, against which new concrete is to be placed, shall be intentionally roughened while it is sufficiently plastic so that the depth of the indentations is at least 5 mm and the spacing is not greater than 15 mm.

All concrete surfaces against which new concrete is to be placed shall be clean, sound, and free from any loose particles and laitance.

The following surfaces shall be abrasive blast cleaned according to OPSS 929, prior to shipping the members:

- a) Top portion of members containing laitance.
- b) The portion of the sides and end of the member against which new concrete is to be placed.

909.07.10 Control of Temperature

During production and during moist curing, moisture retention, and protection periods, the following temperature requirements shall be met:

- a) The concrete temperature shall not exceed 70 °C.
- b) The concrete temperature shall not fall below 10 °C before the concrete has reached 75% of the specified 28-Day compressive strength.
- c) The temperature difference between the concrete temperature of the member, and the conditions to which it is to be exposed shall not exceed 20 °C along any part of the member.

909.07.10.01 Temperature Records

Thermocouples, data loggers, handhelds units, and associated hardware shall be used to monitor the temperature of the member and the ambient conditions to which the member is exposed.

A sufficient number of thermocouples and thermocouple wires shall be installed to ensure compliance with the standard. As a minimum, thermocouples shall be installed to measure the following:

- a) Air temperature that the member is exposed or is to be exposed to.
- b) Concrete temperatures at the following locations:

For I-members

- i. In the middle of the web, 1 m from each end of the member.
- ii. In the middle of the web at mid-span.
- iii. In the middle of the bottom flange at mid-span.

For box-members

- i. In the middle of the solid section at each end of the member.
- ii. In the middle of the bottom slab at mid-span.

Recording of the concrete temperatures shall begin at the start of the placing operation and continue until the moist curing, moisture retention, and protection periods are complete. For each member, the listed temperatures shall be recorded at intervals of 30 minutes or less.

The Contract Administrator shall be provided with necessary access, instrumentation, and equipment to verify temperature readings instantaneously. The thermocouples and data loggers shall be left in place until the end of the monitoring period.

909.07.11 Curing and Protection

909.07.11.01 Curing - General

Moist curing shall be applied for 48 hours followed by a 48-hour moisture retention period.

Concrete containing silica fume shall be moist cured for 7 Days, regardless of the ambient conditions.

During the moist curing and moisture retention period, the members may be exposed to ambient conditions for no more than a cumulative total of 3 hours for the purposes of form removal, release of strands at transfer strength, filling of bug holes, inspection, removal from the bed, and storage.

909.07.11.02 Moist Curing

During the first 48 hours after concrete placement, exposed surfaces shall be moist cured by any of the methods described below.

- a) Saturated burlap.
- b) Water spray or misting.
- c) Steam.
- d) Other means of maintaining 100% relative humidity next to the concrete surface.

Surfaces covered by the forms are not considered exposed. If forms are removed within the first 48 hours, all concrete surfaces shall be immediately moist cured by the positive addition of moisture for the duration of the 48 hours, according to the methods noted above.

Spray or steam to raise the ambient temperature above 30 °C, shall not be applied until after the concrete has attained its initial set. Steam, heat, or forced air shall not be directed on the concrete, forms, reinforcing steel or tendons. There shall be free circulation of steam, heat, and forced air around the top, sides, and ends of the members. The members shall be heated evenly. Concrete surfaces shall not be exposed to combustion gases.

All water shall be removed from and precautions taken to prevent the re-entrance of water into the sheaths or any internal voids.

909.07.11.03 Moisture Retention

After the initial moist curing has been completed, member surfaces shall be completely covered by moisture vapour barrier to protect members from moisture loss for a period of 48 hours. Alternatively, moist curing methods may be continued during this period.

909.07.11.04 Protection from Cold

Prior to full exposure and after the moist curing and moisture retention periods, members that are to be exposed to temperatures less than 5 °C shall be protected from moisture loss for a minimum of an additional 3 Days. The protection period shall be extended beyond 3 Days, if required to meet the Control of Temperature clause.

All members must be dry prior to exposing them to temperatures below 0 °C.

909.07.12 Transfer of Prestressing Force

The prestressing force shall not be transferred to the members until the transfer strength specified in the Contract Documents has been reached. The prestressing force shall be transferred gradually and in a sequence that ensures eccentricities are kept to a minimum.

909.07.13 Treatment at Ends of Members

The prestressing tendons at ends of members that are to be encased in concrete shall be cut off 25 mm beyond the ends of the beams. The prestressing tendons at the end of members that are not to be encased in concrete shall be cut back to recess the cable 25 mm from the end of member. The recess shall be cleaned, filled with a proprietary patching material, and the ends of the members coated with elastomeric coating.

909.07.14 Quality Control

909.07.14.01 General

Sufficient quality control testing and inspection shall be carried out to ensure that the concrete meets the requirements of the Contract Documents.

909.07.14.02 Sampling and Testing of Plastic Concrete

All aspects of sampling and testing of the plastic concrete for slump, air content, and temperature shall be according to OPSS 1350. The results of these tests shall be recorded. The minimum frequency of testing shall be at least once for each load of concrete delivered by a truck mixer, or once for every 7 m³ of concrete for non-truck mixers until satisfactory control is established.

Satisfactory control is established when three consecutive tests of concrete are within the specified requirements, without field adjustments. If any field adjustments are required, testing shall continue until three consecutive tests meet the requirements with no field adjustments.

After satisfactory control has been established, testing shall be carried out on every third load delivered by a truck mixer, or at a delivery frequency of 21 m³ of concrete for non-truck mixers.

Sampling and testing of slump, air content, and temperature of plastic concrete, and casting of cylinders for determination of hardened concrete properties shall be carried out by a person holding either of the following certifications:

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

The person shall have a valid original card issued by the certifying agency in their possession at all times.

909.07.14.03 Transfer Strength

It shall be demonstrated that the transfer strength specified in the Contract Documents has been achieved prior to transfer of prestressing force.

Standard cylinder correlation strength testing programs shall be conducted by the Ministry of Transportation when requested by the Owner.

909.07.14.04 Concrete Cover Measurement

A cover meter survey on all members shall be carried out at the precaster's facility until satisfactory control is established. For each lot, satisfactory control shall be established when three consecutive members of the same design are within the specified tolerances. After satisfactory control has been established, testing shall be carried out on every fifth member. If testing indicates that cover measurements for a member do not meet the tolerances specified in Table 1, testing shall resume on each member until satisfactory control is re-established.

Readings shall be taken at locations 300 mm from both ends, at mid-span, and at intervals not exceeding 5 metres along the length of the member.

For I-members, readings shall be taken at each location, as detailed below:

- a) Top of web, both sides.
- b) Bottom of web, both sides.
- c) Mid-height of each side of bottom flange.
- d) Underside of member, located at 150 mm from both edges of flange.

For box members, readings shall be taken at each location, as detailed below:

- a) Top of web, exterior sides.
- b) Bottom of web, exterior sides.
- c) Underside of member, located at 400 mm from both edges of flange.

909.07.14.05 Dimensional Measurements

Measurements shall be carried out on each member to determine compliance with tolerance requirements. Members shall meet the tolerances specified in Table 1.

909.07.15 Sampling for Quality Assurance

Concrete shall be sampled on a lot basis.

909.07.15.01 General

Cylinders shall be 100 mm in diameter and 200 mm long. Samples shall be taken after all field adjustments have been made to the load of concrete.

Concrete cylinders shall be cast, cured, handled and transported according to CSA A23.2-3C. The specimens shall be delivered to a CCIL-approved laboratory as designated by the Contract Administrator.

Moulds shall be according to CSA A23.2-1D, with a lid. The lids shall be chemically and physically compatible with the concrete and shall provide a watertight seal for the moulds.

909.07.15.02 28-Day Compressive Strength

One set shall be cast for acceptance and one set of referee cylinders may be cast for each lot. Both sets of cylinders shall be cast from the same batch of concrete.

One set shall consist of three cylinders.

Test information shall be recorded on OPSF 909-1. The form shall be submitted with the concrete cylinders.

909.07.15.03 Air Void System and Rapid Chloride Permeability

One cylinder shall be cast from each lot for determination of air void system parameters of hardened concrete and two cylinders from each lot for determination of rapid chloride permeability. Each cylinder shall be cast from concrete from a different member in the lot.

909.07.15.04 Sampling of Steel Reinforcement

Samplings of steel reinforcement shall be provided to the Owner according to OPSS 905 when requested.

909.07.16 Access for Quality Assurance

Electrical power, scaffolding, protection from the weather, and unhindered access shall be provided to Owner's representatives for inspection and testing of all fabrication, delivery, and installation of prestressed concrete precast members.

For the purposes of cover meter and dimensional measurements, all debris and obstructions shall be cleared and the Owner's representative shall be provided access.

909.07.17 Delivery

The Contract Administrator shall be notified in writing 3 Days prior to delivery of the members.

Delivery shall include transportation and storage of the members. Transportation and storage shall be according to CAN/CSA A23.4. The work shall consist of loading of the members, delivery, unloading, and storage at the storage site and shall include temporary works for access.

Members shall be loaded for shipping in such a manner that they can be transported and unloaded at their destination without being damaged or exposed to stresses for which they were not designed.

Members shall be handled and transported with their webs in a vertical plane, and the points of support during lifting, storing, and transporting shall be according to the Working Drawings. When stored, members shall be stored in such a manner to avoid excessive stress or other damage.

Advertising by means of removable signing is permitted on elements only while in transit to the storage site. Any permanent markings on a surface that would be visible after installation shall not be permitted.

909.07.18 Installation

The Contract Administrator shall be notified in writing of the installation date at least 3 Days prior to the commencement of field installation operations. Installation shall be according to CAN/CSA A23.4.

The work shall consist of installation and stabilization of the members during construction. Members shall be lifted and placed in a manner to ensure they are not overstressed, unstable, or unsafe at any time.

A copy of the Working Drawings shall be kept on the site and accessible to the Contract Administrator during installation of the members.

The installation tolerance of members shall be ± 15 mm on the bearing in both the longitudinal and transverse directions.

For box members placed side-by-side, accumulated tolerance differences shall be distributed equally along the width of the structure. The maximum accumulated increase or decrease in total width of the members shall not exceed 70 mm with 35 mm maximum on either side.

The forces resulting from the lifting devices acting on the members shall not be inclined to the vertical at an angle greater than 30 degrees. All lifting devices for members shall be removed prior to the deck being poured.

CPCI members and other members that may experience stability problems during construction shall be braced individually by attaching each end to the respective substructure element, immediately upon installation.

909.07.19 Repair of Defects and Deficiencies Repairable by Standard Methods

Any individual member having one or more of the defects and deficiencies identified in Table 2, shall be repaired according to the repair method specified. Such repairs do not require proposals or owner approval. Where more than one of the defects or deficiencies listed in Table 2 are located in the same area in the member, a repair proposal shall be submitted. All causes, preventative actions, and corrective actions, including repair methods and materials used shall be documented.

909.07.19.01 Assessment of Repair

When defects or deficiencies occur, at the discretion of the design Engineer, a visual inspection may be conducted or other measures required, such as cores to be taken to assess the effectiveness of the repairs.

The filling of core holes shall be according to OPSS 1350.

909.07.20 Certificate of Conformance

A Certificate of Conformance shall be submitted to the Contract Administrator within 5 Business Days of installing all the members within a stage. The Certificate of Conformance shall identify the members and state that the Work has been carried out in general conformance with the signed and sealed documents, which include the Working Drawings, supporting documents, and Contract Documents.

909.07.21 Management of Excess Material

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

909.08 QUALITY ASSURANCE

909.08.01 General

The acceptance of members shall be according to the requirements of this specification, including satisfactory completion of all repairs, if applicable. Members not meeting the requirements of the Contract Documents shall be deemed unacceptable and shall not be included in the Work.

909.08.02 Acceptance of Concrete Compressive Strength

A 28-Day concrete compressive strength of a lot shall be considered acceptable when it meets all of the following:

- a) The average of the three individual compressive strength tests shall be equal to or greater than the specified strength.

b) No individual cylinder test shall be more than 4.0 MPa below the specified strength.

Unacceptable lots shall be removed and replaced.

Compressive strength shall be determined according LS-426 for concrete with silica fume and high strength concrete and according to LS-407 for all other concrete.

The compressive strength result of the lot shall be the average of the set of three acceptance cylinders rounded to one decimal place.

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

909.08.02.01 Referee Testing Compressive Strength

If the Contractor has submitted a set of referee cylinders, an individual test result may be questioned by the Contractor within 4 Business Days of receiving the test result. The Owner shall be notified of the intention to referee test.

The lot shall be re-evaluated as based on the test result from the referee compressive strength cylinders representing the lot and the referee test result shall replace the original test result. The referee test result shall be binding.

909.08.03 Acceptance of Air Void System in Hardened Concrete

One half of a cylinder shall be tested to determine the acceptability of the lot. The cylinder shall be tested according to LS-432. The other half of the cylinder shall be retained by the Owner for audit purposes.

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

For a lot to be considered acceptable, the cylinder shall have an air content of 3.0% or more and a spacing factor of 0.200 mm or less. Acceptable lots shall be subject to full payment.

Lots with a spacing factor between 0.200 mm and 0.250 mm shall be repaired as identified in Table 2.

Lots with a spacing factor exceeding 0.250 mm shall be rejected and replaced at the Contractor's expense.

909.08.03.01 Referee Testing of Air Void System in Hardened Concrete

Referee testing of air void system parameters shall be according to OPSS 1350.

909.08.04 Acceptance of Rapid Chloride Permeability

Rapid chloride permeability testing shall be according to LS-433. Acceptance of rapid chloride permeability shall be based on the result obtained on the cylinders representing the lot. Lots with rapid chloride permeability less than 2,500 coulombs are considered acceptable. Lots with a rapid chloride permeability result greater than 2,500 coulombs and less than or equal to 3,500 coulombs shall be considered unacceptable and shall be repaired as identified in Table 2. Lots with rapid chloride permeability results exceeding 3,500 coulombs shall be rejected and replaced.

For concrete lots containing silica fume, rapid chloride permeability less than 1,000 coulombs are considered acceptable. Lots containing silica fume with a rapid chloride permeability result greater than 1,000 coulombs and less than or equal to 2,000 coulombs shall be considered unacceptable and shall be repaired as identified in Table 2. Lots containing silica fume with rapid chloride permeability results exceeding 2,000 coulombs shall be rejected and replaced.

909.08.04.01 Referee Testing of Rapid Chloride Permeability

Referee testing of rapid chloride permeability testing for all concrete shall be carried out according to the high performance concrete requirements of the OPSS 1350 Acceptance of Rapid Chloride Permeability for Silica Fume Overlays and High Performance Concrete clause. The reference to cores in OPSS 1350 shall be interpreted to mean cylinders.

909.08.04.02 Referee Testing Cost of Rapid Chloride Permeability

The cost of rapid chloride permeability testing for all concrete shall be according to OPSS 1350 Acceptance of Rapid Chloride Permeability for Silica Fume Overlays and High Performance Concrete clause.

909.08.05 Dimensional Verification and Concrete Cover Measurements

The Contract Administrator shall carry out measurements to confirm compliance with tolerance requirements of Table 1. Members exceeding the tolerances specified in Table 1 shall be rejected and not incorporated into the Work.

909.08.06 Defects and Deficiencies

909.08.06.01 General

Defects and deficiencies are classified as follows:

- a) Defects and deficiencies repairable by standard methods.
- b) Defects and deficiencies causing rejection.
- c) All other defects and deficiencies.

909.08.06.02 Defects and Deficiencies Repairable by Standard Methods

Any individual member having one or more of the defects and deficiencies listed in Table 2 shall be deemed unacceptable and the member shall be repaired according to Table 2. When more than one of the defects or deficiencies listed in Table 2 is located in the same area in the member, a proposal for repair shall be submitted to the Contract Administrator for acceptance according to the All Other Defects and Deficiencies clause.

909.08.06.03 Defects and Deficiencies Causing Rejection

A member having any one of the following defects and deficiencies shall be rejected and shall not be incorporated into the Work:

- a) If concrete temperature exceeds 70 °C at any time during the curing period.
- b) For I-members, if there is honeycombing, voids, cavities, spalls, delaminations, or cracks, in the concrete within a bearing surface area defined by the contact area of the bearing plus 30 mm on all sides, except when member ends are encased in concrete.
- c) For box members, if there is honeycombing, voids, cavities, spalls or delaminations in the concrete within a bearing surface area defined by the contact area of the bearing plus 30 mm on all sides, except when member ends are encased in concrete.
- d) If there is a crack in the bottom flange that extends through to the opposite face.

- e) If breakage of strand wires exceeds the limit permitted according to CAN/CSA A23.4.
- f) If the sweep of the member on site and in position without any intermediate bracing is in excess of 1.5 mm/m length of member.

909.08.06.04 All Other Defects and Deficiencies

For members with defects or deficiencies that are not identified as rejectable or included in the list of defects and deficiencies repairable by standards methods in Table 2, or when more than one of the defects or deficiencies listed in Table 2 are located in the same area in the member, a proposal for repair shall be submitted to the Contract Administrator for acceptance.

If the repair proposal is deemed acceptable, the members shall be repaired according to the proposal. No repairs shall be carried out without the acceptance of the proposal. If the repair proposal is deemed unacceptable, the members shall be rejected and shall not be incorporated into the Work.

The repair proposal, signed and sealed by an Engineer, shall include as a minimum:

- a) Description of the member and identification of the defects or deficiencies.
- b) Detailed sketches, width, length, depths, location, and nature and frequency of any defects.
- c) Assessment of any impact of the repaired defects on durability, structural adequacy, and integrity of the member or on the structure.
- d) A detailed repair plan including material, method, and equipment to be used.
- e) Verification that the repair plan complies with the applicable standards for the type of work.
- f) All relevant supporting information, including material test results, field measurements and observations, production records, photographs, and structural analysis calculations used for determining that the performance and function originally expected from the member shall be met.
- g) Causes of the defect and corrective action to be taken to prevent recurrence of the defect in future production, delivery, or installation.

909.10 BASIS OF PAYMENT

**909.10.01 Prestressed Concrete Members (Type) Fabrication - Item
Prestressed Concrete Members Containing Silica Fume (Type) Fabrication - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

909.10.02 Payment Adjustment for Rapid Chloride Permeability

For concrete members containing silica fume, lots of members with an average value of rapid chloride permeability exceeding 1,500 Coulombs and less than or equal to 2,000 Coulombs shall be accepted with a payment reduction in addition to the repair method required in Table 2. The payment reduction shall be calculated and applied as follows:

- a) The price for the fabrication items in the Contract shall be converted to an equivalent price per metre length for each member type in the lot.

- b) P_i , the percent payment reduction factor for each lot = 10%
- c) For each member type in the lot, the payment reduction = $(P_i) \times (\text{Equivalent price per metre length}) \times (\text{Length of Members})$.
- d) Total payment reduction for each lot is the sum of the individual payment reductions for each member type calculated in 'c'.

909.10.03 Prestressed Concrete Members (Type) Delivery - Item
Prestressed Concrete Members Containing Silica Fume (Type) Delivery
- Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work.

909.10.04 Prestressed Concrete Members (Type) Installation - Item
Prestressed Concrete Members Containing Silica Fume (Type) Installation
- Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work.

**TABLE 1
Tolerances**

| Item | Tolerances |
|---|--|
| Length: Straight-line measurement taken horizontally at the mid-height of member | ± 1.0 mm/m; not to exceed ± 25 mm maximum |
| Overall Depth | ± 8 mm for depths up to 600 mm ± 12 mm for depths over 600 mm |
| Flange Depth and Web Width for Members Without Voids | Flange depth ± 5 mm Web width -5/+10 mm |
| Flange Depth and Web Width for Members With Voids | Flange depth ± 10 mm Web width ± 10 mm |
| Width: Flanges and box members | ± 10 mm |
| Sweep: I-members, spaced box members and spaced hollow slab members | 1 mm/m length of member. |
| Abutting box and hollow slab girders | ± 10 mm |
| Squareness and Plumbness | 1 in 200 maximum |
| Camber Difference: Between adjacent members spaced apart Between adjacent members placed side-by-side | 25 mm 15 mm |
| Hold-Down Position Along Length | ± 300 mm |
| Void and Diaphragm Position Along Length | ± 25 mm |
| Concrete Cover Over Reinforcing Steel | Unless otherwise specified in the Contract Documents, the tolerance for concrete cover over reinforcing steel shall be -5/+15 mm |
| Stirrup Projection | -10/+15 mm |

TABLE 2
Defects and Deficiencies Repairable by Standard Methods

| Repairable Defects and Deficiencies | Condition | Repair Method |
|--|--|---|
| Honeycombing, Voids, Cavities, Spalls, and Delaminations | Any area less than an equivalent area of 300 x 300 mm with no reinforcing steel or strand exposed. | <ul style="list-style-type: none"> a) Square all sides of the repair area. b) Sawcut perimeter of removal area to a depth of 10 mm or to the depth of reinforcing steel or strands, whichever is less. c) Remove all loose concrete using a chipping hammer or hand tools. d) Insert corrosion resistant wire mesh and anchors. e) Abrasive blast-clean all concrete surfaces to be patched according to OPSS 929. f) Remove all dust and loose material from the prepared surface by using compressed air. g) Moisten area to be repaired. h) Fill repair area with concrete or a proprietary patching material. i) Cure concrete according to moist curing requirements of this specification. Cure proprietary patching material according to the manufacturer's recommendations. |
| Low Cover | Any cover readings less than 25 mm and greater than or equal to 20 mm | The entire surface of the member shall be sealed, except areas against which new concrete is to be placed or in contact with bearings. |
| Compressive Strength | Any lot with 28-Day compressive strength lower than specified, but not more than 4.0 MPa lower than specified. | The entire surface of the member shall be sealed, except areas against which new concrete is to be placed or in contact with bearings |
| Rapid Chloride Permeability | Any lot of concrete containing silica fume with rapid chloride permeability value exceeding 1,000 and less than or equal to 2,000 Coulombs and lots of all other concrete with rapid chloride permeability value exceeding 2,500 and less than or equal to 3,500 Coulombs. | The entire surface of the member shall be sealed, except areas against which new concrete is to be placed or in contact with bearings |
| Air Void System Parameters | Any lot with spacing factor greater than 0.200 mm, but less than or equal to 0.250mm. | The entire surface of the member shall be sealed, except areas against which new concrete is to be placed or in contact with bearings |
| Sweep | Sweep greater than 1.0 mm /m length but less than or equal to 1.5 mm/m length. | Push or pull the members to within tolerance. Members that can be brought into tolerance and maintained at that position without visible signs of distress shall be accepted. Members greater than or equal to 1,900 mm in depth shall be pulled or pushed at both the top and bottom flange. |

CERTIFICATE OF CONFORMANCE

Contract Number:

Contractor:

Location / Structure:

Work, Component(s)/Element, or Product:

.....

.....

I, _____ (print name), P. Eng. _____ (Professional Engineers of Ontario License Number) certify that the above-noted part of work, component, or product have been constructed in conformance to the requirements of the Contract Documents.

Seal and Signature

Date _____

DISTRIBUTION: 1) Contractor
2) Contract Administrator or Project Manager File

OPSF 539-1 (March 2021)

MANUFACTURER'S CERTIFICATE OF CONFORMANCE

Contract Number:

Contractor:

Location / Structure:

Plant / Manufacturer:

Work, Component(s)/Element, or Product:

.....

.....

I, _____ (print name), P. Eng. _____ (Professional Engineers of Ontario License Number) certify that the above-noted part of work, component, or product have been constructed in general conformance to the requirements of the Contract Documents.

(Attach documents per Contract Documents (examples: test results, production records) outside of form)

Seal and Signature

Date

DISTRIBUTION: 1) Contractor
2) Contract Administrator or Project Manager File

OPSF 906-1 (March 2021)

REQUEST TO PROCEED

| | | | |
|---|--|-----------------------------------|--|
| Contract Number: | | Request to Proceed Number: | |
| Contractor Name: | | Consultant Name: | |
| Location / Structure Site: | | | |
| Description of the work: | | | |
| Work / Component(s) or Product: | | | |
| Applicable specification(s) /special provision(s): | | | |

This is to confirm that the above stage of work, component or product has been completed according to the general requirements of the Contract Documents.

Submitted by: _____ Time & Date: _____
 Contractor's Representative
 (Printed Name and Signature)

Received by: _____ Time & Date: _____
 Contract Administrator or Project Manager
 (Printed Name and Signature)

DISTRIBUTION: 1) Contractor
 2) Contract Administrator or Project Manager File

OPSF 906-2 (March 2021)

NOTICE TO PROCEED

| | | | |
|---|--|-----------------------------------|--|
| Contract Number: | | Request to Proceed Number: | |
| Contractor Name: | | Consultant Name: | |
| Location / Structure Site: | | | |
| Description of the work: | | | |
| Work / Component(s) or Product: | | | |
| Applicable specification(s) /special provision(s): | | | |

The Contractor may proceed to the next operation as of the date of this notice.

Any Notice to Proceed by the Owner or its Contract Administrator or Project manager of the Work and Materials of the Contractor does not relieve the Contractor from any responsibility or obligation for the proper performance of the Work in general conformity with the requirements of the Contract Documents. As well, the Notice to Proceed imposes no liability upon the Owner or its Contract Administrator or Project Manager and is not to be interpreted as an approval or acceptance of the Work or the Materials by the Owner that the Work and Materials was completed or supplied in general conformance with the Contract Documents.

Issued by: _____ Time & Date: _____
 Contract Administrator or Project Manager
 (Printed Name and signature)

Received by: _____ Time & Date: _____
 Contractor's Representative
 (Printed Name and signature)

DISTRIBUTION: 1) Contractor
 2) Contract Administrator or Project Manager File

OPSF 906-3 (March 2021)

CONCRETE CONSTRUCTION REPORT

| | | | | | | | |
|--|---------------|-------------------------|--------------------------------------|---|---|--|---|
| CONTRACT NO. | REGION | HIGHWAY NO. | DATE OF PLACEMENT | | | SPECIMENS MADE AT | AM PM |
| | | | YEAR | MONTH | DAY | TEST AT | |
| STRUCTURE NAME | | SITE NO. | | | TYPE OF TEST 1 - COMPRESSIVE CYLINDERS 5 - COMPRESSIVE CUBES 2 - FLEXURAL BEAMS 6 - AIR VOID SYSTEM 3 - AUTOGENOUS CYLINDERS 7 - RAPID CHLORIDE PERMEABILITY 4 - TENSILE CYLINDERS 8 - LINEAR SHRINKAGE | | |
| LOT NO. | | SUBLOT NO. | | END RESULT SPEC YES <input type="checkbox"/> NO <input type="checkbox"/> | | | |
| TEST LOCATION AND STATION NUMBER | | | TYPE OF WORK (e.g. bridge, sidewalk) | | | LOCATION IF TYPE OF WORK IS A BRIDGE (e.g. abutment) | |
| NAME OF CONTRACTOR PLACING CONCRETE | | | | NAME AND LOCATION OF READY MIX CONCRETE SUPPLIER | | | |
| CONCRETE MIX DESIGN | | | | | | | |
| CONCRETE MIX DESIGN NUMBER | | | YEAR | | SPECIFIED 28 DAY STRENGTH (MPa) | | TICKET OR TRUCK NUMBER |
| FIELD ADJUSTMENTS | | | | | | | |
| SUPERPLASTICIZER | | | | AIR ENTRAINING ADMIXTURE | | | |
| RETARDING ADMIXTURE | | | | WATER | | | |
| CONCRETE SAMPLING , INITIAL CURING, TESTER AND TESTING COMPANY IDENTIFICATION | | | | | | | |
| AIR TEMPERATURE (°C) | | FIELD SAMPLE NUMBER (s) | | | | NUMBER OF SPECIMENS IN THE SET | |
| COMPOSITE SAMPLE TEST RESULTS | | | | CYLINDER/SPECIMEN CURING TEMPERATURE DURING THE FIELD CURING PERIOD | | | |
| SLUMP (mm) | | AIR CONTENT (%) | | CONC. TEMPERATURE (°C) | | MINIMUM (°C) | |
| | | | | | | MAXIMUM (°C) | |
| FIELD TESTING COMPANY'S NAME | | | | TESTER'S LAST NAME, INITIAL | | | |
| TESTER'S CERTIFICATION ACI <input type="checkbox"/> CCIL <input type="checkbox"/> | | | | TESTER'S SIGNATURE, DATE | | | |
| MTO INSPECTOR'S LAST NAME, INITIALS | | | | MTO INSPECTOR'S SIGNATURE, DATE | | | |
| LABORATORY USE ONLY | | | | | | | |
| NAME AND LOCATION OF LABORATORY | | | DATE RECEIVED (Y/M/D) | | AGE AT TEST | DATE TESTED (Y/M/D) | TYPE OF MOULD (Plastic, Cardboard, other) |
| CYLINDER A | | | CYLINDER B | | | CYLINDER C | |
| LAB. CYLINDER NO. | | CYLINDER CONDITION | | LAB. CYLINDER NO. | | CYLINDER CONDITION | |
| | | | | | | | |
| WEIGHT | FORM OF BREAK | STRENGTH (MPa) | | WEIGHT | FORM OF BREAK | STRENGTH (MPa) | |
| | | | | | | | |

OPSF 909-1 (June 2021)

**Appendix 909-A, November 2021
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

Several revisions have been made to the technical information of OPSS 909. It is recommended that the designer and the users read the specification in its entirety to become familiar with the differences and necessary requirements for municipal use.

The designer should specify the following in the Contract Documents:

- Concrete compressive strength. (909.05.03)
- Concrete strength at transfer. (909.07.12, 909.07.14.03)

Clause 909.07.20 requires the use of a Certificate of Conformance as shown on form OPSF 539-1. If a form other than OPSF 539-1 is to be used for submission purposes, the alternate form should be invoked by reference in the Contract Documents and the specification should be amended to remove reference to OPSF 539-1.

Clause 909.04.02.05 requires the use of a Manufacturer's Certificate of Conformance as shown on form OPSF 906-1. If a form other than OPSF 906-1 is to be used for submission purposes, the alternate form should be invoked by reference in the Contract Documents and the specification should be amended to remove reference to OPSF 906-1.

Clause 909.04.02.05 requires the use of a Request to Proceed as shown on form OPSF 906-2. If a form other than OPSF 906-2 is to be used for submission purposes, the alternate form should be invoked by reference in the Contract Documents and the specification should be amended to remove reference to OPSF 906-2.

Clause 909.04.02.05 requires the use of a Notice to Proceed as shown on form OPSF 906-3. If a form other than OPSF 906-3 is to be used for submission purposes, the alternate form should be invoked by reference in the Contract Documents and the specification should be amended to remove reference to OPSF 906-3.

Clause 909.07.15.02 requires the use OPSF 909-1 for reporting concrete test information. If a form other than OPSF 909-1 is to be used for submission purposes, the alternate form should be invoked by reference in the Contract Documents and a special provision should be written to remove reference to OPSF 909-1.

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

Related Ontario Provincial Standard Drawings

No information provided here.