AMENDMENTS TO OPSS 904 (JAN 95) - CONSTRUCTION SPECIFICATION FOR CONCRETE STRUCTURES [1]

OPSS 904.04.02.01 is amended by the addition of the following:

The Contractor shall also submit a letter from his concrete supplier confirming that the proposed mix design is operational for its intent and purposes. Should there be any doubt that the mix is suitable for such, the Contractor shall perform such tests as necessary to convince himself that the mix is indeed operational.

OPSS 904.04.02 is amended by the addition of the following subsection:

904.04.02.11 Materials

Before starting the work, the Contractor shall supply the Commissioner with the material safety data sheets (MSDS) for all materials to be incorporated in the work.

OPSS 904.05.01 is amended by the addition of the following unless otherwise specified:

The concrete shall meet the following requirements:

(i)	Cement type	Type 10 Normal Portland
(ii)	Minimum 28 day cylinder compressive strength	35 MPa
(iii)	Class of exposure	C-1
(iv)	Nominal maximum size of coarse aggregate	19 mm Limestone
(v)	Slump at point of discharge	80 $\pm$ 30 mm
(vi)	Total air content	6.5 $\pm$ 1.5 %
(vii)	Maximum water/cementing materials ratio	0.40
(viii)	Minimum cementing materials content	335 kg/m^3

Admixtures containing calcium chloride shall not be permitted.
Slag shall not be permitted as supplementary cementing material.

If silica fume concrete is specified in the Special Specifications, the concrete shall meet the following requirements as well as the requirements of OPSS 1350.

1. **All references to OPS specifications that have been amended (as noted in LIST T1) are superseded by references to the replacement City of Toronto specifications (as given in LIST T1).**

(i)	Cement Type	Type 10 Normal Portland and Silica Fume
(ii)	Silica Fume Content	8-9 ½ % by mass
(iii)	Minimum 7 day cylinder compressive strength	35 MPa
(iv)	Class of Exposure	C-1
(v)	Nominal Maximum Size of Coarse Aggregate	19mm Limestone
(vi)	Slump at point of discharge	
	(a) without Superplasticizer	maximum 50 mm
	(b) with Superplasticizer	150 $\pm$ 25 mm
(vii)	Total Air Content	7 $\pm$ 1.0 %
(viii)	Maximum Water/Cementing Materials Ratio	0.40
(ix)	Minimum Cementing Materials Content	335 kg/m^3

Admixtures containing calcium chloride shall not be permitted. Slag shall not be permitted as a supplementary cementing material.

The silica fume cement shall be blended from a manufacturer approved by the Commissioner.

OPSS 904.05.09 is superseded by the following:

904.05.09 Geotextile Fabric

Geotextile fabric shall be "Terrafix-270R", white in colour. It shall be free from tears and holes.

OPSS 904.05.10 is superseded by the following:

904.05.10 Expansion Joint Assemblies and Joint Materials

Expansion joint assemblies, joint fillers, joint seals and joint sealing compounds shall conform to TS 920.

OPSS 904.07.03.01 is amended as follows:

The fifth paragraph is deleted and replaced by the following:

The temperature of the concrete at the time of placing shall be between 10°C and 25°C.

OPSS 904.07.03.04.01 is amended by the addition of the following:

The placing of structural concrete shall comply with CAN/CSA- A23.1.19.

Unless otherwise authorized, concrete shall be placed in a single operation to the full thickness of slabs, beams and similar members and shall be placed in horizontal lifts not exceeding 0.5 m deep in walls, columns, and similar members. Each layer shall be uniformly and thoroughly vibrated to consolidate the concrete, remove entrapped air and to eliminate voids and honeycombing.

OPSS 904.07.03.04.02 is amended by the addition of the following:

When bearings are to be installed in the substructure, the size of bearings which will be installed in the structure and the bearing seat elevations shall be submitted in writing to the Commissioner prior to placing concrete in the substructure.

If the size of the bearings to be installed is different from the bearing size shown on the contract drawings, the proposed adjustment to the reinforcement shall also be submitted.

OPSS 904.07.03.04 is amended with the addition of the following subsection:

904.07.03.04.06 Plastic Shrinkage Protection

Placing concrete under conditions which contribute to the rapid evaporation of water from plastic concrete shall be avoided. These conditions are:

- low humidity
- high air and/or concrete temperature
- moderate to high wind velocity

When the surface moisture evaporation rate as calculated using Figure D1 of Appendix D of CAN/CSA-A23.1 exceeds 1.0 kg/m^2 per hour, the Contractor shall select one or more of the following protective measures required to prevent plastic shrinkage cracks at the surface of the concrete.

1. Dampen the subgrade prior to placing concrete.
2. Erect sunshades over the concrete during the finishing operations.
3. Lower the concrete temperature.
4. Cover the concrete surface with white opaque polyethylene film between finishing operations.
5. Apply a fog spray immediately after placing and before finishing, taking care to prevent the accumulation of water that may reduce the quality of the cement paste.
6. Place and finish at night.

OPSS 904.07.03.05 is superseded by the following:

904.07.03.05 Curing Unformed Surfaces

904.07.03.05.01 General

All unformed surfaces and slip formed surfaces shall utilize one or more of the following curing methods:

(a) burlap, geotextile fabric (white in colour), water and moisture vapour barrier
(b) moisture vapour barrier

Unless otherwise authorized and approved by the Commissioner, the use of white pigmented compound is not acceptable.

904.07.03.05.02 Structure Decks

When the ambient air temperature is 0°C or higher at the time of placing, the structure decks shall be cured with burlap, geotextile fabric , water and moisture vapour barrier, as per OPSS 904.07.03.05.03, in conjunction with any other protection measure as indicated in Table 1.

When the ambient air temperature is below 0°C at the time of placing, the structure deck shall be cured with moisture vapour barrier in conjunction with the appropriate protection measure as indicated in Table 1.

Following curing, the deck shall be air dried for an additional 72 hours prior to waterproofing. Buried structure decks shall be cured using any of the curing methods detailed in this specification.

904.07.03.05.03 Curing with Burlap, Geotextile Fabric, Moisture Vapour Barrier and Water

Burlap and geotextile fabric (white in colour) shall be presoaked by immersing in water for a period of 24 hours immediately prior to placing. One layer of burlap and one layer of geotextile fabric shall be applied to the surface of the concrete. Strips shall overlap 150 mm and shall be held down without marring the surface of the concrete.

The burlap shall be applied immediately after finishing of the concrete surface, 2 m from the pan or screed of the finishing machine or from the finishing operation. The filter fabric shall be placed within 30 minutes of the burlap.

The curing materials shall be maintained in a continuously wet condition throughout the 7 day curing period.

The curing materials shall be covered with a layer of moisture vapour barrier in a manner which will prevent deformation of the surface of the concrete. The moisture vapour barrier shall be white opaque polyethylene film at least 100 µm thick conforming to OPSS 1305. Air flow in the space between the moisture vapour barrier and the curing materials shall be prevented in conformance with the requirements of curing with moisture vapour barrier. The moisture vapour barrier shall be placed within 4 hours following placement of the concrete.

904.07.03.05.04 Curing with Moisture Vapour Barrier

The moisture vapour barrier shall be white opaque polyethylene film at least 100 µm thick conforming to OPSS 1305.

A moisture vapour barrier shall be placed immediately after finishing of the concrete surface, 2 m of the finishing operation. Air flow in the space between the moisture vapour barrier and the concrete surface shall be prevented. To achieve this the moisture vapour barrier shall be held down at the edges and at all laps. Laps shall be 150 mm minimum, to prevent displacement.

The moisture vapour barrier shall be kept in place for a minimum curing period of 7 days.

OPSS 904.07.03.06 is superseded by the following:

904.07.03.06 Curing Formed Surfaces

Curing shall conform to the following:

(a) Where the formwork is left in place for the required 7 days or more, the formwork shall also be protected with a moisture vapour barrier in a manner which will prevent air flow between the formwork and the moisture vapour barrier as per OPSS 904.07.03.05.04.

(b) Where the formwork is removed in less than the required 7 days, the concrete shall be cured with burlap, geotextile fabric (white in colour), water and a moisture vapour barrier as per OPSS 904.07.03.05.03 for the remainder of the minimum curing period of 7 days. Curing compound shall not be used.

OPSS 904.07.03.07.01 is superseded by the following:

The temperature of the concrete at the time of placement shall be between 10°C and 25°C.

OPSS 904.07.03.07.02 The second paragraph is amended by the following:

When the air temperature exceeds 28°C, the concrete delivered by means of agitator or truck mixers shall be discharged within 1 hour after the introduction of the mixing water.

OPSS 904.07.03.08.01 is superseded by the following:

The temperature of the concrete at the time of placement shall be between 10°C and 25°C.

OPSS 904.07.03.08.04 is superseded by the following:

904.07.03.08.04 Protection - Minimum Requirements

Structural concrete shall be maintained at an optimum temperature of 20°C for a period of 7 days after placement. In no case shall the temperature of any part of the concrete fall below 10°C nor exceed 55°C during this period.

For cold weather conditions, protection of concrete shall at least conform to the requirements specified in Table 1.

OPSS 904.09.02.01 is superseded by the following:

Concrete in Pier
Concrete in Pier Cap
Concrete in Columns
Concrete in Ballast Wall
Concrete Repair, Deck, Full Depth
Concrete in Diaphragms
Concrete in Deck
Concrete in Sidewalks
Concrete in Median
Concrete in Parapets
Concrete in Dams
Concrete in Approach Slabs

Measurement will be of the volume of concrete in m^3 as calculated from the drawings based on the theoretical dimensions of the member or component.

Tremie concrete may be measured by means of the concrete delivery tickets when so designated by the Commissioner.

OPSS 904.09.03 Plan Quantity Measurement is deleted.

OPSS 904.10.01.01 is amended with the addition of the following:

Payment shall be made in the following basis:

- 75% of the unit price bid for the supply and placement of the concrete, as well as to supply and remove all necessary formwork and falsework

- 5% for finishing of the concrete to the requirements of the specifications

- 20% for curing of the concrete to the requirements of the specifications

Payment at the contract price for the appropriate tender item shall be full compensation for all labour, equipment and material required to do the work.