OPSS 904 – Construction Specification for Structures

Ontario

Date: December 10, 2024

Comments received by TCP:

Comment ID	Organization	Comment	MTO Response
430-1	Individual	Dimension tolerances have been added to the new version. Has MTO considered adding location tolerances? CSA A23.1 Cl 6.4.6.1 gives dimensions tolerances from a reference grid system.	The location tolerance with respect to gridlines is covered under MTO's General Conditions of Contracts, refer to section GC 7.02.
432-1	Large Volume Precast Component Supplier of the Ministry	904.01 Scope Clarification ❖ Does OPSS 904 apply to cast-in-place structures only? Or are precast elements included as well? Many precast elements have their own governing standard, ex. Girders OPSS 909, deck slabs SSP999-S31, culverts/spans >3m OPSS 912 & non-structural culverts OPSS 1821 Reason. OPSS 904 is content clearly shows that it is written primarily to represent cast-in-place and concrete delivery by ready mix truck ❖ Couple of sections from OPSS 912 refers to majority of OPSS 904 would require modification or amendment for precast structures as mentioned in below commentary. 912.07.02.04 "Cast-in-Place Concrete Appurtenances, Protection Slabs and Distribution Slabs" Cast-in-place concrete appurtenances, protection slabs and distribution slabs shall be according to OPSS 904. 912.10.06 Concrete in Cast-in-Place Appurtenances, Protection Slab and Distribution Slabs "Payment shall be at the Contract price for the tender item "Concrete in Culverts", according to OPSS 904."	OPSS 904 applies to cast-in-place structures and to precast components when specific sections of OPSS 904 are referenced in precast specifications. MTO intends to publish a new specification, OPSS 1355 Material Specification for Precast Concrete – Materials and Production, which will contain requirements for precast concrete.
432-2	Large Volume Precast Component Supplier of the Ministry	904.03 Definitions Recommendation & Request Currently cold joint is defined; to avoid confusion in future and during inspections, pour line shall also be defined. This is to avoid mistaking one with the other. Cold joint and pour line are two different topics and have significantly different impacts on lifespan of concrete. Pour line: A visible discoloration line between two placements of concrete where the concrete from each placement is well-bonded to the other. This is as a result of change in w/cm ratio/ variation in aggregate colors or cement colors. These lines are on surface and propose no issue to structural integrity of element. Cold Joint: delamination caused between two consecutive concrete placement that resulted in a joint.	Only terms that are referenced in the specification are defined, pour lines are not referenced or addressed in the specification, as they do not have a negative impact on quality and do not require any administrative action.

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432-3	Large Volume Precast Component Supplier of the Ministry	904.07.04.02 Abrasive Blast Cleaning OPSS Section 904.07.04.01 All concrete surfaces against which new concrete is to be placed, including formed and sawcut surfaces, shall be clean, solid, and free from loose or unsound fragments, coatings, and any other foreign substances or debris and shall be sufficiently rough to ensure that a full bond is developed with the new concrete. The concrete surface shall be uniformly roughened to a surface profile of 5 mm ± 2 mm by means of methods such as scabbling, chipping, or bush hammering to expose the aggregates across the entire surface. Roughening is not required for the vertical faces of slope paving, the vertical faces where an approach slab meets a deck end, or for new concrete substrate with a roughened finish imparted at the time of placement meeting the profile requirement. All reinforcement shall be clean and free of debris prior to concrete placement. OPSS Section 904.07.04.02 c) All ~~new or existing~~ concrete surfaces, including precast concrete, against which new concrete shall be place Recommendation this clause to include the option for precast concrete to have a rough surface finish option aside from sand blasting. This will line up with OPSS 912.07.01.07.04 Concrete Finish “Left with a rough surface finish (so that the depth of the indentations is at least 5 mm and the spacing is not greater than 15 mm)”. This also will line up with Section OPSS 904.07.04.04 General section of OPSS Prov 904-2024. The entirety of this Section is shown in previous comment. The representative sentence is highlighted.	MTO intends to publish a new specification, OPSS 1355 Material Specification for Precast Concrete – Materials and Production, which will contain requirements for precast concrete, and will align requirements, where possible.
432-4	Large Volume Precast Component Supplier of the Ministry	904.07.05.01 General OPSS Section The method of transporting, placing, and consolidating the concrete shall be such as to prevent segregation and formation of cold joints. Recommendation & Request There is a need to define & distinguish between cold joint and pour line as stated in item # 2 for OPSS 904.03 Definition	Please refer to response above, regarding pour lines.

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432-5	Large Volume Precast Component Supplier of the Ministry	904.07.05.01 General OPSS Section When there is an interruption in placing concrete greater than 20 minutes, the surface of the concrete shall be covered with wet burlap. The Contractor any interruption in placing concrete shall notify the not exceed 40 minutes. Recommendation: The highlighted section contradicts the allowable timespan in OPSS 1350.07.04.02 which is 30 mins For cast-in-place and when concrete is delivered with ready mix truck: 40 mins seems reasonable to include traffic and unforeseeable events. For precasters that they have mixer in the plant, 30 mins seems reasonable.	 There is no contradiction, this section discusses the delay after the concrete is placed in the work, while OPSS 1350.07.04.02 discusses the delivery time of the concrete in non-agitated equipment. Thank you for the suggestion.
432-6	Large Volume Precast Component Supplier of the Ministry	904.07.05.03 Concrete in Structure and in Bridge Deck Typo ~~Cross out~~ in Concrete in Structure and ~~in~~ Bridge Dec	Correction applied. thank you.

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432-7	Large Volume Precast Component Supplier of the Ministry	904.07.09.01 Temperature Monitoring Period OPSS Section The temperature monitoring period shall be a minimum of 7 Days. A longer temperature monitoring period may be necessary in order to meet the requirements of the Withdrawal of Protection clause. Recording of concrete temperatures shall begin at the start of concrete placement. Recommendation: ❖ Temperature monitoring period shall be for duration of curing period except in cases that weather protection clause is applicable. ❖ For precasters, this requirement creates major safety concerns as the QC staff has to go to storage yard where products are stored on bunks to remove temperature loggers. Currently loggers are removed in the plant after completion of curing period. ❖ A difference shall be made between cast-in-place and precast. Precast facilities provide more controlled environment. Monitoring temperature in summer months outside of curing period provides no value for a precast component. OPSS PROV 912-2020 912.07.01.08.01 General "For all concrete, all necessary actions shall be taken to maintain temperatures within the specified limits. During production, moist curing and the cold weather protection period, the following temperature requirements shall be met: …" OPSS PROV 909-NOV 2016 909.07.11.01 "For all concrete, all necessary actions shall be taken to maintain temperatures within the specified limits. During production, moist curing and the cold weather protection period, the following temperature requirements shall be met:"	OPSS 904 applies to cast-in-place structures and to precast components when specific sections of OPSS 904 are referenced in precast specifications.

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432-8	Large Volume Precast Component Supplier of the Ministry	904.07.09.02 Temperature Monitoring OPSS Section The Owner may elect to have ~~a digital display that allows the Contract Administrator to verify temperature, the Contractor shall provide~~ additional temperature sensors installed in any selected component. The additional temperature sensors will be supplied by the Contract Administrator ~~with the necessary instruments to allow the Contract Administrator to verify thermocouple function and readings~~. The Contract Administrator-supplied temperature sensors shall be installed at locations designated by the Contract Administrator and access and assistance shall be provided, at no additional cost to the Owner. All temperature sensors and data collection devices shall be protected from damage throughout the construction activities and temperature monitoring period. The Contract Administrator-supplied temperature sensors are in addition to the minimum number of Contractor-supplied temperature sensors specified in Table 1. Recommendation ❖ Is this applicable to cast-in place or precast ❖ Comprehensive inspections are being conducted that does pre and post pour. This includes location of temperature monitoring sensors ❖ This is not the best use of resources at least for precasters that cast their precast components in a facility with controlled environment ❖ Facilities are being audited and certified on an annual basis	OPSS 904 applies to cast-in-place structures and to precast components when specific sections of OPSS 904 are referenced in precast specifications. The temperature monitoring requirements in precast specifications apply to precast concrete.

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432-9	Large Volume Precast Component Supplier of the Ministry	904.07.09.04.02 Housing and Heating A minimum of two additional temperature sensors shall be installed ~~he temperature~~ where the highest and lowest ambient air temperatures adjacent to the concrete or formwork will occur. Additional temperature sensors may be required, at the direction of the Contract Administrator. The ambient air temperature adjacent to the concrete or formwork between the sensors within the housing shall not be permitted to vary by more than 8 °C. Typo ❖ Remove the crossed-out section does not Question: ❖ Temperature probes already measure the ambient temperature. ❖ This will drive up the cost of each element with no value being provided ❖ Would this applicable to precasters that produce precast components in house? ❖ Will this requirement be visited case by case? ❖ What is the reasoning behind this request?	Correction applied. Thank you This is applicable to cast-in-place structures and any precast specifications that refer to this section of OPSS 904 for temperature monitoring.

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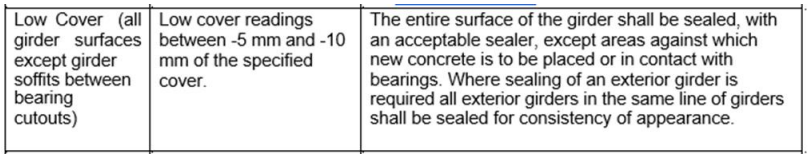
432-10	Large Volume Precast Component Supplier of the Ministry	904.08.03 Acceptance of Concrete Cover OPSS Section Where the concrete cover does not meet the requirements specified in the Contract Documents, the concrete component will be deemed rejectable. Recommendation ❖ Once again clarify whether the spec is for cast-in-place or precast ❖ Either way, there shall be an option for NCR and concrete cover shall be visited case by case depending on the severity of it. OPSS PROV 909-NOV 2016 Table 2 states the following:  Low Cover (all girder surfaces except girder soffits between bearing cutouts) | Low cover readings between -5 mm and -10 mm of the specified cover. | The entire surface of the girder shall be sealed, with an acceptable sealer, except areas against which new concrete is to be placed or in contact with bearings. Where sealing of an exterior girder is required all exterior girders in the same line of girders shall be sealed for consistency of appearance.	OPSS 904 applies to cast-in-place structures and to precast when specific sections of OPSS 904 are referenced in precast specifications. Requirements specific to precast are outlined in precast concrete specifications.

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432-11	Large Volume Precast Component Supplier of the Ministry	904.07.~~12~~13.01 General OPSS Section Concrete surfaces shall not be treated with cement slurry or paste. Within 3 Days following the removal of forms or curing materials, all holes left in the concrete surface with any dimension greater than 15 mm and less than ~~50~~40 mm shall be filled with ~~mortar or~~ a proprietary patching material. The holes shall be moist at the time of filling. Mortar shall be tamped into place. Proprietary patching materials shall be placed according to the manufacturer's instructions. Surfaces with voids or cavities with any dimension greater than ~~50~~40 mm or with honeycombing are considered deficient and shall be repaired. A repair proposal shall be submitted to the Contract Administrator for ~~approval~~ acceptance. Surfaces with spalls, delaminations or scaling are considered deficient. Question ❖ Based on which reasoning 50 mm was changed to 40 mm? Recommendation ❖ Maintain 50 mm, as OPSS 1821 Prov 1821-Nov 2022 Surface finish refers to OPSS 904. ❖ Industry is used to 50 mm, why change unless there is solid study that shows such a change is needed. ❖ The reasoning shall be available to public.	A change was made to improve the long-term durability. In some cases, concrete cover can be 50 mm, which would result in little to no cover in places where voids are coincident with reinforcement.
435-1	RMCAO	904.07.05.04 – "The concrete shall be placed in its final position and to its full depth in a continuous placing operation without interruption." Tremie placements do not have a "continuous flow of concrete at 15 m3/h", since there are times when the concrete supply switches from one truck to another. This fact must be acknowledged by the standard since it is not reasonable to reject the concrete for short stoppages in flow. As long as the concrete hasn't set, there is no detrimental impact, and retarders are often used in these types of applications.	This refers to the whole placement operation. The continuous placing operation is required to ensure the concrete placement is not interrupted (for example the tremie is removed). Switching between concrete trucks is part of the placing operation and is not considered an interruption.

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435-2	RMCAO	904.07.08.02 – Project CA's have rejected the use of fog misting on conventional concrete placements to prevent plastic shrinkage cracking and to control the evaporative moisture loss from the surface of the concrete on low relative humidity days with high wind. The standard needs to acknowledge the use of fog spraying for all concrete, not just HPC. Change the title to "Fog Misting of High Performance and Conventional Concrete". Fog misting is a concrete construction "best practice" to control plastic shrinkage and the MTO should not be banning an industry best practice just because of the potential for uneducated constructors to work the water back into the surface inappropriately. You need to deal with the inappropriate practice by noting that "fog spraying shall be stopped whenever water begins to puddle on the surface and concrete finishing operations shall not be initiated until the water sheen is no longer on the surface of the concrete".	It is correct, CSA 23.1 section 7 lists fog misting as one of the measures to preserve the surface plasticity of the concrete. However, MTO has identified issues in many contracts when fog misting was used. This has impacted the quality of concrete decks. The negative impacts of improper fog missing can significantly exceed the potential benefit of using fog misting for normal concrete. Fog misting remains effective and necessary for HPC. For other applications, the Contractor can propose to use fog misting. Approval of such proposals is decided on a contract-specific basis.

Not applicable	MTO	Since posting to TCP, some additional minor edits were made to OPSS 904, as follows: - Removed all references to ballast wall elastomers, as they are no longer specified for this application. - Added standard form PH-CC-117 to list of forms in References section. In Design and Submission Requirements section, under Temperature Control Plans subsection, added that a form PH-CC-117, showing a sketch of locations of temperature sensors shall be included in the submission. In Construction section, under Submission of Temperature Record subsection, added requirement for submission of a) A completed MTO Form PH-CC-117. and f) Cylinder curing records for concrete test cylinders. - In Definitions section, added the following definition for mortar: *Mortar means a part of concrete that contains cementitious materials, fine aggregate and water.* - In Design and Submission Requirements section, under Temperature Control Plans subsection, moved "Method of withdrawal of protection" bullet from the general list to the cold weather protection list. - In Design and Submission Requirements section, under Tremie Concrete Placement Plan, deleted part of the sentence in bullet g) since foot valves are required according to the Equipment Section: *Foot valve description~~, if used~~.* - In Materials section, for Concrete Sealer, replaced "Owner" with "Ministry", when referring to the list of acceptable sealers. - In Materials section for Insulation Material, corrected R-value to metric version, RSI-value. - In Equipment section, for Mixer for Bonding Agents, added that proprietary patching materials are to be mixed in the same type of mixer. - In Construction section, under Surface Finish subsection, part of the following sentence was deleted: Surfaces with spalls, delaminations or scaling are considered deficient ~~and shall be repaired~~. - In Construction section, under Pre-Wetting subsection, added the following: *For concrete placed against granular material the granular material shall be wetted by means of a uniform spray of water sufficient to wet the material thoroughly without leaving standing water.* - In Construction section, under Concrete Finishing, reworded the last paragraph as follows: ~~If n~~Newly placed plastic concrete shall not be ~~is~~ exposed to precipitation or runoff during placement, consolidation, or finishing.~~, as identified by the Contract Administrator, a written proposal for remedial action and correction of any defects shall be submitted within 3 Business Days to the Contract Administrator for acceptance by the Owner.~~ - In Construction section, under Curing, General subsection, added the following: *If precipitation occurs during the 72-hour air curing period, a proposal may be submitted to the Contract Administrator detailing the measures taken to mitigate the impact of the precipitation on the air curing of the concrete surface, for acceptance by the Owner.* - In Construction section, removed Curing with Moisture Vapour Barrier subsection, since this was removed as a curing method in the Curing, General subsection. - In Construction section, under Temperature Monitoring Period, replaced the word "any" with "the" in the following sentence: *The temperature difference between the internal temperature at the centre of the*

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		concrete component at a location where the concrete is expected to reach the highest temperature and the ~~any~~ surface of the concrete component shall not exceed 20 °C. - In Construction section, under Temperature Monitoring, added requirement that submitted temperature records, including graphical plots, shall be labeled to indicate the sensor location according to Table 1 (i.e. internal temperature, surface temperature). - In Construction section, under Testing for Early Strength subsection, removed part of the following sentence, since the contractor arranges for testing of early strength: The time of testing for early-break cylinders shall be identified and the Contract Administrator provided with one Business Day advance notice ~~to arrange testing~~.	

Comments received by email:

Number	Organization	Comment	MTO Response
			No comments received by email during the TCP consultation.