Ontario

MINISTRY OF TRANSPORTATION

Highway Design Office

Technical Consultation Portal (MTO TCP)
Comments and Responses

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OPSS 422: CONSTRUCTION SPECIFICATION FOR PRECAST REINFORCED CONCRETE BOX CULVERTS WITH SPAN 3M OR LESS IN OPEN CUT
Response to OCPA Comments

Comments (C)	Responses (R)
C1: **422.05.05 Connector Plates** Connector plates shall be in accordance with ASTM A240/240M Type 304 and stainless steel threaded rods shall be in accordance with ASTM F593 Type 316 with nuts in accordance with ASTM F594 OCPA Comment: OCPA Producers propose the use of galvanized steel plates as an alternative to SS plates due to current supply chain issues, and more to do with the concerns with the origin of supply for the majority SS material. Galvanized steel connector plates are the typical industry practice for culvert installations.	**R**1: Use of Stainless-Steel plate is required for durability. On a contract if supply issue arises it will be dealt on contract level.
C2: **422.07.09.01 Box Units** End units to accommodate concrete appurtenances shall be as specified in the Contract Documents. End two box units shall be a minimum of 2.44 m in length, all other units shall be a minimum of 0.914 m in length. All box units shall be less than 3.1m in length. The box units shall be installed to make a continuous line forming a box culvert. OCPA Comment: OCPA Producers agree with the suggestion to maximize the box length for end units to assist with the stability of the culvert inlet/outlet. The suggested minimum length of 2.44m cannot be attained since end units also require a "flush end" finish (i.e. flush face with no spigot or no bell joint). When a box is cast for a flush end, the joint area is blocked out to create the flush face. OCPA Producers would propose a minimum box length of 2 metres which would address intentions to maximize box length and to address producer variances in casting a flush end unit.	**R2:** A minimum 2m length of box is acceptable. This will be changed in the specification.
C3: **422.07.09.01 Box Units** The gap at box unit joints shall not exceed 15 mm. The gaps over 15 mm shall be addressed by removal and replacement of the box unit to achieve a joint not exceeding 15 mm. OCPA Comment: OCPA Producers propose the 15 mm be corrected to match the joint gap value of 20 mm in Clause 422.08.01 b). By keeping to the 20 mm joint gap, this will remain consistent with OPSS.PROV 912, Table 1.	**R3:** 20mm gap value will be made consistent.
C4: **422.07.09.02 Connector Plates** Connector plates shall be used to connect the end culvert unit to the adjacent unit and at all other joint locations as specified in the Contract Documents OCPA Comment #1: OCPA Producers would propose the use of connector plates should be determined on a culvert to culvert basis, since these materials add extra cost to the culvert. Stability of the end unit is intended with prepared foundations and bedding, by maximizing the length of end unit, and with the use of cut-off walls. In many cases, the depth of bury over the end units is zero and the top slab of box remains exposed. When culverts support an embankment and headwall units are necessary, acting lateral soil pressure may impact the balance of the end unit (w/ hdwl) and hence connector plates could be beneficial. As a suggestion, a minimum headwall height of 600 mm should constitute the use of connector plates. OCPA Comment #2: OCPA Producers suggest a standard detail for the connector plate should be included to ensure consistency of connector plate and means of connection to the precast.	**R4:** 422.07.09.02 will be modified to stat "as specified". Also, CDED of OPSS 422 will include some information for the designer. Connector Plate detail is currently shown on SSD 114-007 for large size box culverts, but MTO is creating a separate standard drawing to apply same detail for smaller culverts as well. For the time being SSD 114-007 can be referred

Comments (C)	Response (R)
C5: **422.07.09.03 Joint Treatment** Joints between box units shall be provided with a preformed seal. All joints, including the bottom side of culvert, shall be effectively covered to prevent influx of material from the backfill or native soil through the joints. Unless otherwise specified, material for the joint cover shall be geotextile. OCPA Comment: OCPA Producers agree an effective joint treatment is important for the performance of the culvert. Some joint materials may work against this intention since their application is not well suited to a horizontal installation. Joint materials that cannot mold into the joint profile may cause the joint gap to exceed the 20 mm maximum. Sealing the joint will help to ensure fines do not infiltrate through the joints, but OCPA Producers believe there is also merit to allow these joints to weep and relieve any hydrostatic pressure outside the box and/or to weep trapped water in the frost-free granular zones surrounding the box. OCPA Producers propose the use of geotextile for wrapping joints would be effective for the previous conditions. It is unlikely OPSS.PROV 422 would be used for a box sewer application, but in this scenario, the precast producer is capable to supply a profile rubber gasket for only the standard box sizes in OPSS.PROV 1821, for which OPSS.PROV 422 is associated with.	**R5: OPSS** 422 is to be used with OPSS 1821 with standard sizes of culverts. Guidance to designers will be included in CDED B422 to use only standard culvert sizes provided in OPSS 1821 design tables.