Comments received by TCP#0277			
TCP Comment ID	**Organization**	**Comment**	**Discussion/ Response**
505	Individual	Figure 2.4-1 is shown as a NCHRP-350 TL-1 barrier which has been used on low-volume roads in the United States. As far as I can tell, there is no MTO standard detail for this type of barrier. The figure seems to be taken from “Design and Evaluation of Two Bridge Railings for Low-Volume Roads” (Faller et al., 1995). As there is no MTO standard drawing, a citation to the original report should be included in the Structure Manual so designers can conduct their own research. Please also note that there is critical information missing in Figure 2.4-1 which was included in the 1995 report – a sawcut in the tension face of the post is required but is not shown. Similarly, can reference information for Figure 2.4-2 and Figure 2.4-3 be provided for informational purposes if an MTO standard detail does not exist? Also, Figure 2.4-2 appears to be a new detail added to this version of the Structure Manual – maybe it is an issue on my end only, but this image is very blurry.	MTO has a long-term plan to review and update the current standards of Traffic Barriers. We will address any issues or missing information when we update the standards. Sorry for inconvenience the Structural Manual draft posted on TCP had lower resolution due to file size limitation The final draft will contain clear image.
506	Individual	It's implied that Figure 10.2.2 is taken from SS110-5 and matching the Oregon Side Mounted Thrie-Beam Bridge Railing. Figure 10.2.2. shows a height from top of driving surface to top of post of 715mm. SS110-6 shows a different post height of 808mm. From what I can gather, the height shown in Figure 10.2.2 is closer to the height which has actually been crash-tested with the Oregon Side Mounted Thrie-Beam Bridge Railing. The SS drawings also show a 125mm x 85mm concrete curb, while this curb is not shown in Figure 10.2.2 or in the Oregon Side Mounted Thrie-Beam Bridge Railing detail – where does the curb come from? Should the image in Figure 10.2.2 be updated to match SS110-5 / is there a need to instead update SS110-5 to match Figure 10.2.2?	At the time no changes are being made since it was done historically this way, but as mentioned above MTO is in the process of developing a new MASH TL-2 barrier standard.
507	Individual	CSA S6-25 has modified minimum stirrup and tie bend diameters. For bars with a yield strength of 500 MPa or greater the bend diameter is now 5db instead of 4db previously. This creates inconsistencies between CSA S6-25 and SSD 112.0001 for bend diameters shown. Large stirrups bend diameters will create additional challenges for CIP components that require single ties to be installed. For precast components, there is often even more reinforcing steel congestion where larger bend diameters will cause conflicts. For the MTO NU Girder SSD, the main stirrups in the girder would not fit within the specified cover if fabricated as shown with the larger bend diameter. Has consideration been given to make an exception to CSA S6-25 for stirrup bend diameters? Or will standard details be modified to suit the revised bend diameters?	The CSA S6:25 minimum bar bending requirements come from ACI and ASTM bend test requirements. ASTM 615 bend test requirement specifies 3.5 db for grades 40 and 60 steel, 5 db for grade 80 (550 MPa) and 100 (690 MPa) steel. SSD 112.0001 already includes a 5db bend radius for 20M and 25M stirrups in the stirrup and tie hook table. MTO will revise SSD 112.0001 in the new year and consult with industry prior to the revision.

Comments received by email			
Number	**Organization**	**Comment**	**Response**
1-1	Jewell Engineering	Section 2.1.1 Design Specifications Paragraph makes reference to 2019 version of CHBDC not 2025.	It has been revised.
1-2	Jewell Engineering	Table 2.4.1 – 28-day compressive strengths. OPSS.MUNI 1350 makes reference that all mix designs need to conform to CSA A23.1 Tables 1, 2 and 3. These tables would require that components exposed to deicing chemicals, i.e. portions of bridge deck, sidewalks, barriers and other elements, need to conform to Exposure Class C1 which requires a minimum compressive strength of 35 MPa (at 56 days). Some mention of this in the manual would be beneficial to understand how this applies to non-Ministry bridges. The requirement to conform to A23.1 does not appear to be in OPSS.PROV 1350 although that specification has other requirements.	The MTO Structural Manual does not directly require adherence to the requirements of A23.1, neither in terms of minimum strength nor durability. The MTO Structural Manual applies to provincially owned bridges, and only the Division 1, Exceptions to the CHBDC, are obligatory for municipal bridges. In Division 1, concrete durability requirements are based on the Ontario Provincial Standards for Roads and Public Works or other standard, approved by the Owner.
1-3	Jewell Engineering	Section 2.44 – Reinforcing Steel (Grade 500W) Since 500W grade is not yet as readily available as Grade 400W, is this a mandatory requirement for non-Ministry bridges.	Use of Grade 500 Steel is a mandatory requirement for MTO's projects. It is up to other owners to specify grade of steel for their contracts.
1-4	Jewell Engineering	Section 5.1.1 Integral Abutments – Paragraph (d) Mentions that wingwalls should be oriented perpendicular to the highway, should this not be parallel to the highway?	It has been revised.
1-5	Jewell Engineering	Section 5.1.1 Integral Abutments – Paragraph (f) Missing word: "… installed around the pile to **PREVENT** mixing of the native soil…"	It has been revised.
1-6	Jewell Engineering	Section 8.1.2 Structural Steel Design Requirements Paragraph (a) states that **all** structural steel used in highway structures shall be Type AT or Type WT yet paragraph (d) mentions that certain members can be Type A or Type W.	In general, all structural steel is specified as noted in a) except as noted in d).
1-7	Jewell Engineering	Section 8.4.1 Coping of Stiffeners and Gusset Plates Missing word: … stiffeners shall **BE** J-clips…."	It has been revised.
1-8	Jewell Engineering	Section 9.3.6 Stay-in Place Forms Should say "**Stay-in-place** forms are considered . . ."	Corrected.
1-9	Jewell Engineering	Section 10.2.2. Test Level (TL-4) Some of the railing systems shown that are intended for pedestrian use have gaps between rails greater than 100 as specified in CHBDC. To conform to these requirements some of the MTO SS drawings show optional pickets to be used where there will be pedestrian use. Some SS drawings such as the Four Tube Railing on Sidewalk shown in Figure 10.2.7 do not have optional pickets shown on the SS drawing. These drawings should likely be modified. The requirement for pickets on the pedestrian railings should also be discussed in the Manual.	The CHBDC does not require that openings be limited to 100 mm for combination barriers. Metal traffic railings are designed as combination barriers, not pedestrian barriers. The pickets are provided for aesthetics and could be added to the back face of any metal railing provided they do not adversely affect the crashworthiness of the barrier. The MTO only has one SSD designed as a bicycle barrier, SSD 110-22, which conforms with the geometry requirements of pedestrian barriers. Clause 10.2.2 c) has been revised to reflect the intent of the optional pickets.

1-10	Jewell Engineering	Section 13.2.5. Expansion Joints at the End of the Approach Slab . . . The text makes reference to bridges with lengths of 30m yet Figure 13.2.1 makes reference to span length of 40m.	The description in the figure has been revised to 30 m.
2-1	Salit Steel	Section 1 - 9.22.3.3 Reinforcement “The minimum reinforcement in the concrete slab may alternatively be fibre reinforced polymer reinforcing bars. The reference to “steel” may be taken to also mean FRP.” – We are not clear on the intention of this clause: “steel” “may be” taken to also mean FRP. ?	The reference is specific to the design of wood-concrete composite decks and is clear when read in context with the CHBDC’s requirements.
2-2	Salit Steel	2.4.4.1 “The designer shall utilize only the 500W grade, mixing of 400W and 500W on the same structure is not permitted;” Please clarify what is meant by **“same structure.”** Would a bridge structure detailed with 500W reinforcement and approach slabs detailed with 400W still comply? We still see this case. How should this be interpreted for miscellaneous structures such as pole bases that rely on standard details currently showing 400W?	“Same Structure” means same bridge. Intent is to use 500W in entire structure. Mixing of steel grades is not permitted, however if there are issues coming, they are resolved on contract basis and we expect these issues will be resolved overtime by continuous use of 500W steel on MTO’s bridges. MTO is currently updating the the standards with 400W Steel, during this period 400W steel can be switched to 500W steel. Guidance regarding this is provided in same section 2.4.4 (3&4).
2-3	Salit Steel	2.4.4.3 “For SSD’s, any reference from 400W shall be changed to 500W. Structures Office is in the process of updating the drawings to 500W and has determined that there are no negative implications in using the currently specified reinforcement quantities with the higher strength;” Please clarify the term **“currently specified.”** Our concern relates to the cost premium associated with 500W versus 400W, particularly for projects that have already been tendered based on 400W materials.	The requirements of the contract dictate what grade is required to be supplied for the specific project. The intent is that all new structures should be designed and tendered entirely with grade 500W for carbon steel bars. In time, all structural standards (including overhead sign support structure footings and high mast light pole bases) will be updated to make use of 500W reinforcement.
2-4	Salit Steel	12.5.5.5 Spiral Reinforcement “Ontario reinforcement fabricators are only able to bend spirals of size 15M or smaller. If larger transverse reinforcement is required, it may be possible to use bundled spirals (2 nested 15M spirals that are touching, and then with a spiral pitch somewhat larger than what could be achieved with a single spiral. Hoops of size 20M or 25M are also possible. “ We would like to note that Canadian mills have recently begun manufacturing 20M and 25M coils, and most fabricators now have the capability to produce up to and including 20M spirals. as well we would like to bring to your attention that 2 nested spirals that are touching is nearly impossible and not recommended. As well hoops can be fabricated from all standard sizes.	The section has been rewritten to reflect that feedback.
2-5	Salit Steel	12.5.6 Splicing of Reinforcing Bars There is potential for confusion as the S6 Code does not use this terminology (e.g., Type 1, Type 2). There also appears to be a lack of reference to Anchor head or headed bar reinforcement for rebar while there is a clause 12.5.7 refers to Anchor Headed GFRP Bars	A section has been added to explain that forged heads are allowed. Mechanical anchor heads are permitted only with approval.
3-1	Headed Reinforcement Corporation	The proposal summary specifically notes the adoption of S6-25. **Mechanical Splices** This draft of the Structural Manual references "Type 1 vs. Type 2 mechanical splices" in section 12.5.6. This language is not consistent with S6-25 section 8.4.4.5 Mechanical connections for reinforcing bars nor OPSS 905, section 905.05.02, nor active MTO DSM Lists for Mechanical	The section has been revised to clarify the different between Types of mechanical splices.

		Connectors. CSA A23.3:24 does include definitions for Type 1 and Type 2 mechanical splices in section 12.14.3.4. Please consider revising the language in the Structural Manual to be consistent with S6-25 in order to avoid confusion within the industry.	
3-2	Headed Reinforcement Corporation	The proposal summary specifically notes the adoption of S6-25. **Headed Bars** This draft of the Structural Manual references "Anchor Headed GFRP Bars" in section 12.5.7, but does not discuss mechanical anchor heads for deformed reinforcing bars (headed bars). To be consistent with S6-25, please consider adding language to address headed bars consistent with S6-25 section 8.14.1.5 and 8.15.8.	Pls refer to the response to comment 2-5.
4-1	Dayton Superior Canada Ltd	Now that the use of Headed Bar design for reinforcing steel has been expanded into the CSA S6:25 Code, will you be required to add any related notes in the v61 document? Also, are their plans to have a New DSM created for approved 5Ab / 10Ab heads, similar to the current DSM 09.65.58 / 09.65.60 (Mechanical rebar splices for Plain and Stainless reinforcing steel) **8.14.1.5.1 5A_b anchor heads** A 5A_b anchor head shall provide anchorage of a deformed reinforcing bar in concrete through a combination of bearing of the mechanical anchor head and bond of a straight length of the reinforcing bar. The anchor head shall have a gross bearing area of not less than five times the cross-sectional area of the reinforcing bar and shall conform to ASTM A970/A970M, including Annex A1 requirements for Class HA head dimensions. **8.14.1.5.2 10A_b anchor heads** A 10A_b anchor head shall provide anchorage of a smooth, threaded or deformed reinforcing bar in concrete through bearing of the mechanical anchor head. The anchor head shall have a gross bearing area of not less than ten times the cross-sectional area of the reinforcing bar and shall be capable of developing the lesser of 1.25f_{yg} and the tensile strength of the bar.	Pls see response to 3-1. We will review the need of creating DSM List in future.
4-2	Dayton Superior Canada Ltd	In the second PDF, page 59 of 170, Section 12.5.6 Splicing of Reinforcing Bars, you have used the classification “Type 1 vs Type 2” / “Type 1 or Type 2” for Mechanical connectors.. I’m not sure if this is intentional as CSA S6:19 Clause 8.4.4.4 or S6:25 Clause 8.4.4.5 do not use Type 1 or Type 2 terminology to specify Mechanical Rebar Connector requirements. NOTE: CSA A23.3:25 does use the Type 1 & 2 classification. I bring this up only to ensure we reduce confusion when designers have to reference Bridge Code splice requirements vs CSA A23.3 splice requirements.	Pls refer to response to comment 3-1.
5-1	Safe Roads Engineering	**Contradiction to CSA S6 CHBDC regarding buried structure definition.** The MTO manual Section 1-7.1 Scope (page 10 of 21) *This subsection is amended by the addition of the following:* *“The provisions of this Section are mandatory only for structures that are greater than 3 m in span.”* CHBDC cl.1.3.1 defines a “bridge” as having a span greater than 3.0 m; however, there is no definitive boundary for buried structures. This implies that culverts may have spans less than 3.0 m, which aligns with how OPSS 1821 was originally developed.	The scope clause is clear and to be interpreted as written. CSA S6:25 can be used to design spans less than 3 m but it’s not obligatory in Ontario. An alternative design basis may be used for buried structures spanning up to 3.0 m.
5-2	Safe Roads Engineering	**Question 1:** For spans less than 3.0 m, does CHBDC no longer govern, or does the *unamended* CHBDC still apply?	Pls refer to the response to 5-1.

		The MTO manual (page 11 of 21) 7.9.11.2.2.1 Shear strength for box structures *The contents of this clause are deleted and replaced with the following:* *The shear strength shall be determined in accordance with Section 8, unless approved by the Owner.* This amendment further revises the requirement for shear strength checks, making them mandatory unless otherwise approved by the owner. Since the scope of buried structures has been amended as discussed earlier, a natural interpretation is that spans **3.0 m or greater** must undergo shear-strength verification. OPSS 1821 was developed based on CHBDC provisions for spans **3.0 m or less**, including the allowance for omission of shear-strength checks. OPSS 1821 cross references the structural manual. With the revised scope stating that shear strength must now be checked for spans of 3.0 m, the designs for the 3.0 m spans listed in OPSS 1821 would require re-evaluation of shear strength. This also affects buried conditions that fall outside the limits of OPSS 1821. Section 14.1 of the MTO manual applies to culverts meeting four criteria, including item (c): **all culvert sizes specified in OPSS 1821**, which includes culverts with spans less than 3.0 m.	
5-3	Safe Roads Engineering	**Question 2:** Section 14.1 appears ambiguous and seems to conflict with the amended CHBDC scope. For spans less than 3.0 m, does CHBDC still apply (as raised in Question 1)? OPSS 1821 contains nine standard sizes and also applies to non-standard sizes. Does Section 14 include non-standard sizes with spans less than 3.0 m? And does CHBDC apply to those non-standard sizes? MTO Section 14.2.5 states that cast-in-place culverts with fill heights less than 600 mm require a distribution slab, and that the distribution slab is to be designed in accordance with CHBDC.	Section 14.2.5 has been revised to remove the reference to cast-in-place concrete.
5-4	Safe Roads Engineering	**Question 3:** What is the intent of the distribution slab? CHBDC contains no definition of a “distribution slab,” nor does it provide a design methodology for such a slab. Load distribution through the slab is not quantified, and CHBDC does not currently permit any benefit from load distribution when fill height is less than 600 mm. Clause 7.9.17 provides an optional 150 mm slab for shear-force transfer at precast joints when fill height is less than 600 mm. For cast-in-place culverts, construction joints—if present—are typically continuous and capable of full shear and moment transfer; therefore, a distribution slab would generally not be required. This requirement is therefore ambiguous.	Pls refer to the response to 5-1.
5-5	Safe Roads Engineering	**Question 4:** Please confirm that this requirement applies only to spans greater than 3.0 m, consistent with the amended CHBDC scope. For spans less than 3.0 m, the distribution-slab provision would be omitted for cast-in-place culverts. For precast culverts, the OPSS 1821 provisions would continue to apply.	Pls refer to the response to 5-1.
5-6	Safe Roads Engineering	**Recommendations:** The amendment to the CHBDC adding 3.0 m or greater creates confusion. It is recommended to remove this amendment.	This is amendment aligns with MTO’s standards and Specifications. Please refer to OPSS 912.
5-7	Safe Roads Engineering	**Recommendations:** There are options for handling joint shear transfer according to CHBDC cl7.9.17. MTO prescribes 150 mm distribution slab option, OPSD 3921.110 should be referenced as the design and definition of the “distribution slab” are well presented.	OPSD 3920.11 is intended to work with OPSS 422 and OPSS 1821. Definition of distribution slab is covered in MTO’s specifications.