51-1.03D(4) Construction Joints

Concrete Technology Manual

Additional information regarding girder stem to deck joints can be found in the *Concrete Technology Manual*, Chapter 5, *Concrete Construction*.

Stem to Deck Construction Joint

In 2010, the Structure Maintenance and Investigations (SM&I) group discovered horizontal shear failure between the stem to deck interface in both T-Beam and Box Girder cast-in-place reinforced concrete structures. The shear failure in some cases progressed enough to warrant bridge replacement.

The Division of Engineering Services (DES) Reinforced Concrete Committee evaluated this issue with the objective of increasing horizontal shear capacity at the girder stem to deck interface. In addition to other changes in design practice and procedures, it was concluded that horizontal shear capacity across the stem to deck interface increases significantly when the construction joint is intentionally roughened to minimum amplitude of 1/4". To help assure that proper attention is given to the critical construction joint between the girder stem and the deck, the specifications have been amended.

Figures 1 through 3 depict acceptable roughened surfaces. A hand-held garden rake was used to obtain the roughened surface in these examples.



Figure 1. Example of Acceptable Roughened Surface.





Figure 2. Example of Acceptable Roughened Surface.



Figure 3. Example of Acceptable Roughened Surface.

During the roughening operation, care should be exercised to avoid the following:

- Excessive dislodging of coarse aggregates when using the roughening tool.
- Floating/troweling of the top surface of the stem forcing coarse aggregate into the paste and making the surface too smooth.
- Excessive vibration causing the cement paste to rise and cover coarse aggregates.

In addition to the above, it is also extremely important that the surface of the construction joint be abrasively cleaned per the specifications¹, prior to placement of

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¹ 2010 SS, Section 51-1.03D(4), Construction Joints

deck concrete. All laitance, curing compound, and loosened particles of concrete must be removed.

A rough clean construction joint can go a long way in assuring the structural integrity throughout the life of the bridge.

For projects that are using *Standard Specifications* dated earlier than 2010, your attention is directed to the Division of Construction's Construction Procedure Directive (CPD) 10-8, *Stem to Deck Construction Joint* for more details on how to incorporate the modified joint detail into their projects.

If a change order is required, it will be implemented at no additional cost. It has been determined that the desired roughness can be obtained with insignificant additional effort. Furthermore, removal of the requirement to expose the aggregate by blasting strengthens the *no additional cost* determination.

