

Stem to Deck Construction Joints

In 2010, Structure Maintenance and Investigations (SM&I) 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 a minimum amplitude of 1/4 inch. To help assure that proper attention is given to the critical construction joint between the girder stem and the deck, the *Contract Specifications* have been amended.

Figures 1 and 2 depict acceptable roughened surfaces. A handheld 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

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

- Excessive dislodging of coarse aggregates when using the roughening tool.
- Floating or trowelling 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 *Contract Specifications*, prior to placement of deck concrete. All laitance, curing compound, and loosened particles of concrete must be removed.

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