

Peer Exchange Topic: Preserving Prestressed Concrete Beams/Girders

Date/Time: August 23, 2023/11:15AM

Moderator: Ben Foster, Maine DOT

Note Taker: Richard Dunne, GPI

Discussion:

Ben asked what do States do to protect the ends of girders:

NHDOT uses coal-tar epoxy at the ends of girders in continuous spans.

NJDOT uses epoxy paint, but recognizes that may not last and will need to be reapplied.

Siva Venugopalan suggested agencies could use a spray on zinc “paint” anode on the ends of beams in the fabrication plant which would cathodically protect the steel in the ends of prestressed beams.

A vendor in the room mentioned that when working in Ohio, ODOT seals the ends of new concrete beams as well as the bottom flanges that will be exposed to salt spray.

Ben then asked about repairs to ends of girders:

MassDOT has a typical (not standard yet) detail which calls for careful (hand tools) removal of deteriorated concrete and cleaning of exposed steel and then re coating steel, repainting the concrete and applying a concrete sealer.

DelDOT talked about issues with adjacent box beams and the transverse ties and shear keys cracking. They no longer require transverse ties, they now use a reinforce shear key with UHPC.

Others mentioned similar problems with shear keys as well as longitudinal cracks reflecting up to the deck above where the box beams abut with each other.

Sreenivas Alampalli noted that, based on recent research (NCHRP Research Report 1026 Guidelines for Adjacent Precast Concrete Box Beam Bridge Systems), some agencies are increasing the depth (size) of the shear keys and the number of transverse ties required between adjacent box beams, plus increasing the required stress in the tie rods to eliminate the reflective longitudinal crack.

Siva Venugopalan noted that if inspectors see corrosion and efflorescence on the bottom box beams, that generally indicates corrosion of the bottom steel, but when those beams are “opened up” for repair the top reinforcement in the box girders is even more severely deteriorated than the bottom reinforcement.

General discussion ensued talking about the opportunities to make the girders more robust and resistant to corrosion including mix design changes, use of GFRP or “tokyo rope” – which was cited on a bridge by VDOT . Maine DOT and VDOT no longer use epoxy coated rebar, and NYSDOT is looking at other options rather than epoxy coated steel. MDTA designed their new Nice Bridge (a 1.7 mile long bridge) over the Potomac River for a 100 year service life using a combination of improved concrete ix design and corrosive resistant reinforcing steel.

