Repair of Prestressed Concrete Bridge Beams

Presented by:
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Goal

- Understand that damage/defects of precast/prestressed beams will occur and can be repaired without compromising the durability or integrity of the product.
Spalling from Rapid De-tensioning of shipping strand in the Field

• Eddy Road project over I-90
• 2015 prior to Republican National Convention
• Contractor cut transportation strand quickly and force caused spalling along top flange near to the web
• Strand exposed – No structural need for transportation strand after beams are erected
• Sounding of areas identified loose concrete and spalls
No Time To Waste

• PSI hired structural engineer to analyze beams and suggest a repair procedure
  – Remove any unsound concrete
  – Seal with a micaceous iron oxide, and refined tar resin coating

• ODOT did not accept Tar Sealer proposal
  – ODOT requested removal of loose material followed by mortar repairs and cover with a fiber wrap
  – Never used in this type of application before
Repair Materials Used

• Euclid – Verticoat
  – Two component polymer modified cementitious mortar for vertical/overhead concrete repairs

• Sika – Sikawrap Hex-103c
  – High strength, unidirectional carbon fiber fabric.

• Sika – Sikadur Hex 300
  – Two component high-modulus, high strength, impregnating resin
Honeycomb/Voids in New Beams

• Possible Causes:
  – Congested Reinforcement
  – Concrete too stiff
  – Placement method
  – Inadequate Vibration
End Spalls
End Spall Repaired
Cracking
Common Reasons Beams Crack

- Concrete binding in the form
- Improper detensioning
- Shrinkage
- Draped strand causing a vertical force
- Excessive number of debonded strand
- Poor design
Items to consider when cracks are observed

• Cracks will often close after the beam has been detensioned.
• Cracks that remain after the detensioning process may still close after they have been loaded by the deck.
• Fine cracks will often heal autogenously after a member has been prestressed by continued hydration of previously unhydrated cement.
What to do when a crack is observed

- **515.18 Prestressed Member Acceptance and repair.** Throughout the fabrication process reject all prestressed members not meeting specification requirements. For all rejected members provide the Department with a complete description of the rejection, and unless waived by the Director, an Ohio registered professional engineer’s written evaluation of the criticalness of the rejection and the professional engineer’s proposed repair method that will repair the rejected member to an acceptable condition. The Department will determine the acceptability of the member and the repair procedure. If acceptable, the fabricator will only make repairs witnessed by the Department’s inspector unless waived by Director. Use the Precast/Prestress Concrete Institute’s Manual for the evaluation and repair of Precast, Prestressed Concrete Bridge Products MNL-137-06 as a general guide.
Super Low Viscosity Epoxy

Concrete Repair

CRACKBOND SLV-302

Product Description
CRACKBOND SLV-302 is a super low viscosity, 2-component epoxy ideal for gravity-fed repair of fine to very fine width horizontal cracks. It can be used in temperatures between 50°F - 100°F (10°C to 38°C) for a variety of repair projects including vertical crack repair using injection ports in conjunction with a curing paste. Its bonding and sealing capabilities for interior and exterior slabs are exceptional.

General Uses & Applications
- Pressure injection of fine to very fine cracks
- Gravity fed structural crack repair in concrete, masonry and wood fine to very fine cracks: 0.0025 in. to 0.125 in. (0.06 mm to 3.2 mm)
- Epoxy resin binder for mortar repair, patching, and overlay of interior surfaces including addition of aggregate
- Sealer for interior slabs and exterior above-ground slabs, decks, patios, curbs, parking garages and other structures
- Primer for industrial coatings
- Shear fracture repairs in interior and exterior concrete slabs
- Bonding agent for fresh or hardened concrete and hardened concrete

Advantages & Features
- Moisture insensitive for use in damp environments
- Super low viscosity with low surface tension allows deep penetration of fine to very fine cracks
- Non-shrink and bonds to all surfaces of the crack

Availability:
Adhesives Technology Corp. (ATC)
CRACKBOND products are available through select distributors who can provide you with all your construction needs. Please contact ATC for a distributor near you or visit our website to search by zip code.


Storage & Shelf Life: 24 months in unopened containers stored in dry conditions between 40°F (4°C) and 60°F (20°C). High relative humidity will reduce shelf life.

Installation & Coverage: Manufacturer’s Printed Installation Instructions (MPI) are available within the Technical Data Sheet (TDS). Due to occasional updates and revisions, always verify that you are using the most current version of the MPI. In order to achieve maximum results, proper installation is imperative.

Clean Up: Always wear appropriate protective equipment such as safety glasses and gloves during cleanup. Clean unused materials from tools and equipment with mild solvent. Cured material can only be removed mechanically.

Limitations & Warnings:
- NOT intended for aesthetic finishes as product may turn amber when exposed to UV light
- Once cured, properly prepared product may be coated or painted to meet desired appearance; see MPI
- New concrete should be a minimum of 28 days old prior to application
- Cartridges balancing and repair instructions must be strictly followed
- Do not thin with solvents, as this will prevent cure

Safety: Please refer to the Safety Data Sheet (SDS) for CRACKBOND SLV-302 published on our website or call ATC for more information at 1-800-892-1830

Specification: The epoxy repair material shall be a two-component, 2:1 ratio, epoxy adhesive system. When cured 7 days and at a temperature of 75°F (24°C), the epoxy adhesive shall have a compressive strength of 10,185 psi (70.2 MPa) per ASTM D959 and a tensile strength of 6,707 psi (46.2 MPa) per ASTM D638. The epoxy adhesive shall be CRACKBOND SLV-302 from Adhesives Technology Corp., Pompano Beach, Florida.

STANDARDS & Approvals
ASTM C881-14 TYPE I, II & V
Grade 1 Class C
AASHTO M255
(See ATC website for current list of Department of Transportation approvals throughout the United States)
Office of Materials Management

- Notify of deficiencies
- Propose a corrective action plan
- Receive an approval
- Perform plan
- Document
- Revise Quality Control Plan to avoid reoccurrence if necessary
Questions