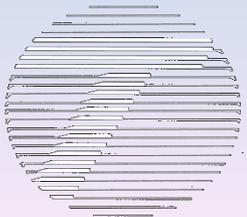


Accelerated Bridge Construction (ABC) in New York

Wahid Albert, PE
Director, Structures Design

September 17, 2015



***NEW YORK STATE DEPARTMENT OF TRANSPORTATION
Main Office Structures***

New York City : *Lateral Slide*

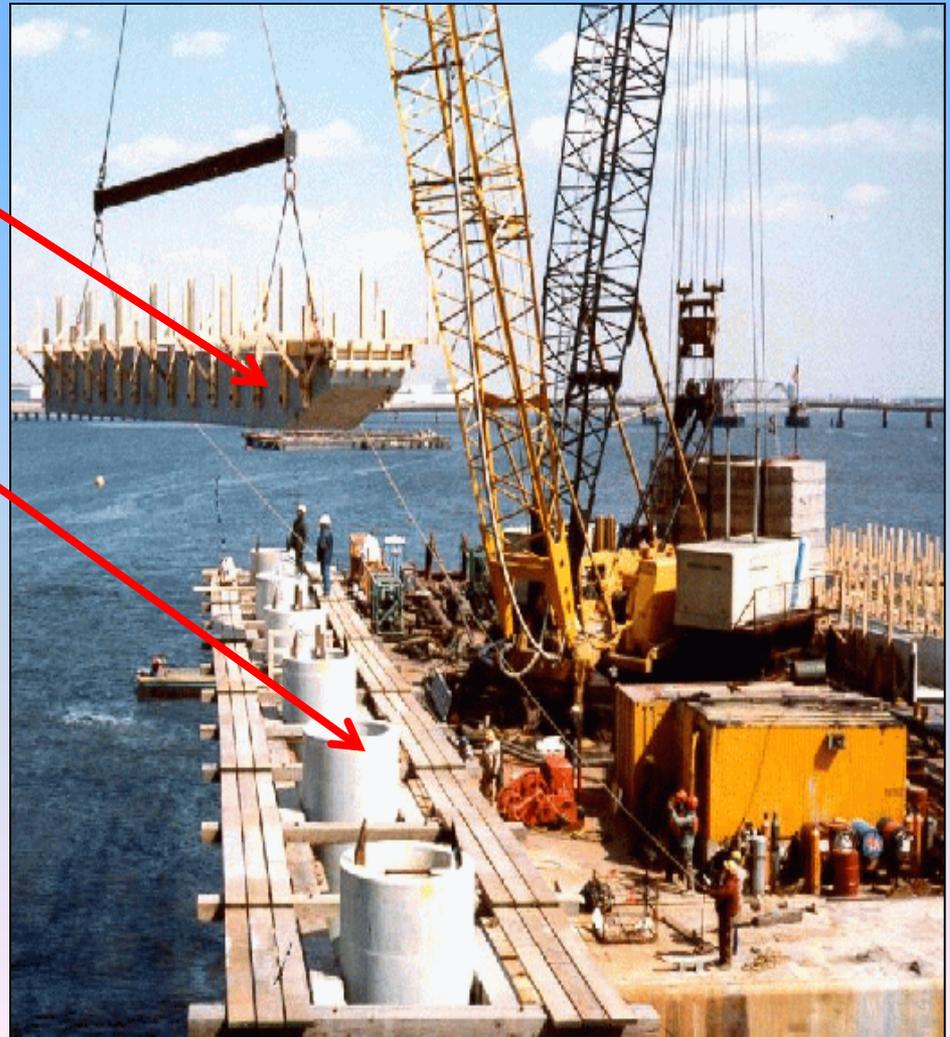
Jamaica & Hillside Ave. over Van Wyck Expwy



Cross Bay Boulevard over North Channel

Precast Tub Caps

Cylinder Piles



Roslyn Viaduct Replacement

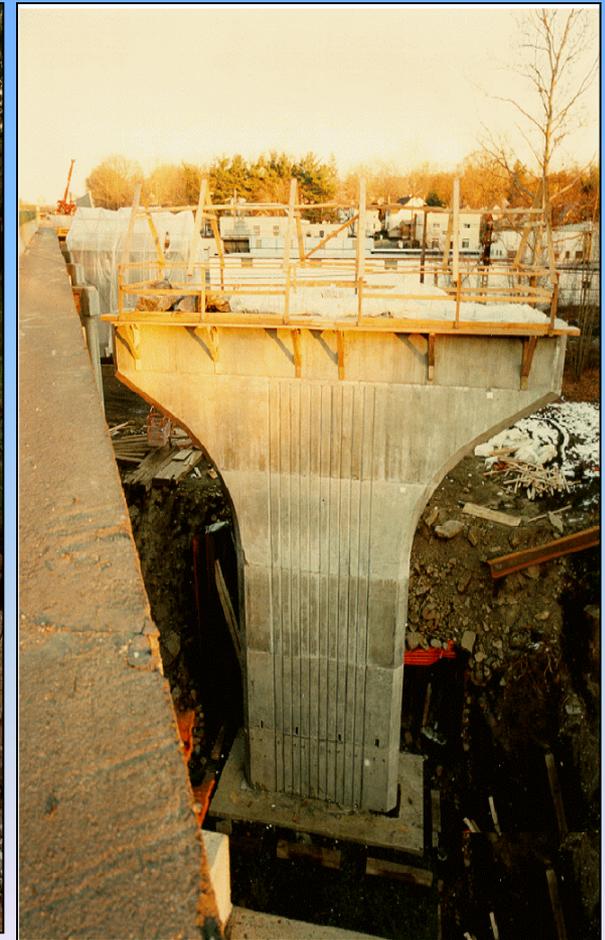
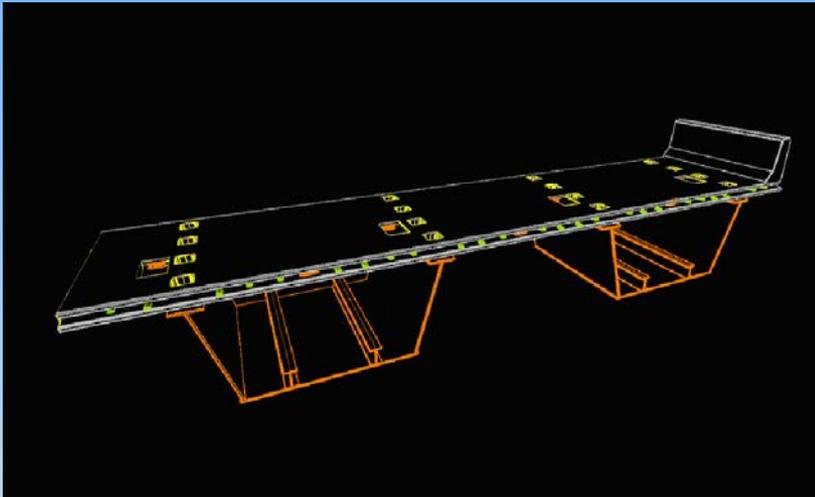


Match-Cast Piers
W/ Vertical Post-
tensioning

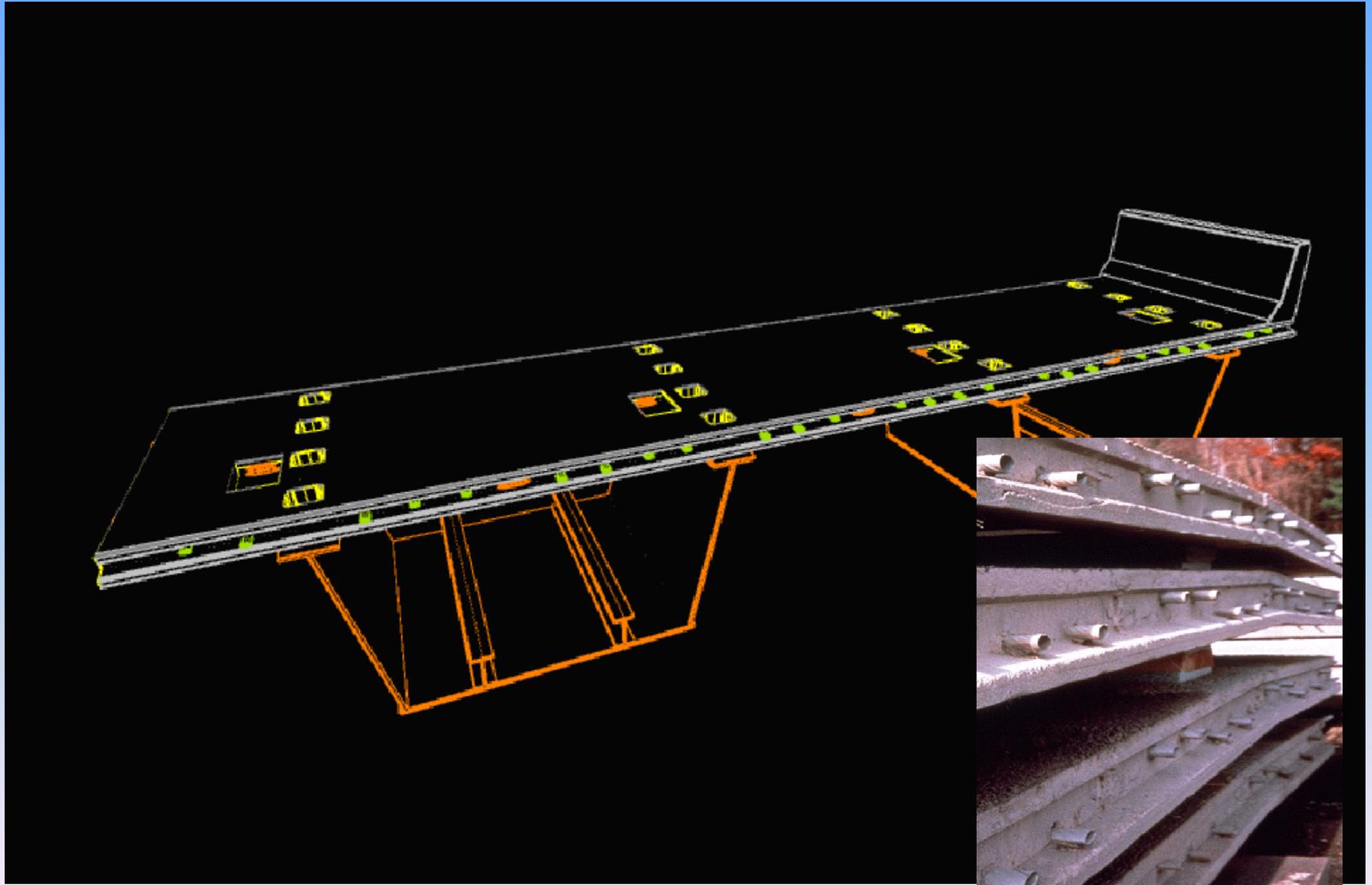


05/18/2009

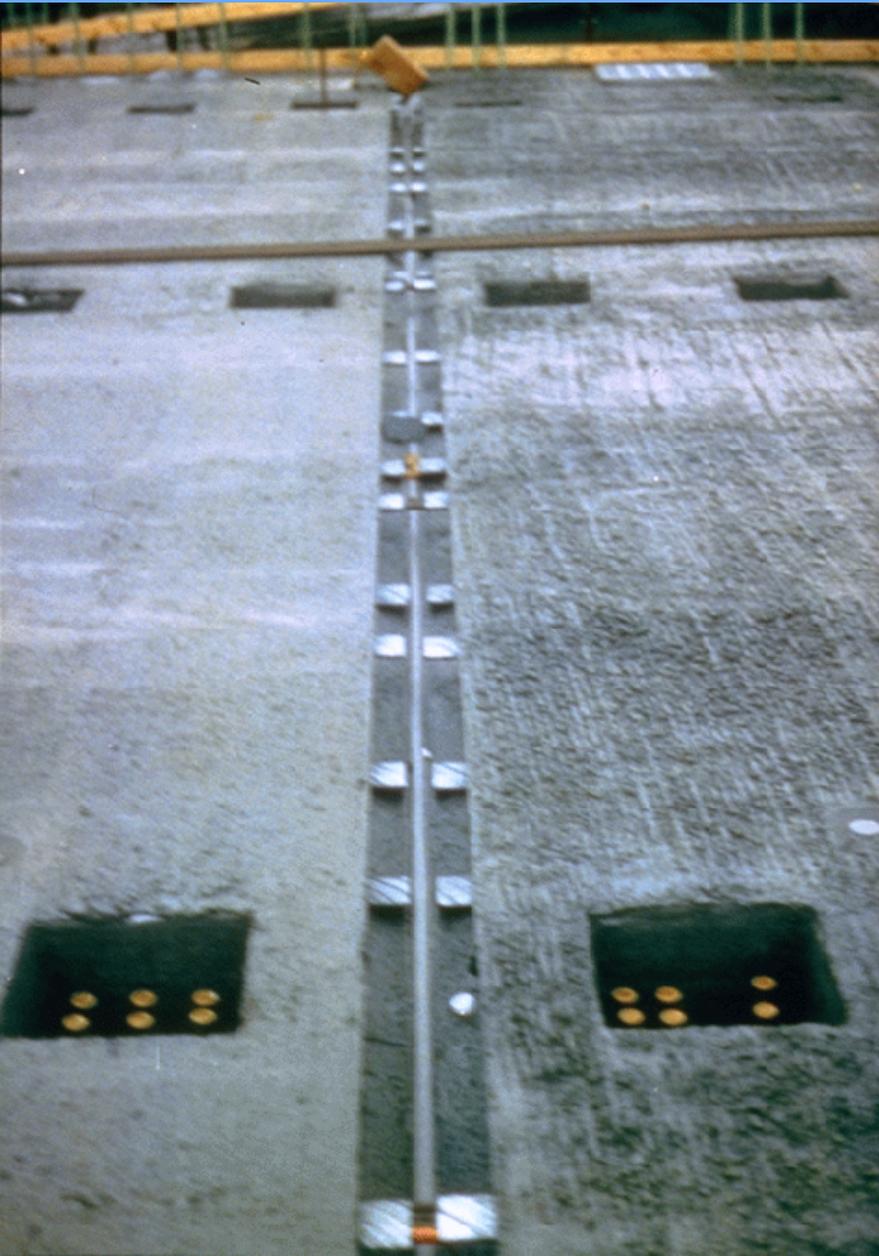
I-287 Cross Westchester Expressway Viaducts



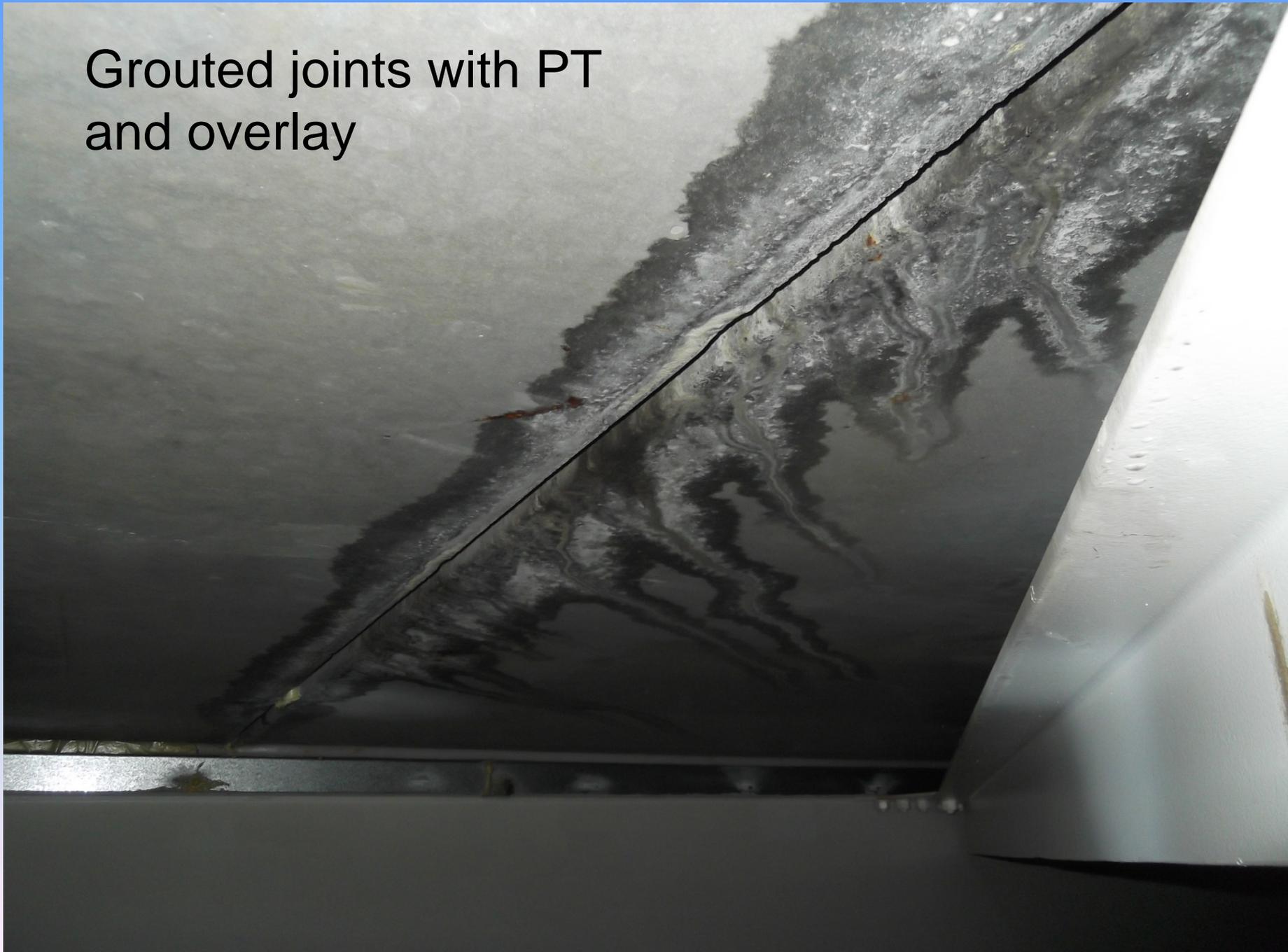
Precast Deck on Steel Tubs



Grouted joints, PT, exposed stud pockets, overlay



Grouted joints with PT
and overlay



Cracks in Exposed Pockets



Figure 35. Photo. Cracking apparent on top of deck at grout pocket near east end of test specimen prior to start of structural loading.

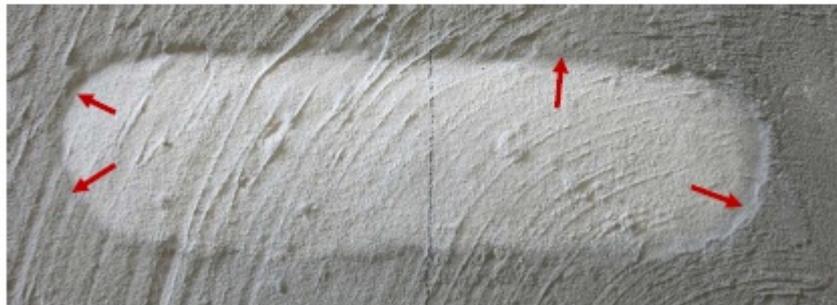


Figure 36. Photo. Cracking apparent on top of deck at grout pocket near west end of test specimen prior to start of structural loading.

Ultra High Performance Concrete

- Ultra High Compressive Strength – Up to 30 ksi
- High Ductility
- Outstanding Durability

NYSDOT Development Length Tests



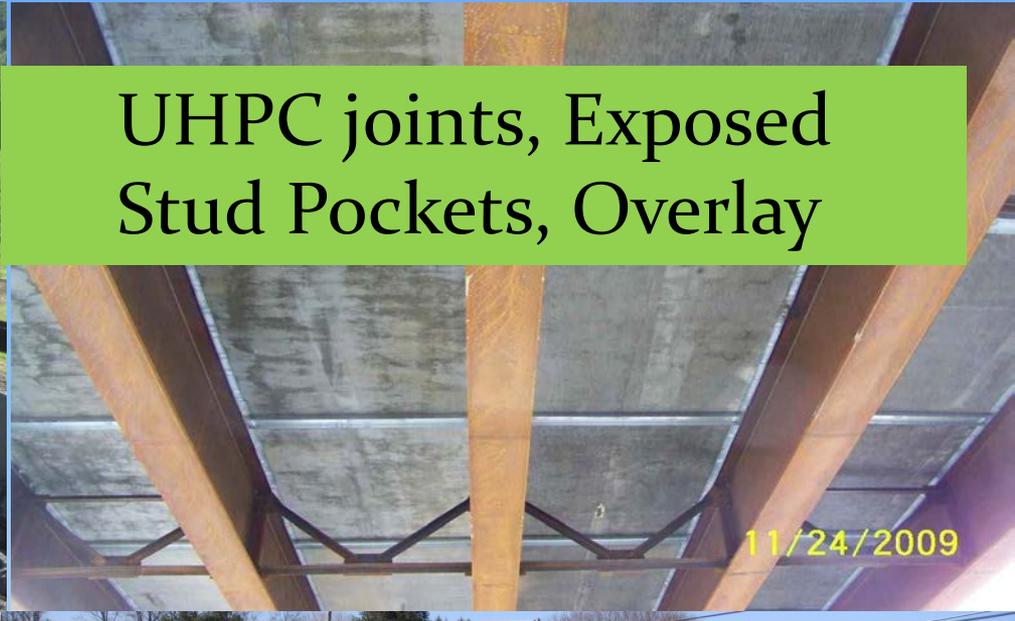
- #4 BARS (BLACK & EPOXY) – 3" EMBEDMENT
- #5 BARS (BLACK & EPOXY) – 4" EMBEDMENT
- #6 BARS (BLACK & EPOXY) – 5" EMBEDMENT

Joint Testing by FHWA for Strength, Durability and Performance



- ⦿ 8" THICK PANEL - #4 EPOXY COATED HAIRPIN BARS
- ⦿ 8" THICK PANEL - #5 GALV. STRAIGHT BARS (6" LAP)
- ⦿ 8" THICK PANEL - #5 BLACK STRAIGHT BARS (6" LAP)
- ⦿ 8" THICK PANEL - #5 BLACK HEADED BAR (3 ½" LAP)
- ⦿ 6" THICK PANEL - #5 BLACK STRAIGHT BARS (6" LAP)
- ⦿ 6" THICK PANEL - #5 BLACK HEADED BARS (3 ½" LAP)

1st US Bridge w/Precast Deck & UHPC Joints.



UHPC joints, Exposed Stud Pockets, Overlay



First use of UHPC Joints in Deck Bulb Tees.

85'-0" SPAN
42'-9" WIDE
15 DEGREE SKEW
3'-5" DEEP DBT
5'-4" DBT SPACING



Other Type of Bridges with UHPC

- Deck Bulb Tees ,UHPC joints, membrane and asphalt overlay
- Deck Bulb tees ,UHPC joints, concrete overlay
- NEXT beam, UHPC joints, concrete overlay
- NEXT beam ,UHPC joints, thin overlay
- NEXT beam ,UHPC joints, Asphalt overlay

NY Works Program

- Accelerated Bridge Program:
 - \$ 212 M Budget/115 Bridges
 - 108 Decks, 2 PBES and 5 Bridge Replacements
 - 16 Bridges utilized ABC Method
 - 9 Decks Syracuse, NY
 - 4 Decks Binghamton, NY
 - 2 PBES Albany, NY
 - 1 Westchester County, NY

NY Works Program

- Accelerated Bridge Program:
 - Bare Concrete Decks (No Overlay)
 - UHPC in the Joints Exposed to Traffic
 - Hidden Pockets filled w/Grout
 - Integral Concrete Barriers
 - Diamond Grind Surface
 - Armorless Joints at End of Approach Slabs

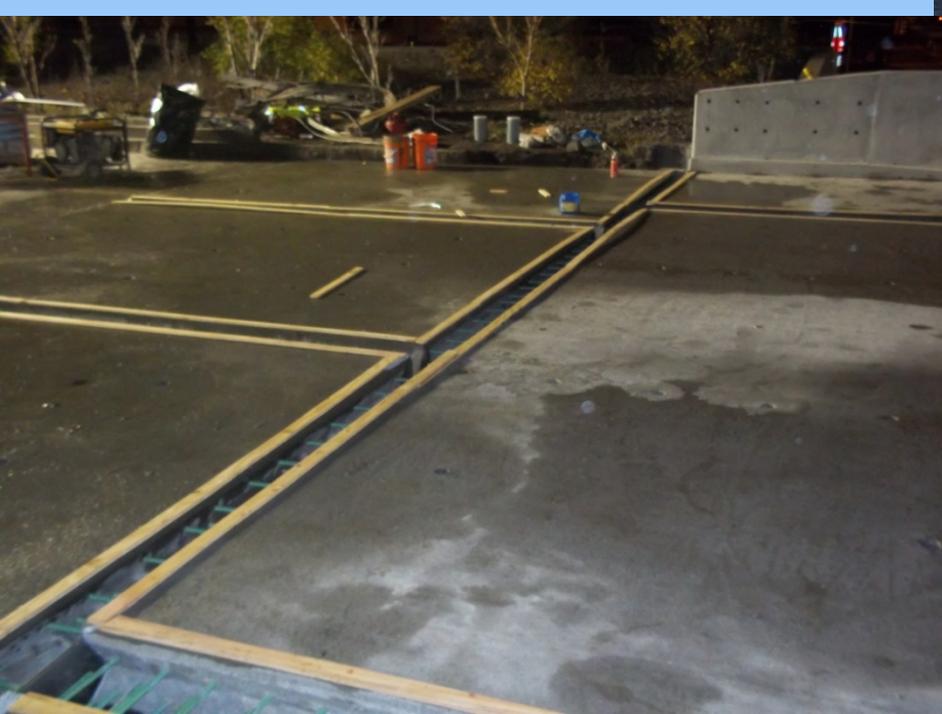
Another First in the USA

Hidden Haunch Pocket

Long Studs to Engage
Transverse Bars







Haunch Down Approach Slab



Precast Deck System with UHPC joints

Accelerated curing
with external heating

UHPC Placement
operation



UHPC Link Slab

Rt. 962G Over Rt.17

Two 137' simple spans, curved steel multi-girder

Fixed-fixed bearings(W/1/8" Gap around PIN) at the pier

Deck replacement utilizing precast panels w/ UHPC joints

Expansion joints at End of Approach Slabs

Deck joint at pier replaced w/ UHPC Link Slab







UHPC Link Slab

Design Concept

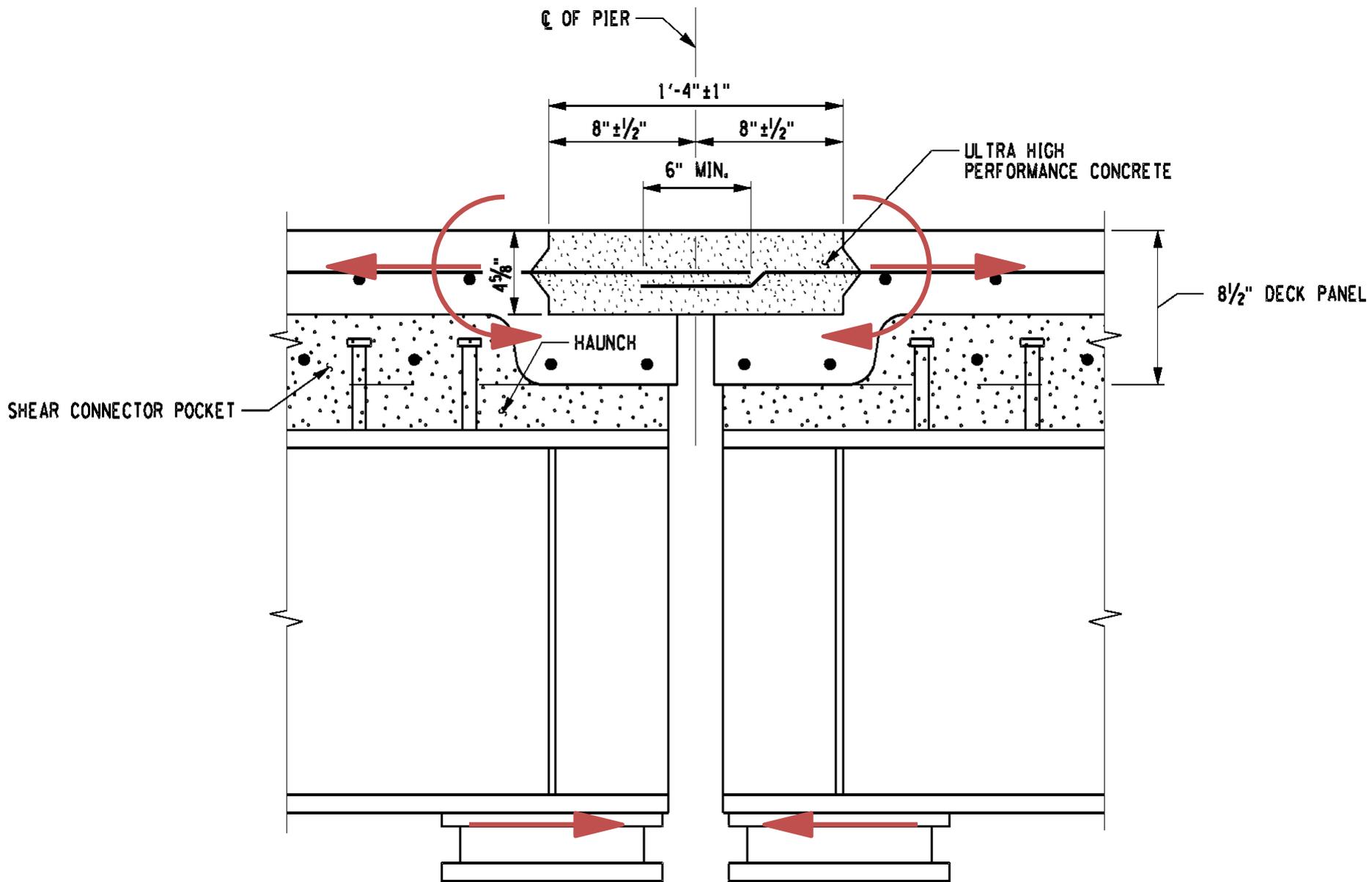
Simple span behavior retained

Girder end rotation to be relatively unrestrained.

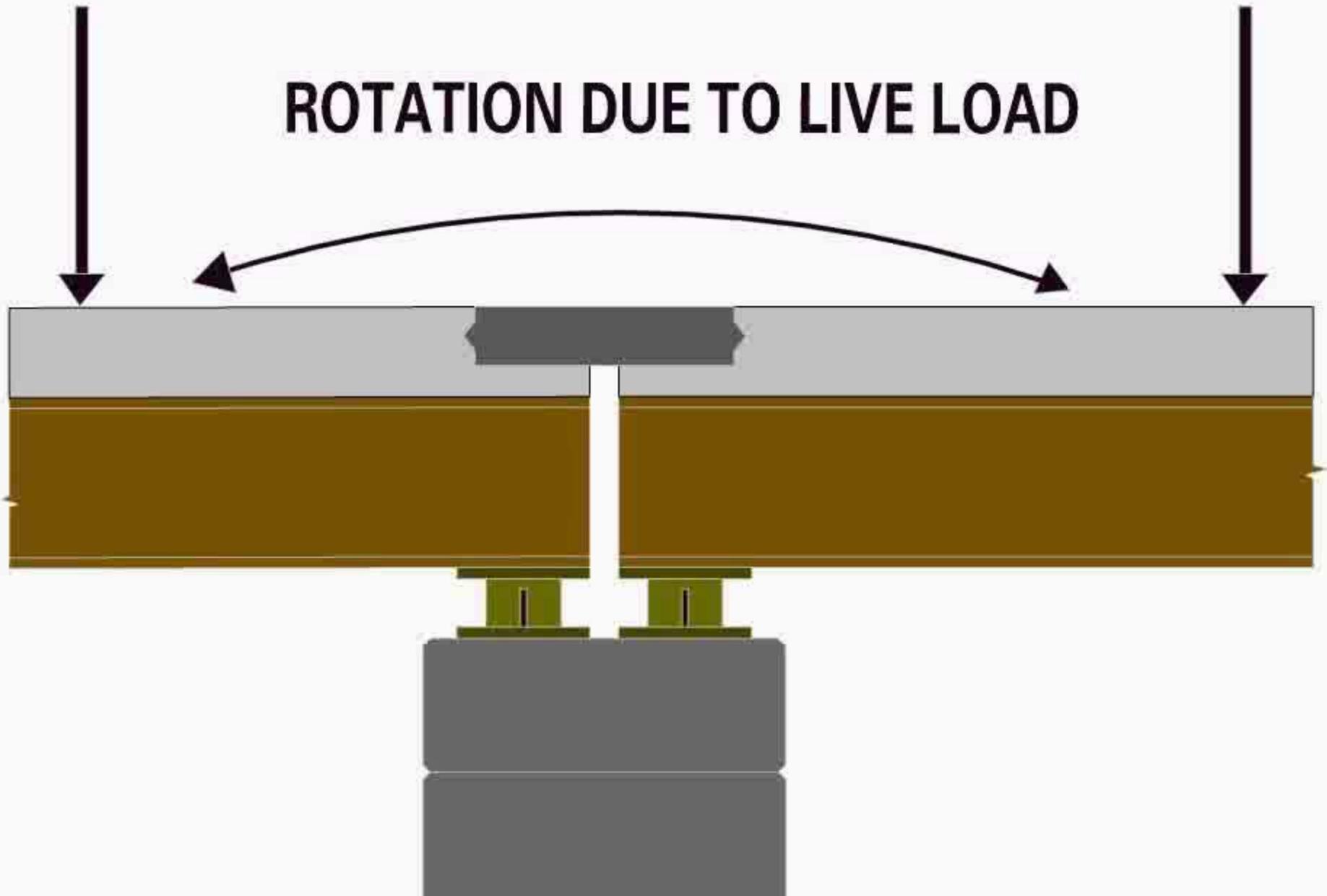
Rotation of girder ends accommodated by small translation of fixed bearings (1/8 “ Gap around the PIN)

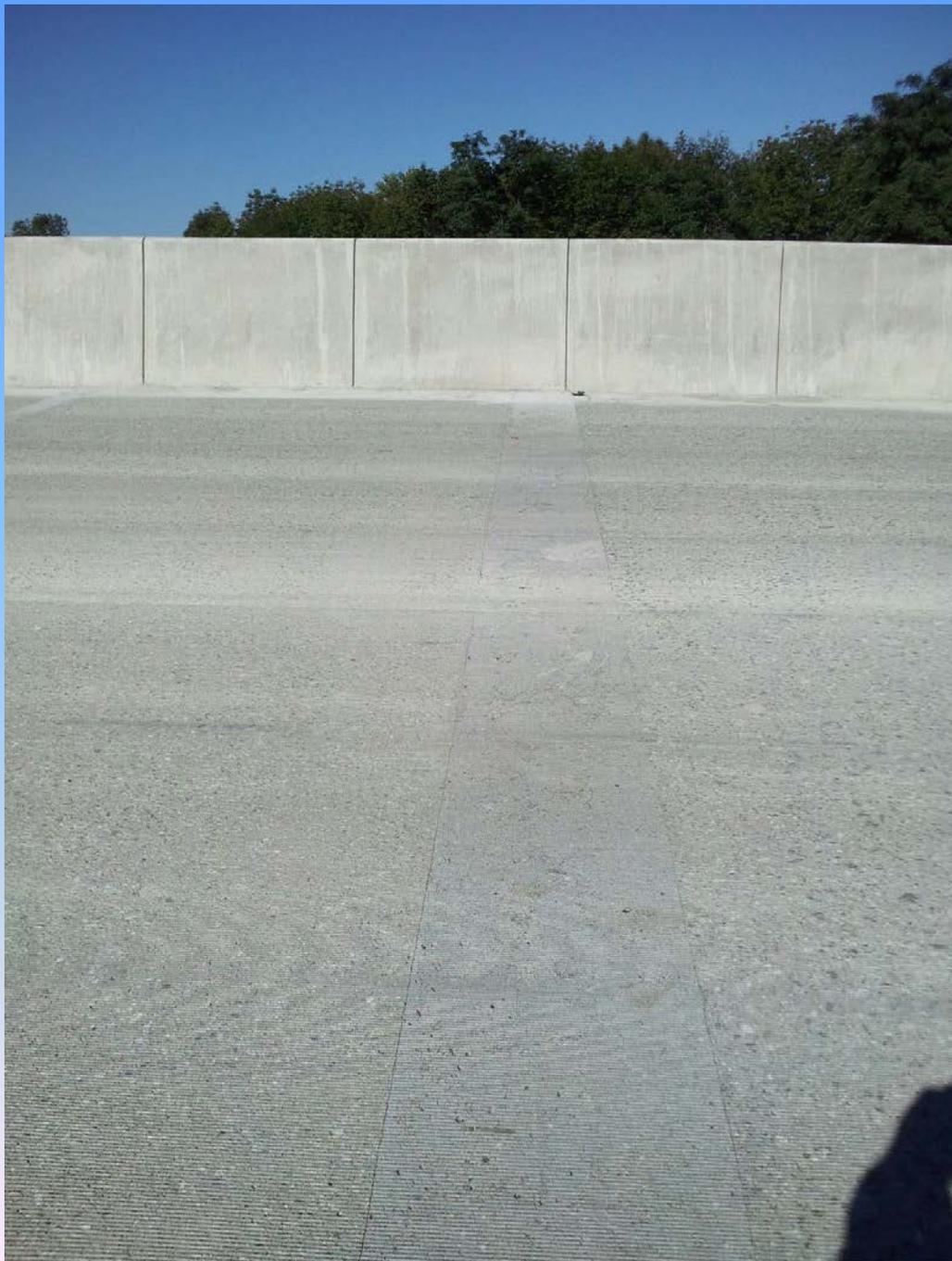
Uniform tensile stress in the UHPC combined with bending stresses.

UHPC's large tensile strain capability combined with the ability of fixed bearings to translate by a small amount made link slab feasible.



ROTATION DUE TO LIVE LOAD





Precast Deck Replacement

Case Study

- Syracuse, NY
- I-690 WB over Peat St.
- 79' Single Span
- 8,000 SF Deck Area
- Built in a Weekend















Other Decks

RTE 31 over Putnam Brook









Prefabricated Bridge Element and System

Modular Deck Beam

Integral Concrete Barrier

Rapid Set Concrete Joints (2,500 psi / 3 Hours)

Waterproofing Membrane and Asphalt Overlay

I 87 NB & SB over the Mohawk River 1st Best Value Contract in NY















BURT
www.burtcrane.com
1-800-252-7216

OVERSIZE LOAD

LANE









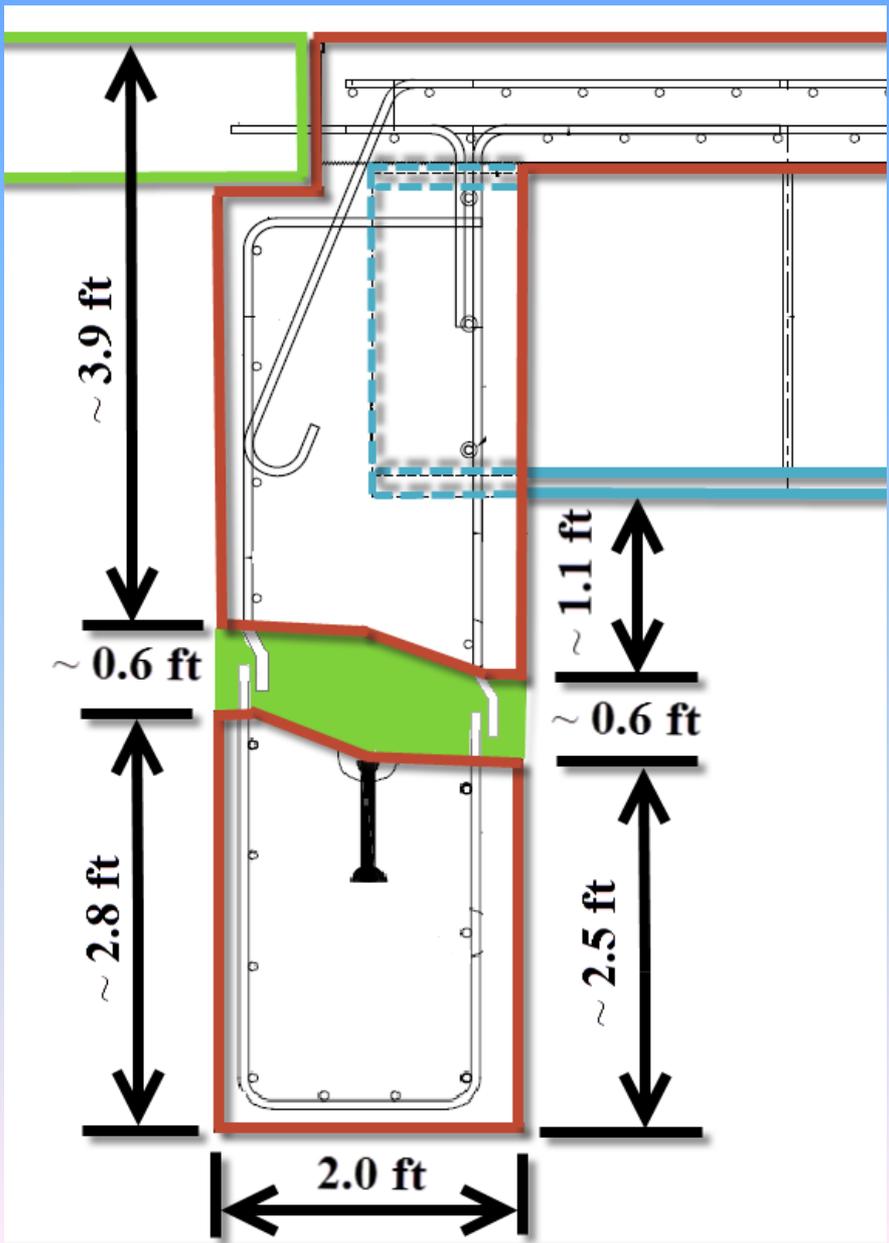
Other Projects

- **I-81 SB & NB over Preble Rd**
 - Modular Deck Beam With UHPC Joints
 - Precast Semi Integral Abutments
 - October 22, 2013 Construction

- **I-190 SB & NB over Buffalo Ave/Weekend project**
 - Modular Deck Beam with Rapid Set Concrete Joints, Semi Integral Abutments – Cast at Site
 - May 2014 Construction

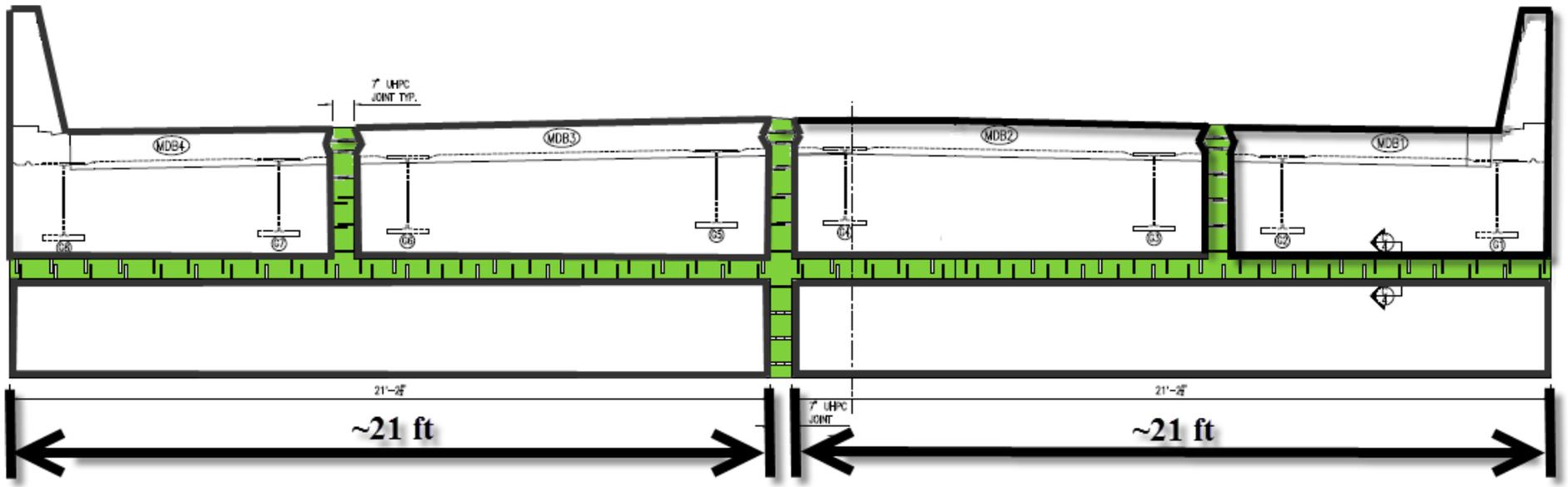


Semi-Integral Abutment - As Fabricated





Semi-Integral Abutment - As Fabricated





Setting of Precast Deck Panels





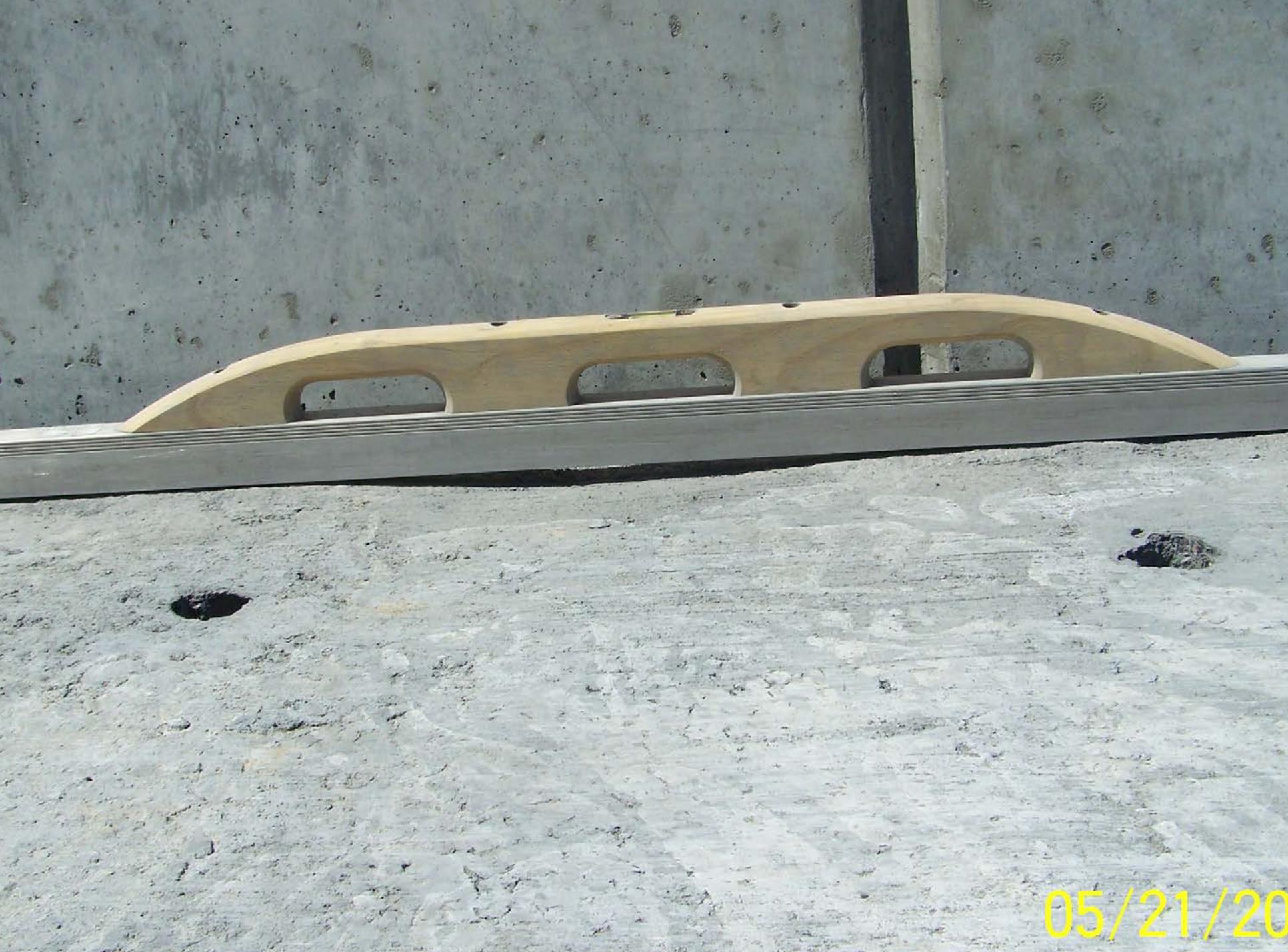


Hidden Pocket Girder Haunch





05/21/20



05/21/20



05/21/20

I-84 over Delaware River

- \$40 Million.
- 9 spans, each 140' long
- bridge length of about 1260'
- The decks are 37'-4" out-to-out.
- Precast Deck area per bridge is about 47,000 SF for a total of 94,000 SF
- The low 3 bidders was \$465/SY.
- These panels had stainless steel reinforcement.







Questions

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NYSDOT/Office of Structures

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