Quality Control: Fabrication Procedures for Precast Elements
Program Outline and Learning Objectives

• PCI Northeast Bridge Technical Committee
  – Update on Committee Activity - Bridge Guidelines

• PCI National Updates
  – Discuss Strategic Partnership between PCI and NPCI as it relates to the certification programs.
  – QC Programs Overview
  – Discuss resources currently under development.
  – Regional QC research projects

• Examples of regional common issues for improvement

• Q/A
PCINE Bridge Technical Committee

- PCINE Technical Committee was established in 1990
- Members included State Department of Transportations Engineers from New England and New York, Consultants and Precastors
- Focus is on Updating and Developing Regional Standards for ABC Bridge Construction since 2004
PCINE Bridge Technical Committee

State DOT
- Rabih Barakat – CTDOT
- Bryan Reed - CTDOT
- Robert Bulger - Maine DOT
- Brian Reeves – Maine DOT
- Alex Bardow - MassDOT
- Maura Sullivan – MassDOT
- Edmund Newton - MassDOT
- Duane Carpenter – NYSDOT
- Michael Twiss – NYSDOT
- Jason Tremblay –NHDOT
- David Scott - NHDOT
- Mike Savella - Rhode Island DOT
- Rob Young – Vermont AOT

Precasters
- Rita Seraderian - PCI Northeast
- Joe Carrara - J. P. Carrara & Sons
- Ernie Brod - J. P. Carrara & Sons
- Chris Fowler - Oldcastle Precast
- Eric Schaffrick - Dailey Precast
- Scott Harrigan – Fort Miller
- Chris Moore – United Precast
- Bill Augustus – Oldcastle Precast

Consultants
- Michael P. Culmo - CME Associates, Inc.
- Eric Calderwood - Calderwood Eng.
- Vartan Sahakian - Commonwealth Eng.
- Darren Conboy - Jacobs Eng.
- Ed Barwicki - Lin Associates
Reports Developed by the Technical Committee

- NEBT Preliminary Design Charts
- NEBT Post-Tensioned Design Guidelines
- High Performance Concrete Specification
- Prestressed Concrete Girder Continuity Connection
- Precast Deck Panel Guidelines
- Full Depth Precast Concrete Deck Slabs Guidelines
- Bridge Member Repair Guidelines
- Accelerated Bridge Construction Guidelines
- NEXT Beam Details and Design Charts
Northeast Bulbtee (NEBT)

Bridge Guideline: First Issued 1998 (Revised 2008)
NEBT Northeast Bulb Tee - Section Properties (226.1kb PDF File)
Preliminary Design charts for designing the New England Bulb Tee Girders. Charts will help you determine span capabilities, spacing and preliminary number of prestressing strands required. If a State Standard exists it will take precedence over these guidelines and details.

Bridge Guideline: 1998
NEBT Load Charts for Northeast Bulb Tee - HS20 Load Charts (90.7kb PDF File)
Preliminary Design charts for designing the New England Bulb Tee Girders. Charts will help you determine span capabilities, spacing and preliminary number of prestressing strands required. If a State
PCINE Bridge Technical Committee Focused it’s work on Accelerated Bridge Construction starting in 2004.

Timeline:
• 2004 – Developed an Accelerated Bridge Guidelines Report
  Completed 2006
• 2006 – Begin Development of the NEXT “F” Beam
  Completed 2008 – First Bridge Built in 2010
• 2008 – Begin Development of NEXT “D” Beam
  Complete 2010 – First Bridge Built in 2011
• 2011 – 2\textsuperscript{nd} Ed. Full Thickness Deck Panel Report Updated
• 2012 – Developed Prefabricated Bridge Elements & Systems
  Guide Details – Completed and Posted June -2012
• 2012 - Develop Guidelines for Precast Approach Slabs –
  Completed and Posted November- 2012

Current Work
• Update the Accelerated Bridge Guideline Report
• Develop Standard Details for Deck Bulb Tees
• Development of NEXT E
“Guidelines for Accelerated Bridge Construction using Precast/Prestressed Concrete Components”

- Section 1: Application Overview
- Section 2: General Requirements
- Section 3: Precast Components
- Section 4: Joints
- Section 5: Grouting
- Section 6: Seismic
- Section 7: Fabrication & Construction
Section 7: Fabrication/Construction

- Lifting Devices
- Shipping And Handling
- Assembly Plan
- Tolerances
- Fabrication Tolerance
- Erection Tolerances
- Repair Of Elements
7.5.1 Fabrication Tolerance
(Ref: PCINE Sheet SUB-11 & 12)

The PCI Northeast Bridge Technical Committee has developed recommended tolerance drawings for typical precast elements. Details for typical element tolerances are included on Sheets SUB-11 & 12.

Guidelines For Accelerated Bridge Construction

75.1 Fabrication Tolerance
(Ref: PCINE Sheet SUB-11 & 12)
All precast elements are manufactured to a tolerance. Designers should include element tolerance details in the plans or specifications.

27.1.1 Inserts, Voids, and Projecting Reinforcing
(Ref: PCINE Sheet SUB-11 & 12)
The erection tolerance and hardware tolerances are interconnected. If a connection involves the insertion of a reinforcing bar into a device (coupler or duct), the specification for tolerances would be based on the assumption that the bar is installed to one side (say to the left) and the coupler installed to the opposite side (say to the right). The combination of these two potential installation tolerances needs to be kept within the tolerance of the insertion of the bar in the device.
The equation for the horizontal location of the specified projecting bar location tolerance would be:

$$T_B = \frac{1}{2} \times T_d$$

Where:
- \(T_B\) = Specified bar location tolerance
- \(T_d\) = Insertion tolerance of the bar on the device based on the requirements of the manufacturer of the device

The equation for the specified device location tolerance would be:

$$T_d = \frac{1}{2} \times T_id$$

Where:
- \(T_d\) = Specified device location tolerance
- \(T_id\) = Insertion tolerance of the bar on the device based on the requirements of the manufacturer of the device

27.2 Erection Tolerances
(Ref: PCINE Sheets SUB-3 & 4)
The erection and setting of heavy precast elements are controlled through the use of erection tolerances. Designers should include element erection tolerances in the plans. Erection tolerances should be measured from a common working line that is shown on the plans.

Erection of elements based on center-center spacing can result in a build-up of erection errors. The use of working lines is critical to prevent this build-up of errors.
PCI Northeast Guide Details posted 2012

– Based on experience in Utah and the NE region

NOTES
1. ERECTION TOLERANCE OR ELEVATION 2 1/4".
2. ERECTION TOLERANCE OR REAR BEAM ELEVATION 2 1/4".
3. REAR BEAM Frm MAY OR MAY NOT BE BROKEN TO SPECIFIED ELEVATION.
4. COLUMN SHEAR REINFORCEMENT NOT SHOWN FOR CLARITY.
5. FOOTINGS MAY BE MORE CONTINUOUS BY EXTENDING REINFORCEMENT AND CASTING 1 COLUMN POUR, SIMILAR TO DETAILS ON SHEET 1.
6. SETTLE, KEENED BLOCKS MAY BE PLACED BETWEEN OTHER BEAMS IF REINFORCING CONFLICTS WITH FOUNDATION FOOTING.
7. FOOTING TO BE SET TO A TOLERANCE OF 2 1/4" IN 4 FEET.
8. USE CAST IN PLACE EXTENSIONS TO KEEP SIZE AND WEIGHT OF FORMS MINIMUM. CONCRETE MUST CONNECT INDIVIDUAL FOOTINGS TO FORM A COMMON FOOTING.
9. A LEVEL FOOTING CAP IS PREFERRED TO REDUCE FABRICATION COST. NO EPS PLACED ARE PERMITTED. SEE DETAILS ON SHEET 6.
Tolerance Details

COLUMN FABRICATION TOLERANCES

| A | LENGTH | ± 1/2" |
| B | WIDTH (OVERALL) | ± 1/4" |
| C | DEPTH (OVERALL) | ± 1/4" |
| D | VARIATION FROM SPECIFIED END SQUARENESS OR SKEW | ± 1/8" PER 12 INCH WIDTH MAXIMUM |
| F | SWEEP, FOR MEMBER LENGTH: | ± 1/8" PER 10 FEET MAXIMUM |
| G | LOCATION OF GROUTED SPLICE COUPLER: MEASURED FROM A COMMON REFERENCE POINT | ± 1/8" |
| H | LOCAL SMOOTHNESS OF ANY SURFACE | ± 1/4" IN 10 FEET |

COLUMN ERECTION TOLERANCES

| J | TOP ELEVATION FROM NOMINAL TOP ELEVATION |
|   | MAXIMUM LOW | 1/2" |
|   | MAXIMUM HIGH | 1/4" |
| K | MAXIMUM PLUMB VARIATION OVER HEIGHT OF COLUMN | 1/2" |
| L | PLUMB IN ANY 10 FEET OF COLUMN HEIGHT | 1/4" |

ELEVATION

SECTION

GROUTED SPLICE COUPLER
NEXT Beam Shapes

- **NEXT F plus 8” CIP Deck**
  - No Forming between Flanges
  - Easily accommodates Vertical Curves w/CIP Topping
  - Easily Handles Camber Variations between Members

- **NEXT D no CIP Deck**
  - No CIP Topping/Deck
  - Best Section For ABC
  - Special Concrete for Flange Conn
  - Harder to match adjacent members Skew/Design

- **NEXT E plus 4” CIP Deck**
  - Uses Less Topping & Reinforcement
  - Flange Connection Made with CIP
  - Easily Accommodates Vertical Curve
  - Easily Accommodates Camber Variations between members
NEXT Beam Shapes

1. The details shown depict varying the thickness at the quarter point, note this will not raise the height of the curb or parapet wall.
2. Crest vertical curve if the camber is less than the curve ordinate. The detailed will be similar to the tangent profile shown.
3. The detailed shows the intersection of the parapet wall, the distance from the inner edge of the parapet wall to the face of the curb/barricade. The distance from the face of the curb/barricade to the height of the curb or barricade.

**NEXT F BEAMS**

- 8" minimum concrete deck
- Weighing surface
- 4" top flange
- Thicker topping thickness at ends caused by beam camber
- 8" topping thickness at mid-span

**NEXT F BEAMS - TANGENT PROFILE**

- 8" topping thickness at ends if vertical curve ordinate is larger than camber.
- Thicker topping if camber is less than ordinate.
- 8" topping thickness if camber is less than ordinate.

**NEXT F BEAMS - CREST VERTICAL CURVE PROFILE**

- Thicker topping thickness at ends caused by vertical curve ordinate plus beam camber.
- 8" topping thickness at mid-span.

**NEXT F BEAMS - SAG VERTICAL CURVE PROFILE**

- Constant thickness topping
- Constant thickness overlay
- Thickness varies

**OPTION 1: VARY TOPPING THICKNESS**

- Curb/barricade height varies
- Overlay thickness varies

**OPTION 2: VARY OVERLAY THICKNESS**
### FAQ

1. Why is the NEXT Beam more economical than other bridge systems?
2. Is the NEXT Beam acceptable to bridge owners?
3. When should I consider using the NEXT Beam?
4. What are the span lengths and widths?
5. What is the difference between the D and F Beam?
6. What bridge software can be used to design a NEXT Beam bridge?
7. What is the construction sequence for the NEXT F beams?
8. Are diaphragms required?
9. Can I cut back the Top Flange of the NEXT beam to accommodate casting the of the end diaphragms?
10. How do you seal the longitudinal joints between beams?
11. What is the recommended bearing?
12. How are parapets handled?
13. What is the live load distribution factor?

The AASHTO LRFD Bridge Design Specifications are not clear when it comes to the calculation of live load distribution factors for a double tee beam with a composite concrete deck. The PCI Northeast Bridge Technical Committee has contacted the original authors of the specification and found that this type of structure was not specifically investigated during the development of the code. In lieu of more precise information, the following approach for calculation of live load distribution factors was suggested.

Please reference, AASHTO LRFD 4.6.3.1 Distribution of Live Loads Per Lane for Moment in Interior Beams. For the calculation of NEXT Beam F Interior Distribution Factor use Cross Section Type K – Precast Concrete I or Bull-Tee Sections (AASHTO LRFD Table 4.6.2.2.2b-1) with the following modifications, ‘One Design Lane’ and ‘Two or More Design Lanes’:

1. Treat each stem as an individual beam and calculate Distribution Factors for each stem based...
TIMELINE NEXT Beam Developed in 2008

2009
First NEXT Beam Cast

2010
First NEXT F Bridges Built York ME and Kittery ME

2011
7 Bridges
First NEXT D bridges are Built in Maine & Vermont MA and NY Build first Bridges

2011-12
18 Bridges
Logan Airport uses NEXT beams for Runway Extension and new Airport Viaduct

2012
NY built First Lateral Slide

2013
25+ Projects
NJ and RI build their first projects
Massachusetts DOT
Vermont AOT
Maine DOT
Rhode Island DOT
New Hampshire DOT
New York State DOT and New York City DOT
New Jersey DOT
Delaware DOT
Pennsylvania DOT
Virginia DOT

States with NEXT Beam in Design/Construction:
Connecticut DOT

New Brunswick has also adopted the new shape for Canada
States using Accelerated Construction

- States using ABC
- MassDOT
- VAOT
- MEDOT
- CTDOT
- RIDOT
- NHDOT
- NYSDOT
- NJDOT

MassDOT Released Part III of their bridge design manual – Prefabricated Bridge Elements
Easthampton MA Deck Bulb Tee

Eight – 1220 mm NEBT 5’ wide 95’ long Deck Bulb Tees  8000 psi Concrete – UHPC Joint
Resources

Precast Prestressed Concrete Institute [www pci org]
Resources

Precast Prestressed Concrete Institute [www pci org]

Precast Prestressed Concrete Institute Northeast [www pcine org]

Quality Control Plant

Quality Control Field
PCI and NPCA Strategic Partnership

As of June 30, 2014

• NPCA is no longer offering certification of prestressed product.
• Plants can maintain dual PCI and NPCA certifications.
• Ross Bryan Associates will Audit PCI and NPCA Plants
• Precast Substructures fall under BI PCI Certification
Quality Control Plant

Plants
PCI’s Plant Certification Program ensures that each plant has developed and documented an in-depth, in-house quality system based on time-tested, national industry standards.

Personnel
Three Levels of instruction and evaluation for certified quality-control personnel.
B1 – Precast Bridge Products (No Prestressed Reinforcement)
B2 – Prestressed Miscellaneous Bridge Products (Non-Superstructure)
B3 – Prestressed Straight-Strand Bridge Beams (Superstructure)
B4 – Prestressed Deflected-Strand Bridge Beams (Superstructure)
BA – Bridge Products with an Architectural
Plant Quality Control Technicians Level I, II, & III

Training Manual 101 (TM-101)

Recertification every 5 yrs

Continuously certified for 15 years will no longer have to meet the examination requirement.

Training Manual 103 (TM-103)

The concepts are advanced and require considerable experience in a precast plant or an advance CE or technology

Recertification every 5 yrs.

Expired Level III certification will require re-examination.
2014 Registration PCI Plant Quality Control Schools
Holiday Inn Express Downtown Nashville
November 17 - 22, 2014

• Level I & II: November 17- 19, 2014
• Level III: Nov 19 – 22, 2014

• Regional Workshops can be arranged
• NETTCP also offers Level I and II next year
Plant Quality Control

**ASTM Standards for PCI Certified Plants, 1st Edition - CD - (STN-116)**

![ASTM Standards CD](image1)

**Chuck Safety & Maintenance DVD**

![Chuck Safety DVD](image2)

75 ASTM specifications referenced in PCI Quality Control Manuals 116 and 117.
Manual for the Evaluation and Repair of Precast, Prestressed Concrete Bridge Products, 1st Edition - (MNL-137)

Bridge Member Repair Guidelines
By PCI Northeast
PCINER-01-MBRG

Report No:
PCINER-01-BMRG

Title:
Bridge Member Repair Guidelines

Developing Organization:
Precast/Prestressed Concrete Institute Northeast Region
Technical Committee
Phone – 888-700-5670
Email – contact@pcine.org

Report Date: October 2001


Status of Report: Final

Abstract

This report is intended to serve as a guide to identify defects that may occur during the fabrication and handling of bridge elements. The report gives guidance on possible cause and prevention. It will help determine the consequences of the defects and assist in making a judgment as to acceptance/repair or rejection.

This report can be utilized by State Inspectors, Designers, Plant Production Managers, Plant Quality Control Inspectors and Plant Engineers.

Number of Pages: 49

PCI cannot accept responsibility for any errors or oversights in the use of this material. The user must recognize that no guidelines or regulations can substitute for experienced judgment. This guideline is intended for use by personnel competent to evaluate the significance and limitations of its contents and able to accept responsibility for the application of the material it contains.

Bridge Member Repair Guidelines
Report Number PCINER-01-BMRG

Northeast Region
Bridge Member Repair Guidelines

• For Newly Cast Precast
• 14 Common Crack and Repair Procedures
Bridge Member Repair Guidelines

• Cause
• Prevention

TS #4
TROUBLE SHOOTING HORIZONTAL END CRACKS IN WEBS AND FLANGES
Description – This crack usually begins at the end of the beam and extends across the end of the beam and is visible on both sides.

CAUSE

A. Detentioning
1. Improper procedures for detensioning
2. Improper detensioning sequence

B. Design
1. Low release strength specified
2. Inadequate end vertical reinforcing
3. Excessive pretension force or concentration of force
4. Excessive number of debonded strands in the bottom plane and/or lack of confining straps
5. Excessive vertical force from deformed strands

C. Production
1. Concrete bonding in forms
2. Bottom plates, sleeves or inserts at end of beam
3. Shrinkage and curing
4. Improper removal of header or strand caught in header
5. Settlement of wet concrete below a concentration of strand or mild reinforcing near the top at beam end
6. For box beams, delayed warping causing a cold joint

PREVENTION

A. Proper Release Procedure
1. Heat strand to allow slow elongation (annealing) and avoid sudden release
2. Keep pretension forces balanced using a pre-established procedure

B. Improve Design
1. Establish adequate release strength
2. Use adequate anchorage zone end reinforcement to control width and length of cracks
3. Properly space and distribute strand at beam ends
4. Debond strands for a short distance in effective reducing stress concentrations. Debonding of an entire row of strand or debonding the outer strand in a layer are not recommended.
5. Provide confinement reinforcement near beam ends
6. Fan out debonded strands or combine debonding and deflecting strand

C. Improve Production Technique
1. Keep forms well oiled
2. Assure forms will not interfere with hardware of forms around or during detensioning
3. Provide uniform heat and humidity during curing
4. Separate header from forms before lifting
5. Improve vibration techniques
6. Pour webs prior to set of bottom slab of box beam


• Engineering Effects
• Repair Considerations

TS #4
TROUBLE SHOOTING HORIZONTAL END CRACKS IN WEBS AND FLANGES
Description – This crack usually begins at the end of the beam and extends across the end of the beam and is visible on both sides.

ENGINEERING EFFECTS

1. Cracks not intercepting strands are not of structural consequence, provided the area of vertical shear reinforcement in the webs meets horizontal shear requirements. After installation of the beams, the cracks would not be expected to grow, given adequate reinforcement against horizontal shear, since the dead load weight of the slab and other dead loads would induce vertical compression in the beam ends.
2. For cracks that intercept or are co-linear with strands, the shear and moment capacity will require recomputation due to a change in location of transfer length of affected strands.
3. Cracks in beam ends under expansion joints, should be considered for epoxy injection to avoid future deterioration from water and salt intrusion. Cracks in box beams, in side-by-side (butted) configurations should be epoxy injected in any case due to potential leakage through grouted joints.
4. In deciding whether to inject cracks or leave them unfilled, ACI Committee 224 report “Control of Cracking in Concrete Structures” states that tolerable crack widths are 0.006 in. for concrete exposed to seawater spray with wetting and drying, 0.007 in. for concrete subject to de-icing chemicals and 0.012 in. for concrete exposed to humidity.

REPAIR CONSIDERATIONS

1. No repairs to beams used in composite construction in accordance with the discussion in ENGINEERING EFFECTS 1.
2. For cracks discussed in ENGINEERING EFFECTS 2:
   a. Cracks that have been verified by the owner to not have diminished the beam capacity below acceptable levels should be injected, in accordance with Standard Repair Procedure #10.
   b. Beams verified by the engineer to have capacity reduced to unacceptable levels will be rejected.
3. Durability concerns, discussed in ENGINEERING EFFECTS 3 and 4 may favor epoxy injection, in accordance with Standard Repair Procedure #10. The surface of cracks narrower than 0.006 inches should be sealed. See Repair Procedure #14.
TS #12
TROUBLE SHOOTING PARTIALLY CRACKED TOP FLANGES – NEXT BEAMS

Description – Crack running parallel to beam centerline along inside face of stem. This crack is expected in obtuse corners of skewed beams adjacent to the interior face of the stem, but can occur in any beam.

CAUSE

A. Detensioning


B. Shrinkage

1. Shrinkage of top flange concrete restricted by the fixed 2 stem form.

PREVENTION

A. Adjust Reinforcement and detensioning sequence

1. Place additional transverse steel reinforcement in flange to intercept and minimize crack width. The bars should be located as close to the bottom of the top flange as allowed by state specifications for deck reinforcement (1” is recommended).

Consider adding FRP reinforcement along inside radius with minimal (1/2”) cover to intercept crack near surface of concrete.

Note: The reinforcement described above was added to the typical details on October 25, 2012.

2. Release one strand at a time alternating from stem to stem.

B. Modify Fabrication Methods

1. Avoid rapid cooling, after curing has stopped and until beam is removed from form.
2. Place additional transverse reinforcement in flange to intercept and minimize crack width.

ENGINEERING EFFECT

1. For beams that will be topped with a composite concrete slab (NEXT F), there are no concerns. These cracks will be covered by the slab in composite construction.

2. For beams whose top flange is to be used as the riding surface of the completed bridge (NEXT D), cracks in the top flange can affect durability, if not repaired

REPAIR CONSIDERATIONS

1. Where a composite concrete deck is embedded in concrete in the finished structure (integral abutment), no structural repairs are needed.

2. NEXT F: If the crack is exposed on the underside of the finished structure and the bridge is in a corrosive environment:
   - Cracks less than 0.006 inch wide should be ignored (See Note).
   - Crack greater than or equal to 0.006 inch wide and less than 0.016 inch wide should be sealed with epoxy paste. See Repair Procedure #14.
   - Cracks greater than or equal to 0.016” wide should be sealed using epoxy injection by the pressure injection method. See Repair Procedure #10.

3. NEXT D: Where the top flange will be the riding surface and the crack width is greater than 0.006 inches, the crack at the top surface of the deck can be sealed with a low viscosity epoxy or methyl/methacrylate product. See Standard Repair Procedure 14.

Note: The AASHTO LRFD Bridge Design Specifications limits crack widths in Class 2 exposure conditions (bridge decks) to 0.0085 inches (Article 5.7.3.4). Therefore these recommendations are conservative.
SPALLS AND VOIDS IN THE BOTTOM FLANGE THAT EXPOSE PRESTRESSING STRAND

NOTE: This repair applies only to those voids which do not exceed 4 inches in depth, 4 feet in length and expose no more than 2 strands, and when no more than one spall or void appears in a given section of the girder. A section is defined as ¼ the length of the girder. No two such spalls or voids shall have their closest dimensions nearer than two beam depth apart. With the prior approval of the owner/engineer, this repair may be made, in the presence of the owners inspector without submitting the repair for formal approval.

Repairs at beam ends should be made after detensioning because any repairs made prior to detensioning will most likely fail due to high transfer stresses.

Repairs away from beam ends should be made prior to detensioning so that precompression stresses are induced in the patch material

A. Remove all loose concrete.

B. Square interfaces with existing concrete to be in contact with the patch.

C. Clean the excavated area, blowing away dust.
Tolerance Manual for Precast and Prestressed Concrete Construction, 1st Edition - (MNL-135)
Erector's Manual - Standards and Guidelines for the Erection of Precast Concrete Products - (MNL-127)

Erection Safety for Precast and Prestressed Concrete (MNL-132)
The PCI-Certified Erector Program

• Audited 2/yr by a PCI-Certified Field Auditor.

• Items Audited
  – Safety Procedures
  – Erection Procedures
  – Personnel Qualification records
  – Project Files
  – Equipment Management records

• Category S1-Simple Structural Systems
  – Horizontal decking members

• Category S2- Complex Structural Systems
  – Total precast concrete systems, multi-product structures (those that combine vertical and horizontal members), architectural finishes.

• Category A- Architectural Systems
Scope:

- Develop & validate non-proprietary high early concrete mixtures.
Task 1: Literature Review
- Databases/journals
- Survey Concrete mixtures from DOTs

Task 2 – Develop Mixture Design Specification
- Specification requirements?

Task 3 – Develop Mix Design
- Trial batches tested for strength
- Select mixture(s) for wider array of tests

Task 4 – Test Mixture
- Large number of short-term and long-term tests
<table>
<thead>
<tr>
<th>Concrete Property</th>
<th>Performance Category</th>
<th>Applicable Standard(s)</th>
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<tbody>
<tr>
<td>Set time</td>
<td>Workability</td>
<td>AASHTO T197 / ASTM C403</td>
</tr>
<tr>
<td>Air Content (pressure method)</td>
<td>Durability</td>
<td>AASHTO T152 / ASTM C231</td>
</tr>
<tr>
<td>Slump</td>
<td>Workability</td>
<td>AASHTO T119 / ASTM C143</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>Strength</td>
<td>AASHTO T22 / ASTM C39</td>
</tr>
<tr>
<td>Bar Pullout</td>
<td>Strength</td>
<td>AASHTO NA / ASTM A944</td>
</tr>
<tr>
<td>Confined Shrinkage (Ring test)</td>
<td>Serviceability</td>
<td>AASHTO T334 / ASTM C1581</td>
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<tr>
<td>Freeze-Thaw Resistance</td>
<td>Durability</td>
<td>AASHTO T161 / ASTM C666</td>
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<tr>
<td>Chloride Permeability</td>
<td>Durability</td>
<td>AASHTO T259, T260 / ASTM C1543, C672</td>
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<tr>
<td>Alkali Silica Reactivity</td>
<td>Durability</td>
<td>AASHTO T303 / ASTM C1260</td>
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</table>
Precast Joints for Closure Pours

PCINE Bridge Committee is developing two types of joints
Deck NEXT Beams – Beck Bulb Tees – Deck Panels

Normal Concrete  UHPC Concrete
Ultra High Performance Concrete Connections for Prefabricated Bridge Element Connections

EDC-3 Regional Summit Locations

TENTATIVE

1 DC Oct. 7-8
2 Louisville Oct. 21-22
3 St. Louis Oct. 23-24
4 Phoenix Oct. 27-28
5 Sacramento Oct. 29-30
6 Portland Nov. 13-14
7 Charlotte Dec. 9-10

Ben Graybeal, PE
Federal Highway
Atlanta, GA
(404) 562-3930
First In Interactive Symposium on Ultra-High Performance Concrete (UHPC)
November 19 – 22, 2015
University of Connecticut
Storrs, CT
Title: NETC 13-3: Improved Regionalization of Quality Assurance (QA) Functions

- Sponsor: New England Transportation Consortium
- Conducted by: University of New Hampshire, Durham, NH
- Status: Just under way
- Scope:
  - Develop common acceptance standards for the PCE/PSE for New England State Transportation Agencies
  - Cost-sharing mechanism for use of resources from one agency for conducting QA on behalf of another agency.
Developing Regional Acceptance Standards

Example of why do we need to change?
Producer works in 14 states & has 72 mix designs approved

• Concrete Strength – 6 – 8 - 10 ksi

Specifications

  Shrinkage
  • ASR
  • Freeze Thaw
  • Chloride Penetration
  • Material Testing
Thank-You for your Attention
Questions?

Rita Seraderian, PE, FPCI
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Northeast
www.pcine.org
Email – rseraderian@pcine.org