Concrete Bridges

Reports

- Bridge Data File Protocols for Interoperability and Life Cycle Management (April, 2016)
- Bridge Information Modeling Standardization (April, 2016)
- Bridge Information Modeling (BIM) Using Open Parametric Objects (.pdf) (December, 2015)
- Multi-Use Corrosion Protection Systems for Reinforced Concrete Bridge Components
- Compilation and Evaluation of Results from High Performance Concrete Projects
- Ultra-High Performance Concrete: A State-Of-The-Art Report for the Bridge Community

Manuals

- Strut-and-Tie Modeling (STM) for Concrete Structures, Design Examples (.pdf) (October, 2017)
- Load and Resistance Factor Design (LRFD) for Highway Bridge Superstructures (.pdf) (July, 2016)
  - Design Examples (.pdf, 8 mb)
- Post-Tensioned Box Girder Design Manual (.pdf) (September, 2015)
- Engineering for Structural Stability in Bridge Construction (.pdf) (April, 2015)
- Contracting and Construction of ABC projects with Prefabricated Bridge Elements and Systems (.pdf) (June, 2013)
- Post Tensioning Tendon Installation and Grouting Manual (.pdf) (May, 2013)
- Engineering Design, Fabrication and Erection of Prefabricated Bridge Elements and Systems (.pdf) (June, 2013)
- Manual of Refined Analysis (.pdf, 1 mb) (under development)

Videos

- Replaceable Grouted External Post-Tensioned Tendons
- Electrically Isolated Tendons
FHWA TECHNOLOGY DEPLOYMENT

Post-Tensioning Guidance Downloads

Downloads / Year

PT Instal  PT Box

Strut and Tie Modeling Short Course & Design Examples (NHI - Course 130126)

- 1.5 day course
- Multiple DOT requests
- 4 Design Examples (on-line)
- Industry Sponsored Delivery
Strut-and-Tie Modeling Course

Course Description

Strut-and-Tie Modeling (STM) for Concrete Structures

PROGRAM AREA: Structures
COURSE NUMBER: FHWA-NHI-130126

Instructor-led Training (ILT)

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>Length</th>
<th>CEU</th>
<th>Host Price</th>
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<tr>
<td>2018</td>
<td>1.5 Days</td>
<td>1.1 Units</td>
<td>$970 Per Participant</td>
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<tr>
<td>2019</td>
<td>1.5 Days</td>
<td>1.1 Units</td>
<td>$970 Per Participant</td>
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TRAINING LEVEL: Basic
CLASS SIZE: Minimum: 20 Maximum: 30

NOTES:
FHWA is offering a special incentive to promote this newly released, high-priority training. For a limited time and subject to availability, DOT’s who host the course can receive 15 seats at no cost. However to meet the 20-participant minimum at least 5 additional seats must be purchased at regular price, either by DOT or by outside participants. We request that course be advertised to the local consultant community to maximize participation. DOTs can only take advantage of this incentive once.
USDOT YouTube Videos

Bridge Technology Series
USDOTFHWA - 1 / 2

Bridge Technology Series: Replaceable Grouted External Post-Tensioned Tendons
USDOTFHWA

Bridge Technology Series: Electrically Isolated Tendons
USDOTFHWA
USDOT YouTube Videos

Concrete Clips: Blended Cements
USDOTFHWA
2 months ago • 281 views
Concrete Clips: Blended Cements.

Concrete Clips: Internal Curing
USDOTFHWA
7 months ago • 1,048 views
Concrete Clips is a series of informational videos developed by FHWA. Internal curing is a method of water curing concrete.

Concrete Clips
USDOTFHWA
Concrete Clips: Internal Curing 9:06
Concrete Clips: Cement Manufacturing 9:22
View full playlist (3 videos)

Concrete Clips: Cement Manufacturing
USDOTFHWA
2 months ago • 409 views
Concrete Clips: Cement Manufacturing.
FHWA Technology Deployment

- Advanced Precast Element Design (AASHTO/PCI)
  - PCC Girder WBT (8 hrs.)
  - Full-Depth Precast Panel WBT (4 hrs)
  - PCC Girder Stability Design Tools and WBT (4 hrs)
  - Bridge Geometry Design Manual – Layout, Fabrication & Erection Considerations
  - Curved / Spliced U-Beam Design Manual
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FHWA Technology Deployment

- Electrically Isolated Tendons (EIT)
  - YouTube video
  - Developing State-of-the-Art Report
  - Global Benchmarking Study on EIT technology (TBD)
  - Demonstration Projects (PA, TX, CA)
  - PTI/ASBI M-50 Specification Adoption
Questions?
FHWA OFFICE OF BRIDGE TECHNOLOGY

FHWA Technology Deployment
Guidance for Monitorable, Replaceable & Assessable PT Tendons
EIT Demonstration Projects / Showcases

• Coplay Bridge - Allentown PA
  – 3-Span Spliced Girder Bridge (approx. 180 ft. spans)
  – Showcase Sept. 2018 (exploring use of Lehigh University)
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FHWA Technology Deployment

• Future Activities
  – LWC Design Primer (NTP Winter / Spring 2018)
  – PT Detailing Selection Guidance (NTP Winter / Spring 2018)
PT Detailing Selection Guidance

- Guidance is needed to assist owners/designers in navigating multiple PT technologies
- Guidance should:
  - Establish PL-2 as the appropriate level of protection for bridges
  - Identify appropriate use of PL-3 (EIT)
  - Identify appropriate use of replaceable tendons
  - Provide strategies to address extreme environments
  - Provide strategies to extend service life to 100 years.
### PT Technology Selection Guidance

Sample - Attributes for tendon corrosion with likelihood of occurrence

<table>
<thead>
<tr>
<th>Attribute</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Remote</th>
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</thead>
<tbody>
<tr>
<td>Tendon Profile</td>
<td>Highly Profiled</td>
<td>Moderately Profiled</td>
<td>Flat / low profile</td>
<td>Vacuum assisted</td>
</tr>
<tr>
<td>Environmental Exposure</td>
<td>Severe</td>
<td>Moderate</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Protection Level</td>
<td>PL-1</td>
<td>PL-1A</td>
<td>PL-2</td>
<td>PL-3</td>
</tr>
<tr>
<td>PT Strand Material</td>
<td>NA</td>
<td>NA</td>
<td>Black</td>
<td>Stainless</td>
</tr>
<tr>
<td>Installer Experience</td>
<td>None</td>
<td>Moderate</td>
<td>Extensive</td>
<td></td>
</tr>
</tbody>
</table>
EDC-3 & 4 - UHPC Connections for PBES
PT Technology Selection Guidance

• a: Use framework established by NCHRP 12-82 “Reliability Based Bridge Inspection Practices” to develop PT Detailing Practices guidance.

• Uses Delphi process to identify risks and appropriate detailing to address these risks.