

PCEF Meeting Minutes
August 25, 2009
Delaware Department of Transportation
Dover, Delaware

Meeting Convened and Introductions made at 8:30 am

Chairman Lou Triandafilou welcomed everyone and asked for self-introductions. This included several people who were linked to the meeting through webconferencing. Lou thanked Barry Benton of DEL DOT for all the arrangements he made to set up the Webconferencing.

Approval of Minutes from February 9, 2009 Meeting

Minutes approved – motioned by Bill Via and seconded by Chad Saunders.

Presentations on Life-cycle Cost Analysis (LCCA) and Contractor Alternate Designs by Hank Bonstedt, PCAP (attached)

Hank's 1st presentation covered an economic analysis using engineering inputs based on present worth. Considerations would include the present worth of initial costs plus at least 1 future rehab costs (FRC) plus maintenance costs plus inspection costs (every 2 years) plus salvage costs (end of life), taking the sum over a period of decades.

Maintenance costs include the annual upkeep of the structure, which vary based on size and type of material. For concrete and steel, assume 0.05% of initial costs. Inspection costs for concrete bridges can be estimated at 0.015% of initial costs, with steel being higher. Painting costs are applied at a 20-year cycle for steel bridges, estimated at 7% of initial costs. Frequency of FRC is a function of time and growing traffic rate (assume 0.75%) (assume 40 years for concrete and 35 for steel). Removal costs can be assumed at 10% of initial costs for both concrete and steel bridges. Salvage costs for concrete would be zero, and 2% of initial costs for steel.

User costs would include driver delays, vehicle operations, and accidents; all taking into account present worth factor and discount rate. The pros of using these costs are that drivers pay for the transportation system. On the negative side, owners cannot recoup these costs. Process and approach limits – government does not invest to gain benefits, but is generally invested in depreciating assets.

Hank described the spreadsheet for performing LCCA – LCC Analysis-version 4.xls (available at www.caba-bridges.org), as being much simpler to use than some of the federal programs; also, it can be used for bridges in rural or urban areas. It was developed by a national Delphi group of 3 producers, 2 designers, 1 State DOT owner (Stan Woods of WI), and 1 non-DOT owner. The group did not take into consideration the use of newer high performance materials. Hank's email address: info@caba-bridges.org.

Ed Darby of VDOT noted that they have completed a LCCA for re-painting a steel truss. VDOT has a policy of doing LCCA on all projects greater than \$25 million. Parsons Brinckerhoff has performed a LCCA to compare a fixed vs. moveable bridge option for the Dominion Blvd. bridge in VA

Action Item #1- Each State DOT and industry supplier will designate someone to apply the spreadsheet to an active design or construction project.

Hank's 2nd presentation covered the contractor alternate design process being used in PA. Benefits to the owner included: a) lower bids without a reduction in project quality; b) improved customer service by reducing construction time; and c) advantage of using the latest materials available. The main benefit to contractors was that it accommodated their best construction operations. The process works by the Owner providing criteria for design in the bid documents, and then allowing the low bidder a period of time to suggest an alternate. Essential project requirements are not changed.

Two competing alternate designs that are put out to bid (concrete vs. steel) are not the same as the contractor alternate design process. In response to why the best design is not incorporated right up front, this process recognizes that necessity is the mother of invention and that creativity is at its peak during the bid process. Value engineering is not allowed after the bidding period because the State's experience has been that it is a time-consuming process.

MDSHA allows alternate designs for bridges only on design/build projects, and allow them for noise wall steel vs. concrete posts. DC DOT has the \$300 million 11th Street bridge project required to be built within budget, with the Contractor doing their own design. VA DOT allows design/build and value engineering (VE) incentive clauses during construction, and DE and NJ DOTs also allow VE. WV DOT does not allow alternates during construction.

Project Fabrication Updates – Troy Jenkins, Northeast P/S Products, LLC

Troy presented several example projects that NPP was currently in. PCEF beams were part of a Contractor alternate design for 6 bridges, resulting in a savings of more than \$1,000,000 on a PA project. On a NJ cofferdam project, they supplied precast pier units and PCEF beams, allowing the contractor to finish 700 days ahead of schedule.

FHWA's Turner-Fairbank Highway Research Center installed strain gages on various joint configurations between deck bulb-tees for a NY State DOT project (black, galvanized and epoxy-coated rebar used in the joints). They are running 9 million cycles on the joints with NaCl ponding. No cracking or leaking has been noted so far. Ultra-HPC joint fill was used. Allowable camber tolerance is 1/8" +/-.

NPP was supplying a post-tensioned concrete arch bridge for the VA DOT; a 3-span box beam bridge for the KY Transportation Cabinet; 2'-thick concrete arch bridge beams for private bridges in MA; and 3-span spliced PCEF beams for another MA project. He also noted that the New England states considered PCEF beams to be a direct substitution for New England bulb-tees.

Project Fabrication Updates – Chad Saunders, Bayshore Concrete Products Corp

Chad described their plant operations at Cape Charles, VA and Chesapeake, VA, along with the following PCEF beam projects:

1. NJ DOT – Route 52 Causeway Contract B
2. DEL DOT – Indian River Inlet and C&D Canal
3. MDSHA – Intercounty Connector design/build projects
4. VA DOT – Spliced girders, approach span girders, spliced lightweight concrete girders (10 ksi, 6" camber) and various interchange projects
5. SC DOT – design/build
6. FHWA project at Fort Belvoir, VA
7. U.S. Navy Dam link
8. U.S. Army Corps of Engineers

Chad has also worked with VDOT on a UHPC project, and a Hampton Roads transit project which modified the PCEF beam shape by keeping the bottom bulb and using an AASHTO Type IV top flange.

His recommendations to the PCEF were to allow prestressed concrete suppliers to move forward with SCC (sensing some resistance), and that on design/build projects there needs to be improved coordination if multiple design offices are involved in a project.

Alan Derr of Newcrete Products New Enterprise Stone & Lime reported that they have supplied PCEF beams on projects in MD, NY and PA (involving a precast through truss bridge). He offered to make a presentation at the next PCEF meeting.

Action Item #2 – Alan will make a formal presentation at the next PCEF meeting.

Design Parameters & Standardization Subcommittee Report – Claude Napier, FHWA Resource Center

Next meeting of the group is planned for November, at a central location that will minimize travel. Agenda items to be considered include:

1. Accelerated Bridge Construction
2. Long-term durability of precast/prestressed concrete products (i.e., girder end 3'-5', bearings, corrosion-resistant rebar)
3. Draped vs. debonded strand
4. Strand patterns & spacing

Joe suggested the committee re-evaluate the minimum clear cover currently provided on PCEF beam bottom flanges, in order to avoid spalling.

Materials & Construction QC/QA Subcommittee Report – Paul Ingram, PA DOT (for Bob Horwhat)

Group consensus was to tackle standard precast concrete connections next.

Overview of Essential Design & Construction Aspects of P/T Spliced Girder Bridges – Teddy Theryo, Parsons Brinckerhoff (copy attached)

Definition – assembling 8 long pretensioned pieces into a single girder

History – FL DOT tried this method in order to eliminate bridge piers or to reduce the number of piers in long bridge projects.

Typical usage – 250' to 300'-long spans in a 3-span or more configuration. Inter-coastal waterway crossings

Construction process includes design/construction interdependency and erection.

Temporary Support during Construction – robust temporary supports and bracing systems; locked girder supports vs. longitudinal and lateral sliding; avoid using P/T bar couplers if possible; stable structure at all stages.

Erection process includes: pier support; haunched girder supports; end span segment and connection span/drop-in girder before post-tensioning operation.

Design aspects include a philosophy of 2-stage P/T and stability. Deck replacements can be accomplished, however, must be designed into the original project. One design strategy would be to use lightweight concrete.

Web thickness needs to be designed to take into account the P/T ducts (8" minimum is recommended), stress all tendons prior to concrete placement, vibrator clearance and radial concerns (bursting stresses). Pier segment considerations include vertical bursting and ultimate negative moment capacity. End segment considerations include anchorage block, P/T anchorage and multi-strand anchorage systems.

PCI Northeast Standards for Accelerated Bridge Construction (ABC-copy attached)-
Mike Culmo, CME Associates (for Rita Seraderian, PCI Northeast)

Guidelines have been developed by the PCI Northeast Bridge Technical Committee, and can be downloaded from their website www.pcine.org. They focus on the use of precast concrete, including footings. Mike highlighted the Maine DOT's use of precast integral abutments.

The group has recently developed the NEXT beam to address the following limitations on adjacent box beam bridges: utility accommodation, difficult fabrication process and difficult field process. The NEXT beam is a high level railroad beam to be used as follows: can be curved; used in 50-85' spans; 24" to 36" depths in 4" increments; 8' to 12' widths; no draped strands; used for bridges with utilities; work well in ABC.

FHWA Connection Details Manual for ABC (copy attached) – Mike Culmo

Project goals included gathering details of connections that State DOTs have used on ABC projects and investigating the transfer of technologies from other markets into bridge markets. 160 details were received from 15 States.

Connection data sheets include: submittal and contact information; actual detail; frequency of use; photographs; and a subjective rating based on ease and speed of construction, cost, performance, etc.

Schematic Design of an ABC Project (copy attached) – Mike Culmo

Case Scenario – 4-lane bridge overpass; existing bridge deteriorated beyond repair; heavy traffic; short but undesirable detour. Public hearings have been held with businesses stating they do not want a long-term construction project. The proposed bridge type is to use NEXT beams. Preliminary beam sizing is based on AASHTO LRFD distribution factors.

Mike also showed a video of a prefabricated bridge element project where grouted reinforcing splice connectors were installed between footings and columns. Known suppliers include Dayton Superior, Linten-Erico and MMB.

Sleeves need to be flushed prior to grouting. 11 ksi grout has been used—suggestion was made to slope surfaces downward from the middle in order to let the grout ooze out. NH used 250 sleeves in their precast abutment project; sleeves developed 100% of ultimate strength.

Mike emphasized the possibility of building a bridge in 30 days or less. He noted that Utah has a goal of using ABC techniques on all projects let for the 2010 construction season.

Upcoming Conferences

The following events were noted for 2010:

- January 10-14: TRB – Washington, DC
- February 8-10: Mid-Atlantic States Quality Assurance Workshop, DC
- February 24-26: National Concrete Bridge Conference, Phoenix, AZ
- March 4-5: Annual Virginia Concrete Conference
- March 23: Annual Maryland Concrete Conference
- April 7-9: FHWA Bridge Engineering Conference- Accelerated Bridge Construction and Highways for LIFE, Orlando, FL
- May 29-June 3: International PCI/FHWA/FIB Symposium, DC
- June 7-9: International Bridge Conference, Pittsburgh, PA
- December 1-3: 7th International TRB Bridge Engineering Conference, San Antonio, TX

Results of 2nd PCI GA/NC/SC PCEF Meeting – Lou Triandafilou

Copy of actions items from the August meeting is attached for information.

Other Issues

1. Claude Napier discussed issues with I-81 deck closure pour failures. VA Transportation Research Council is researching corrosion and fatigue issues that led to failure of epoxy-coated rebar.
2. Those in attendance gave positive feedback on HPC Bridge Views newsletter.

Meeting adjourned at 4:00 pm.

Next meeting was tentatively set for Tuesday, August 24th, preferably at a State DOT with Webconferencing capabilities.