ACEC/MaineDOT Bridge Design Subcommittee

MEETING MINUTES

April 2, 2013

Attendees:		**Location:** MDOT Conference Rm. #317
Dave Sherlock	MaineDOT	
Leanne Timberlake	MaineDOT	
Wayne Frankhauser	MaineDOT	
Marie Malloy	MaineDOT	
Mike Wight	MaineDOT	
Jason Gallant	CMA Engineers	
Steve Percassi	Erdman Anthony	
Chris Snow	GZA	
Steve Hodgdon	VHB	
Craig Weaver	Kleinfelder	**Notes Taken By:** Craig Weaver

This was the first ACEC/MaineDOT Bridge Design Subcommittee meeting for this year.

- **Follow-up from Previous Meeting (various)**

  - Wayne Chadbourne's (Haley and Aldrich) term on the committee ended after the last meeting on November 1, 2012. MaineDOT was concerned that there was no longer a geotechnical representative from the consulting community on the committee. To address the concerns, Chris Snow (GZA) was added to the rotation and this was his first official meeting. In addition, new Bridge Sub-Committee members were selected through the ACEC Transportation Committee that will extend consultant representation into 2018. The updated schedule is provided below.

  - The current committee member rotation schedule is:

Steve Percassi:	Q3 2009 through Q3 2013
Jason Gallant:	Q2 2010 through Q2 2014
Craig Weaver:	Q4 2011 through Q1 2015
Steve Hodgdon:	Q1 2013 through Q4 2015
Chris Snow:	Q1 2013 through Q4 2015
Keith Donnington:	Q4 2013 through Q3 2016
Tom Kendrick:	Q3 2014 through Q2 2017
Jack Burgess:	Q2 2015 through Q1 2018

- Jason Gallant will remain Chair of group until his scheduled departure in Q2, 2014.
- Marie Malloy has replaced Naomi Petley as the MaineDOT Contracts Specialist on the committee. Marie noted that from the beginning of April through mid-May, MaineDOT will be short-staffed with contracts specialists. It will take a great deal of in-house coordination and workload sharing to deal with the anticipated abundance of contracts and invoices during that time. One of Marie's first orders of business in her new role will be to streamline and add clarity to the notice-to-proceed and contract-execution process.

- **Information Dissemination from MaineDOT (various)**

  - Wayne F. reported that the 2014/2015 work plan has been finalized and MaineDOT has begun to schedule new projects. Early kickoff for some projects will begin by late summer. Funding for the new work plan is approximately $110M/2 years plus $30M for the Sarah Mildred Long Bridge. This is about half the funding from the previous four (4) years which resulted in an average of approximately $110M/year. Future work plans will contain 3 years of planning, and will be updated annually based on the cash flow cycle. New construction funding will not be available until January 2014. However, about 20 new projects have been identified and preliminary engineering will begin during the 2013 calendar year.
  - The responsibility to load rate Maine bridges has been shifted from Bridge Maintenance to the Bridge Program. Leanne T. is leading the effort to establish LRFR load ratings for approximately 2000 bridges by 2019. This effort will be carried out by MaineDOT staff as well as consultants appointed by Leanne. MaineDOT is currently handling a batch of about 70 simple span steel bridges in-house and plans to hire additional staff to take on more. Consultant contracts valued around $500k have been issued. Ratings should be in conformance with the MaineDOT 2013 Load Rating Guide and should reference the 2nd Edition AASHTO Manual for Bridge Evaluation with Interim Revisions through 2013.
  - 2-day NHI training titled "LRFD for Highway Bridge Superstructures – Concrete" is scheduled for April 8-9. This training was organized by MaineDOT and will be hosted at their Region 2 office in Augusta. Participant capacity is 30 slots and will be open to the Department as well as the consulting community.
  - The MaineDOT Bridge Program will be taking on some highway culverts with current spans less than 10'. This is due to the current guidelines from the environmental regulatory agencies for bridge openings to meet or exceed 1.2 times the bank-full width of the stream channel.

- Mike Wight shared Designers' Meeting Minutes from November 14, 2012 through March 20, 2013. Meeting notes and supporting documents are attached. Below is a summary of the topics discussed:

A. Designers' Meeting November 14, 2012
   1. Removal of Standard Detail 504(21) – Tension Flange Connection for Diaphragms and Crossframes
   2. Geotextile Wrapped Bridge Approach Issue
   3. Possible Change to Guardrail Connection to Bridge Standard Details
   4. PCI NEXT Beam Repair Manual and PCINE Meeting Notes
   5. Lessons Learned – Milo, Pleasant River Bridge #3244 (Minimum Pavement Lengths for Bridge Approaches)

B. Designers' Meeting January 9, 2013
   1. Line-X Coating of Pipe Piles
   2. Construction Loads on Bridges
   3. Centri-Pipe for Culvert Rehabilitation
   4. New Live Load Factors for Load Ratings using Legal Loads
   5. Alkali Silica Reactivity Webinar
   6. Stockton Spring – Lessons Learned and Aesthetics
   7. Miscellaneous Topics
      - Xypex
      - Snow Fence
      - MSE Walls
      - Granite versus Bituminous Curb

C. Designers' Meeting January 23, 2013
   1. Site Distance Issues with 4-Bar Steel Bridge Rail End Posts
   2. Bridge Curb Line Wedge
   3. Elastomeric Bearing Discussion

D. Designers' Meeting February 20, 2013
   1. Reinforcing Steel Splices in Concrete Tension Zones
   2. Negative Moment Design Section in Cantilevered Members
   3. Merlin Dash Issues

E. Designers' Meeting March 20, 2013 (Minutes Not Yet Finalized)
   1. PCINE Technical Committee Update
   2. Preliminary Design Reports
      a. Corrosion Resistant Rebar
      b. Joints
      c. Hydraulics must be in PDR
   3. New FEMA maps for Cumberland and York Counties in 2014
   4. Revised Gland Seal Standard Details

5. Elastomeric Bearing Spec/Design Update (Status Report)
6. Low-Volume End Treatments
7. Modular Joints
8. Bentley Open House
9. Load Rating Manual

- **Future Meeting Discussion Topics**

1. MaineDOT plans to make changes to the Gland Seal standard detail. They feel that the current detail is not working well. They are interested in the design/performance of gland seals used in other states. They will be reaching out to other state DOTs and are asking the consultant community to provide feedback from their experiences outside of Maine.

2. Use of FRP to strengthen existing concrete bridges
    a. Chemical versus mechanical anchors to form bond between FRP and existing concrete
    b. University of Maine currently researching drill-up anchors

3. Feedback and follow-up from innovative composites technology currently being used on Maine bridges.
    a. GFRP reinforcement used in concrete deck in Auburn
    b. Carbon fiber strands will be used in a NEBT for a bridge project in Kittery. Leanne T. is the project manager.
    c. Others?

- **Next Meeting Date**

    - Tentatively planned for June 11, 2013 at 1:00 PM, Room 317A/B.

Attachments: Designer Meeting Minutes from November 2012 and March 2013

I have attempted to summarize discussions held during this meeting as accurately as possible. If there are any items discussed herein that are misrepresented in any way, please contact me within ten working days. In the absence of any corrections or clarifications, it will be understood that these minutes accurately summarize the discussions at the meeting.

Respectfully Submitted,

Craig A. Weaver P.E.

Designers Meeting Agenda

Wednesday, November 14, 2012
Conference Room 317 A&B
1:00 – 2:00 PM

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1) Removal of Standard Detail 504(21) - (2 min.)

Reiterated that Standard Detail 504(21) - Tension Flange Connection for Diaphragms & Cross-Frames, has been removed. In the more recent past, AASHTO LRFD Bridge Design Specifications have required a yielding check where holes are placed in the tension flange. This can and has been shown to be a controlling design check. By removing the Standard Detail, it is hoped that there will be no more fabrication errors in assuming that the Detail is optional over a welded diaphragm or cross-frame connection plate. Maine is one of the last states to use the bolted connection detail.

2) Geotextile wrapped bridge approach issue - Rich Myers (10 min.)

Discussed an issue that came up during construction on the Stockton Springs Bridge Replacement Project (see attached detail). The detail discussed involved wrapping three separate layers of aggregate subbase course gravel in the approach using non-woven geotextile. This detail was used to try to minimize pavement cracking at the ends of this semi-integral bridge. As can be seen in the detail, only 2 inches of gravel was provided above the top-most wrapped end of the subbase/geotextile near the end of the bridge. This 2 inch thickness proved to be problematic during base pavement placement. The gravel would not stay in place during pavement compaction and the 4 foot length of fabric began to undulate. The lesson learned is that if this detail is to be used again, a greater thickness of gravel should be provided above the last layer of geotextile. When determining this thickness, consideration should be given to the maximum stone size allowed in the gravel material.

Other integral and semi-integral bridge/pavement joint details were brought up as a means to discuss what the Bridge Program has been trying out recently:

- *Ramp "M", I-95 in Kittery is a rehab project including a new wearing surface and approach pavement. It appears to be an older style integral abutment bridge. As can be seen in the attached detail, the design calls for a composite paving grid to be placed in the pavement at the joint between the concrete deck and the approach pavement for 3 feet on either side of the joint. The grid will hopefully reinforce the pavement and help transition from the stiff concrete deck to the more flexible pavement structure in the approaches. This particular joint has historically been decimated by traffic.*

- *Asphaltic plug joints have been used several times around the state as a means to provide a more flexible joint, control where cracking will occur, and possibly provide a detail more maintainable with integral and semi-integral bridges rather than paving completely over the joint. It sounds as though the*

to the web stirrups and top flange bottom steel (typically WWR) and should be spaced longitudinally throughout the ends of members.

Another topic discussed at the most recent PCINE meeting was the composite connection of adjacent NEXT D beams (full depth flanges). Ongoing research is being done to determine other reinforcing details to create a composite connection between adjacent beams. Some of this research has shown that one detail used in the past, a single layer of headed stud reinforcing bars protruding into the connection area, does not exhibit good behavior in all cases of stress and may result in full depth cracking through the connection and pavement. Currently, although a bit difficult to construct, the best detail for design is probably overlapping hairpin reinforcing steel extending out from the beam flanges in the connection area with longitudinal bars running through the overlap. If the headed stud connection detail is not banned, extreme caution should be used when considering this detail. The Bridge Program encourages maintenance forces to keep a close eye on bridges where this detail has been used (one example is the Sibley Pond Bridge #2767).

5) *Lesson Learned - Milo, Pleasant River Bridge #3244 - Mike Wight*

This was a wearing surface project and ended up needing some backwall repairs. The design called for 25 feet of new approach pavement. It turned out to be very difficult for the Contractor to properly grade and pave such a short length of 25 feet. There was a lot of hand work needed. It was suggested that in the future, designs should provide a minimum of 50 feet of pavement in an approach.

jury is still out on this option. It was mentioned that these plug joints probably last about half as long as the pavement.

3) Possible change to guardrail connection to bridge Standard Details - Eric Shepherd (15 min.)

This topic was raised to address an inconsistency in the connection between the standard guardrail transition and different bridge rail types. The Standard Details show that when a transition barrier is used, such as on a bridge with steel bridge rail (the typical case), the guardrail transition should be connected to the transition barrier by way of an embedded anchor plate. The Standard Details also show that for a permanent concrete barrier style bridge rail or Texas Class Rail, the guardrail transition should be connected to the end of the barrier by way of a through-bolt connection with a base plate on the outside face of the barrier. Three specific questions were put forth on this matter:

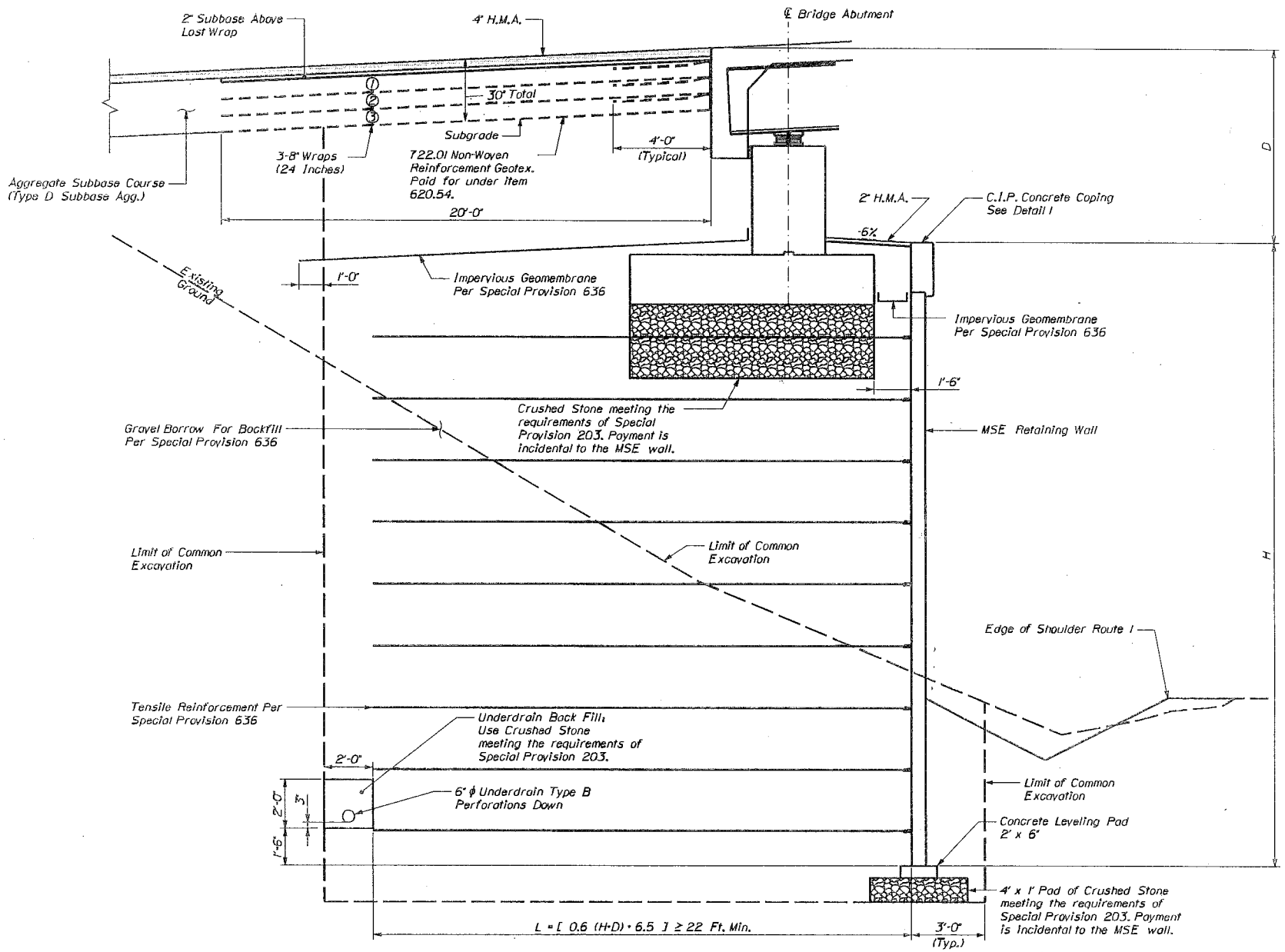
1. *Can the Residents choose either of the two above means of connecting the guardrail transition to the end of the bridge, regardless of the type of barrier?*
2. *Is there a design reason for using one detail over the other?*
3. *Does Bridge Maintenance prefer one detail over the other?*

It was uncertain at the meeting how there ended up being two different style connections in the Standard Details. It was noted during the meeting that a few maintenance folks think that the exterior mounted base plate is easier and quicker to repair.

After the meeting, it was found that the likely driver behind the two different connection types is the thickness of the barrier. The permanent concrete barrier is nearly one foot thinner than transition barrier, so there is a lot less room for an embedded anchor. Knowing this, and considering that most projects use transition barrier and not permanent concrete barrier bridge rail, it was decided that the Standard Details shall stand. Field personnel/Contractors do not have an option of what type of connection to use; the Standard Details shall be followed. As an aside, if there are aesthetic reasons for embedding an anchor plate in permanent concrete barrier, this shall be noted in the Design Documents.

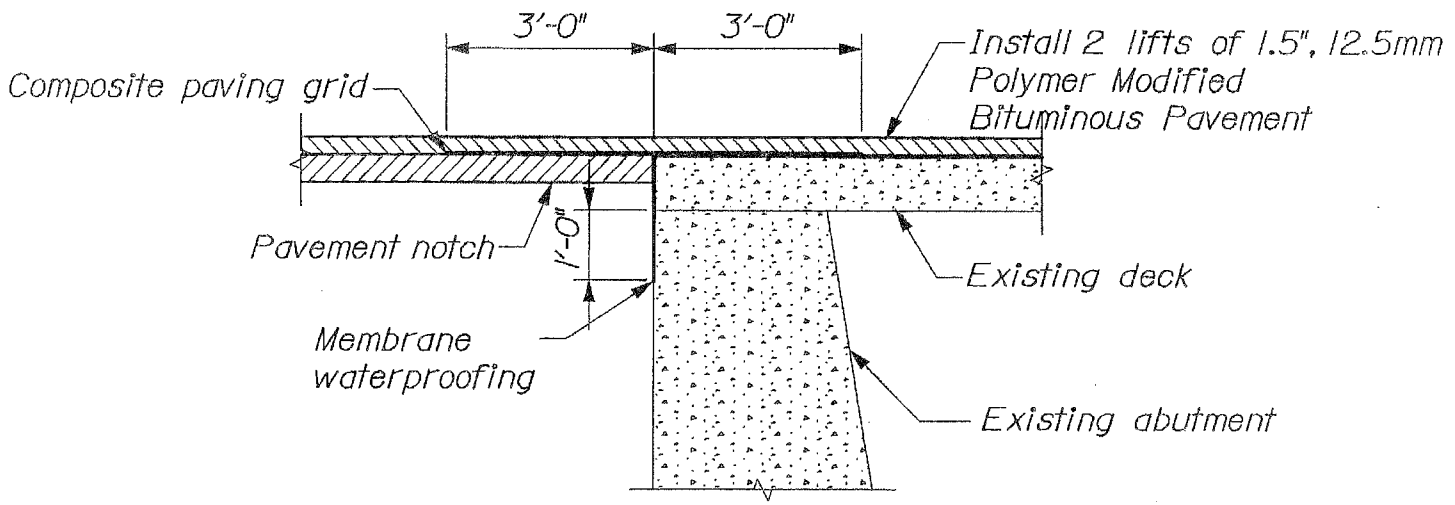
4) PCI NEXT beam repair manual and PCINE meeting notes - Brian Reeves (15 min.)

Cracking in NEXT beams, particularly the NEXT F beams (partial depth flange), near the intersection of the web and flange, has been an ongoing issue noted by PCINE and local precasters. The crack is vertical through the flange and is located just beyond the radius junction between the web and flange. The cracking typically occurs soon after fabrication, before erection, and is likely exacerbated by transportation. The cracks begin at the end of the member and typically extend 8 to 10 feet into the span. Skewed ends are worse. PCINE will be issuing a repair specification for designers and precasters that basically specifies the use of a bent L reinforcing bar at the junction of the web and flange, crossing the crack location. The L bar can be tied



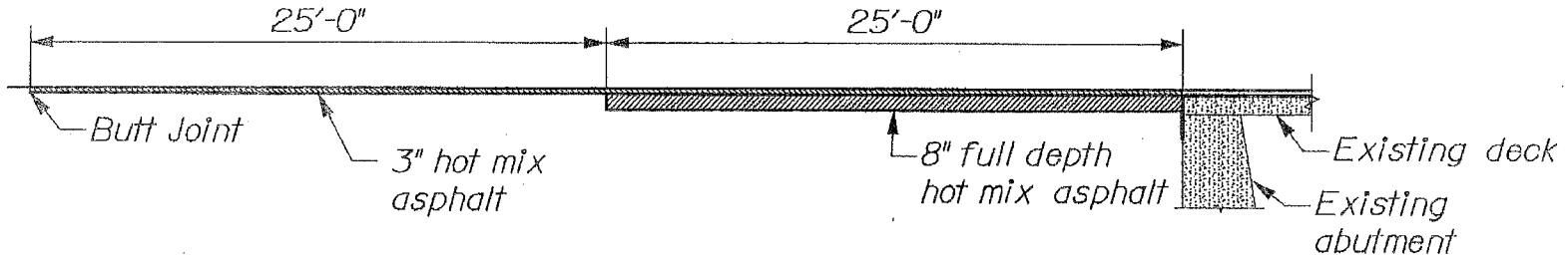
MSE WALL DETAIL

(Abutment No. 1 Shown. Abutment No. 2 Similar)



PAVEMENT REINFORCING SYSTEM

typical at all slab over backwall locations



LONGITUDINAL APPROACH SECTION

SHEET NUMBER 6 OF 6

RAMP "M"
I - 95
TOWN OF KITTERY YORK COUNTY

DETAILS

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

BH-1670(900)E

WIN 16709.00 BRIDGE NO. 6222

Designers Meeting Agenda

Wednesday, January 9, 2013
Conference Room 317 A&B
1:00 – 2:30 PM

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1) LINE-X - Fabrication group (30 min.)

2) Construction loads on bridges Special Provision - Wayne Frankhauser Jr (20 min.)

3) Centri-pipe - Mike Wight (10 min.)

4) Live load factors for load rating using legal loads - Mike Wight (10 min.)

5) Alkali Silica Reactivity (ASR) Webinars - Mike Wight (5 min.)

   - February 6
   - February 13
   - February 20
   - All 1:00 - 3:30 pm

6) Stockton Springs lessons learned - Rich Myers and Mike Wight (15 min.)

7) New Secretary

1) Line-X coating of pipe pile

- Currently being tried on both bent piles at Clay Hill Bridge
- It was used at a 350 level (around 100 level is used on truck beds) at 125 mill thickness with a 3 mil primer base.
- A special frame was used to protect the sides of the pile while it was being driven
- The coating performed well during the driving. It only had minor damage to the coating that did not need to be repaired.
- In the removal test it took a electronic chipping hammer to remove it from the pile and the primer delaminating is where it failed.
- The cost for the coating is currently around $30 per foot coated
- There was some talk about coating the ends of beams with it instead of paint
- Moving forward with the process another project is being looked at for another experimental trial and a universal spec needs to be created to get away from sole sourcing
- See the following link for a power point presentation of the pile driving process: ..\..\..\Polyurea coating on pipe pile.ppt

2) Construction Loads on Bridges

- Make sure that a special provision for construction loads is in the spec book for all rehab projects.
- It set limits for what load the contractor is allowed to have on the bridge during construction
- This spec was done by Eric Shepard based on the research done by the Minnesota DOT after the bridge collapse

3) Centri-pipe

- This is a process of coating up to 120" pipes that Ken saw at a AASHTO conference
- It uses a rapidly spinning pin wheel type head to cast a 8 ksi mortar at approx. ½" thick on the inside of storm and sanitary sewer pipes.
- This is currently a proprietary method and product with the nearest location being in Mass.
- For a 10' diameter pipe the cost is $120 ft^2, this fairly close to sliplinings cost
- http://www.centripipe.com/site/CentriPipe/tabid/65/Default.aspx.

4) Live Load factors for load ratings using legal loads

- There is a new 2013 amendment for the MBE found at the following link: ..\..\..\Load Rating\2012 draft revsion to MBE.pdf
- Make sure that the new load factors are used to bridges that don't pass the HL93 spec

5) Alkali Silica Reactivity Webinar

- Three part webinar on Feb 6,13,20 at 1-3:30pm
- See the engineering counsel site for more information

6) Stockton Spring Lessons learned
Esthetics
-Looks nice

Xypex

- Acts as a retarder
- Do not use with Recover admixture (plastic for 6 hours after placement)

Snow Fence

- Opening size of fencing used was too big. Need to use smaller size opening for fencing
- Fencing used full length of bridge. No consensus on what length of snow fencing needed.
- Location of Ubolt had to be moved up 9"

MSE wall

- Precast coping cheaper than cast in place

- Concrete used between the back side of the MSE wall and front of breastwall due to safety issues with tying off

Miscellaneous

- Consider using granite curb versus bituminous (per contractor)

Designers Meeting Agenda

Wednesday, January 23, 2013
Conference Room 317 A&B
1:00 – 2:30 PM

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1) Sight distance issues with 4-Bar Steel Bridge Rail End Posts – 10 mins

2) Bridge Curb Line Wedge – 5 mins

3) Elastomeric Bearing Discussion – 15 mins

Attendees: Roger Naous, Laura Krusinski, Joe Stilwell, Brian Reeves, Wayne Frankhauser, Rich Myers, Bob Bulger, Devan Eaton, Brian Nichols, Joel Veilleux, and Garrett Gustafson.

1) Sight distance issues with 4-Bar Steel Bridge Rail End Posts – 10 mins

- Curb-mounted 4-bar steel bridge rail has created sight distance issues on two recent bridge projects with intersections in close proximity (Carrabassett Valley, North Branch Bridge #5346, WIN 18202.00 & Hollis-Standish, Bonny Eagle Covered Bridge #2190, WIN 16704.00)
- The problem in Carrabassett Valley was resolved by cutting the end posts and bridge rail down to the top of the third rail.
- The problem in Hollis was due to the temporary alignment of the side road during construction due to utility relocation timing.
- A standard detail for a modified 3-bar Wyoming bridge rail is currently being reviewed by FHWA. Upon approval, the 3-bar Wyoming bridge rail will be the recommended bridge rail for bridges with sufficient bicycle traffic to warrant a higher bridge rail than the standard 2-bar bridge rail. The 3-bar Wyoming bridge rail can be used in the interim with project specific approval.
- The 4-bar steel bridge rail remains an acceptable option for sidewalks. The 3-bar Wyoming bridge rail with vertical pales should be considered as an alternative on sidewalks.
- On bridges with intersections in close proximity, designers need to evaluate sight distances. Bridge rail selection should be on a project specific basis.

2) Bridge Curb Line Wedge – 5 mins

- Standard detail 502.03 which included the pavement wedge at the curb line has been removed.
- The detail had issues pertaining to compaction and tear out by snow plows and provided no appreciable benefits.
- Membrane details remain unchanged
- A rubberized sealant similar to that used at the centerline of interstate projects is recommended for mill and fill projects. Bridge Maintenance should be consulted before requiring a sealant on new construction to determine if a problem exists.
- For projects going out in the immediate future, proceed as usual.
- Devan Eaton will investigate method of payment for the sealant

3) Elastomeric Bearing Discussion – 15 mins

- Recent issues with elastomeric bearings have triggered some review of our specifications, Bridge Design Guide, and common practices. Devan Eaton and Brian Reeves will review our specifications and BDG relative to current AASHTO LRFD Bridge Design Specifications for elastomeric bearings. The following questions and observations were raised:

    1. Does the modulus of elasticity we specify contradict AASHTO?
    2. The BDG specifies a temperature range of 60-90 degrees Fahrenheit, should the range actually be centered about 45 degrees? The range in the BDG may have been a recommendation from field personnel experience.
    3. We specify that elastomeric bearings be deformed outside the specified temperature range but it can be quite difficult to do this and has been skipped in the past. Is deforming the bearings completely necessary or could a design change allow this to be omitted? It needs to be clear when deforming the bearings is required and the BDG should establish options for resetting bearings.
    4. Timing of welding the girders to the sole plates can affect the bearings.
    5. Should temperatures be instantaneous or 24 hour averages?
    6. Is it always necessary to jack and reset the bearings?
    7. Adequate room to jack the bridge up should always be provided.

Designers Meeting Minutes

Wednesday, February 20, 2013
Conference Room 317 A&B
1:00 – 2:30 PM

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1) Reinforcing steel splices in concrete tension zones-Roger Naous

   - Other states have been experiencing cracking at splice locations in tension zones.
   - A research done in 2008 found that a 1977 equation by Orangun provides the best estimate of bond strength (see attached)
   - The splice location must be checked in tension zones to determine the possibility of cracking due to moment.

2) Negative moment design section in cantilevered members-Roger Naous

   - Other states have observed cracking near centerline of support in negative moment tension zones in pier caps.
   - A research concluded that there was not enough reinforcing for the moments in these zones.
   - It was recommended that the moment design section be taken at the center of support rather than at face of support, such that

adequate reinforcing can be provided over the entire tensile zone.

- A finite element model created for Richmond Dresden Bridge pier cap verified the research and testing finding, such that the tensile stresses at the center of support exceeded those at the face of support.

3) MerlinDash issues-Joel Veilleux

- The program has issues with the specialized loads for Maine legal loading
- When using MerlinDash it is recommended that hand comps are done to verify results
- The areas of greatest discrepancy are for exterior girders on multi span
- Make sure that the legal load factors are correct due to the new rating number

Designers Meeting Agenda

Wednesday, March 20, 2013
Conference Room 317 A&B
1:00 – 2:30 PM

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1) PCI Northeast Technical Committee update – Bob Bulger (15 minutes)

2) Preliminary Design Reports (Comments) – Mike Wight (5 minutes)
   - Corrosion resistant rebar
   - Joints
   - Hydraulics need to be included in PDR

3) New FEMA maps for Cumberland and York Counties in 2014 – Mike Wight (5 minutes)

4) Revised gland seal standard details (Status report) – Mike Wight (5 minutes)

5) Elastomeric bearing spec/design update (Status report) – Mike Wight (5 minutes)

6) Low-Volume End Treatments – Rich Myers (15 minutes)

Attendees: Rich Myers, Devan Eaton, Wayne Frankhauser, Mark Parlin, Jonathan Buck, Mike Wight, Dave Sullivan, Brian Nichols, Eric Shepherd, Roger Naous, Joe Stilwell, Laura Krusinski, Joel Veilleux, Brian Reeves, Garrett Gustafson, Nate Benoit and Roland Cote.

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6) Low-Volume End Treatments – Rich Myers (15 minutes)

7) Modular Joints – Roland Cote (Bonus)

8) Bentley Open House – Wayne Frankhauser (Bonus)

9) Load Rating Manual – Wayne Frankhauser (Bonus)