

MINUTES OF 2010 STRUCTURE WORKSHOP

The 2010 Structure Workshop was held on June 23rd in the Structure Design Unit Conference Room C in Raleigh. Those in attendance included:

Greg Perfetti	State Bridge Design Engineer
Tom Drda	FHWA – Division Bridge Engineer
Dan Holderman	State Bridge Management Engineer
Dave Henderson	State Hydraulics Engineer
Chris Peoples	State Materials Engineer
Mike Robinson	State Bridge Construction Engineer
Njoroge Wainaina	State Geotechnical Engineer
Roger Thomas	Assistant State Roadway Design Engineer
Allen Raynor	Assistant State Bridge Design Engineer
Tom Koch	Assistant State Bridge Design Engineer
Rick Nelson	Assistant State Bridge Management Engineer (Operations)
Cameron Cochran	Bridge Construction Engineer
Kevin Bowen	Bridge Construction Engineer
Lee Puckett	Bridge Construction Engineer
Larry Carpenter	Bridge Construction Engineer
Eddie Bunn	Bridge Construction Engineer
Aaron Earwood	Bridge Construction Engineer
Darren Scott	Bridge Construction Engineer
Mohammed Mulla	Geotechnical Contract & Statewide Services Manager
John Pilipchuk	Geotechnical Western Regional Manager
Scott Hidden	Geotechnical Support Services Supervisor
Chris Kreider	Geotechnical Eastern Regional Operations Engineer
Dean Hardister	Geotechnical Western Regional Operations Engineer
John Fargher	Geotechnical Western Regional Design Engineer
Jack Cowsert	Materials and Tests – State Materials Quality Engineer
David Greene	Materials and Tests – Structural Members Engineer
Steve Walton	Materials and Tests – Metals Engineer
Aaron Dacey	Materials and Tests – Coatings and Corrosion Engineer
Trudy Mullins	Materials and Tests – Prestressed Concrete Engineer
Bill Goodwin	PDEA – Bridge Development Unit Head
Bryan Kluchar	PDEA – Project Planning Engineer Supervisor
Neal Galehouse	Research and Analysis – Research Engineer
Brian Hanks	Structure Design Project Engineer
Paul Lambert	Structure Design Project Engineer
James Gaither	Structure Design Project Design Engineer
Gichuru Muchane	Structure Design Project Design Engineer
Nilesh Surti	Transportation Program Management – Design-Build Engineer

The following items of business were discussed:

I. WELCOME:

Mr. Perfetti kicked off the meeting with self-introductions, welcome remarks, and a statement on the purpose of the workshop. He noted that the workshop is a unique forum where the represented disciplines discuss issues of mutual interest and serves to keep communication open between Business Units.

2. **REVIEW OF THE 2009 ACTION ITEMS**

(STRUCTURE DESIGN)

Cored Slab Details – Structure Design now details a varying sidewalk parapet dimension on the plans.

Detour Alignments – Structure Design has instructed their Engineers to show clearance limits for the end tie-in of the detour bridge on the preliminary general drawing which is sent to the Area BCE for review and comments.

Deck Pour Direction – Structure Design is consulting with the Area BCE when determining pour sequences. The Bridge Management Unit suggested utilizing pour sequences for latex modified concrete overlays to mitigate tension and reduce cracking in the overlay.

Drilled Pier/Column Issues – Structure Design issued a policy memo to discontinue use of mechanical couplers for splicing reinforcing steel and extending the drilled shaft to the bottom of cap for short columns on drilled piers. It was noted that the Bridge Management Unit has let some projects with permanent casing extending to the cap.

Integral Abutment Issues – Structure Design reported that a couple of projects were let with the requirement of a post-bid design of a fabric wall that will function as a reinforced bridge approach fill. However, the Construction Unit noted that Contractors have not placed cranes on the fabric walls.

Transverse Joint Shear Key Detail – Structure Design reported that alternate bridge deck shear key details were still under consideration.

Approach Slab Sub-base – Structure Design continues to investigate the possibility of eliminating the sub-base.

Elastomeric Joints – Construction reported a few more joints failures. It was noted that the revised special provision for elastomeric concrete is now active, and only a few material suppliers have been prequalified. Construction and Structure Design will continue to evaluate the effectiveness of the new requirements before considering whether to eliminate the joint armor.

Cored Slab Joints – The Structure Design, Bridge Management and Construction Units will investigate using some type of bond breaker on the end faces of the cored slab units and allow Contractors to pour the approach up against the cored slab units.

Miscellaneous Steel Product Fabricators – Materials and Tests is still working out a process for approval of miscellaneous steel product fabricators.

Structural Elements not Cambering as Predicted – A research project addressing this issue is currently in progress.

High Strength Concrete for P/S Concrete Piles – Structure Design is developing a policy for concrete piles with higher strength concrete, which is nearing completion. The revised standard drawings will be distributed soon.

MSE Abutment Walls – It was noted that MSE abutment walls are routinely used on design-build projects because they are cost effective, but the Department usually considers MSE wall when there are no other options. It was agreed that the Department should routinely consider MSE walls when evaluating all the options for abutments.

Substructure Standard Designs – Structure Design reported that development of standard substructure designs is nearing completion and standard foundation loads will be provided to GEU soon.

3. **PREFABRICATION SCAN:**

(FHWA)

Mr. Drda reported on a recent scan tour of bridges that were largely constructed with prefabricated elements. The tour, attended by the Construction (Bridge), Bridge Management, and Structure Design and FHWA, included bridges in Martin, Hyde, and Carteret counties. In general, the prefabricated elements appeared to be performing well. However, there were some concerns regarding the quality of the various types of grout used on the projects.

The Martin County bridge (#36) grout, which was more like concrete, was used in voids in the deck units to develop a composite connection between the precast deck and the girders. This grout did not appear to bond to the precast concrete deck very well, and moisture appears to be leaking through the grout pocket seams on to the steel girders. There was some speculation that vibrations during deck grinding may have caused delamination between the grout pocket and precast deck panel.

The Hyde County bridges (NC 12 on Ocracoke Island) used grout to connect precast bent caps to prestressed concrete piles. This grout appeared to be very high quality and appeared to provide seamless connections. Grout was also used for miscellaneous repairs on spalled areas of the precast barrier rail.

The Carteret County bridge (#20) did not have an overlay. Grout was used in the cored slab shear keys, dowel holes, and joints between spans. It appeared that the grinding process damaged the grout and caused delaminations between the grout and the cored slab units. Holes left by the void hold-down systems were also uncovered by the grinding process.

The discussion noted that the grout used on the Martin and Carteret County bridges was in accordance with the *Grout for Structures* special provision. It was noted that this provision addresses grout for numerous applications (including Geotechnical), and that a more targeted specification was needed. There was consensus to develop a new special provision that will address grout for bridges.

Action Item(s):

- ▶▶ Structure Design will develop a special provision specifically for grout in grout pockets, precast caps, shear keys, etc.

4. **BRIDGE INCIDENTS:**

(FHWA)

Mr. Drda gave a presentation on bridge incidences that involve a catastrophic event, such as a collapse or severe damage. He noted that the FHWA Emergency Preparedness policy requires the FHWA headquarters be notified if both directions of an interstate highway are closed for over 8 hours. Notification for significant interruptions (closure or backups) is preferred, but not required. He added that the significant interruptions typically attract media attention. For a variety of reasons, such as public safety, public information, and forensic investigations, Mr. Drda articulated the importance of developing guidelines for managing bridge incidences.

During the discussion there was consensus to develop guidelines for managing bridge incidences, and the business units that would need to be involved in this process were identified. The guidelines/policy should address control of the construction site after an incident, handling of Public/Media relations, and should include provisions for retaining a Forensics Consultant. It was suggested the Construction Unit collaborate with the Professional Services Management Unit (Scott Blevins) to develop an opened ended contract, and with the various disciplines to develop the requisite qualifications for a Consultant.

Action Item(s):

- ▶▶ Construction will develop guidelines for managing bridge incidents.

- ▶▶ Construction will collaborate with the Professional Services Management Unit to develop an advertisement and to select an on-call engineering firm with the capability to assist the various disciplines in the Department.

5. FHWA STEWARDSHIP OVERSIGHT: (FHWA)

Mr. Drda briefly described the FHWA-NCDOT Stewardship and Oversight Agreement and discussed recent revisions. This agreement formalizes how the Federal-Aid Highway Program is administered in the State of North Carolina, which is largely through delegated authority to the State for certain preliminary engineering, construction contract administration, right-of-way, and utility activities. He provided a brief overview of the revisions, which affected inherently low risk projects, design-build oversight and projects over \$100 million. Mr. Drda noted that the revisions were open for comments and he invited all Units to channel their comments through the Preconstruction Office (Debbie Barbour).

Mr. Drda also drew attention to the program Responsibility Matrix for Bridges (Item 4) in the agreement document. He noted that FHWA needs to review the Preliminary Bridge Survey Report on Federal Aid step-by-step projects, and therefore requested FHWA receive a copy of the report.

Lastly, Mr. Drda reminded all Units that the deadline for submitting applications for IBRD funds is July 30, 2010.

Action Item(s):

- ▶▶ Hydraulics will modify the current process and send FHWA the Preliminary Bridge Survey Report for review.

6. BRIDGE TOPICS: (BRIDGE MANAGEMENT)

The Bridge Management Unit led a discussion on the TMT recommendation to transition to two project management approaches; namely the Tri-Managed Process and the Division Managed Process. Under the Division Managed process, each Division will have a Division Bridge Program Manager who will be responsible for planning routine maintenance, identifying Division needs and developing a plan to address the management of bridge structures. The discussion emphasized that there will be various training needs for Division Personnel to raise the bridge management program.

The discussion noted that Divisions 1, 6, 7, and 13 will soon advertise design-build projects for multiple bridges, and the other 10 Divisions will also let a number of design-bid-build bridges at a later date. The FHWA asked who would manage construction of the Division design-build projects, and the Construction Unit responded that they would be assisting the Divisions.

The discussion noted that there will not be a second round of *ARRA* (stimulus) funds. However the Department is proceeding with maintenance of effort projects (MOE), and the Construction Unit is working with Contractors to meet the MOE spending commitments by the September 30, 2010 deadline.

Next, the Bridge Management Unit noted that there are approximately 4500 posted bridges in the State, which impede economic activities of the trucking industry. As such, there is a need for a policy or program to address posted bridges. It was noted that the TMT recommended developing a Bridge Maintenance and Preservation manual to provide guidance and strategy for extending the life of existing structures.

The Bridge Management Unit also reported that the angle used to armor joints continues to be an element that sometimes fails, and suggested eliminating the use of joint armor. Structure Design noted that new requirements for elastomeric concrete were recently implemented, and it would be

worthwhile to evaluate if the situation improves as a result of the new requirements. Failures of Evazote joint seals were also discussed. Structure Design noted that the issue has been discussed in the AGC-DOT Joint Bridge Committee meetings and will be addressed through a revision to the special provision for Evazote Joint Seals. In general the revisions will require more durable material for the joint seals and address the relative location of splices and laminations in the material.

Action Item(s):

- ▶▶ Bridge Management will develop a policy and/or program to address approximately 4500 posted bridges.
- ▶▶ Bridge Management will establish a process/training for managing and contract administration of Division managed bridge projects
- ▶▶ Bridge Management and Structure Design will continue to monitor the performance of joint armor.
- ▶▶ Construction and Structure Design will work on revising the special provision for Evazote Joint Seals.

7. CORED SLAB JOINTS: *(CONSTRUCTION)*

The Construction Unit reported that cored slab bridges continue to exhibit transverse reflective cracking in the overlay above the joints. They recommend detailing both ends of all cored slab units as fixed.

In the discussion, Structure Design noted that cored slab bridges up to 150 feet in length are currently detailed with fixed ends. In addition, the revised Structure Design Manual does not recommend cored slab superstructures for bridges with more than four spans. As such, most cored slab bridges should be detailed with fixed ends under current policy and practice.

Action Item(s):

- ▶▶ Structure Design will continue detailing all joints fixed in cored slab bridges.

8. GROUTING CORED SLABS FOR TOP-DOWN CONSTRUCTION: *(CONSTRUCTION)*

The Construction Unit noted that the *Standard Specifications* require shear keys on cored slab bridges to be grouted prior to placing any construction equipment on the bridge. However, for bridges that are constructed top-down, the construction equipment often damage the grout in the shear keys, which cracks and spalls out of the keyway. This damage can only be repaired by removing all the grout and re-grouting the shear keys. They inquired if it was possible to grout the shear keys after the heavy construction equipment had been move off the bridge.

Structure Design noted that the shear keys' function is to assist in transverse distribution of loads, and therefore did not recommend grouting the shear key after the heavy construction equipment had been moved off the bridge.

Action Item(s):

- ▶▶ None.

9. 'K' BAR PLACEMENT ON HEAVY SKEW PRESTRESSED GIRDERS: *(CONSTRUCTION)*

The Construction Unit showed pictures illustrating the difficulty in placing 'K' bars at the ends of prestressed girders on bridges with a heavy skew. Essentially, the shear stirrup loops extending above the top of the girder conflict with the 'K' bars in the edge beam. In many cases it is not possible to thread the 'K' bars through the loops. Construction requested Structure Design consider constructibility when detailing the reinforcing at the ends of prestressed girders on heavy skews.

Action Item(s):

- ▶ Structure Design will update the Design Manual to require engineers check whether 'K' can be placed without conflict.

10. EROSION UNDER DECK DRAINS:

(CONSTRUCTION)

The Construction Unit showed pictures depicting significant erosion of material beneath the bridge due to the discharge from deck drains. They requested the Hydraulics Unit consider some sort of erosion prevention treatment for areas subject to deck drain discharge.

The Hydraulics Unit stated that deck drains are typically discharged on to areas with erosion protection. However, it was noted that on tall bridges it is not always possible to direct the discharge, and in some cases the topography beneath the bridge is unknown.

Action Item(s):

- ▶ Hydraulics will encourage their engineers to consider treatments to prevent erosion of material underneath bridges with deck drains, such as using permanent matting, rip rap, etc, which prevent "rivlets" from forming.

11. LATERAL GUIDES:

(CONSTRUCTION)

The Construction Unit questioned the need for lateral guides (retainer blocks) on cored slab and box beam bridges with dowels on the ends. They requested Structure Design discontinue detailing lateral guides if they are redundant.

Action Item(s):

- ▶ Structure Design will eliminate the lateral guides on bents and end bents on cored slab and box beam bridges.

12. TRANSVERSE CONSTRUCTION JOINT DETAIL:

(CONSTRUCTION)

The Construction Unit reported that the bridge deck shear key detailed on plans is very difficult to construct. They requested Structure design eliminate the shear key detail.

After some discussion on the function of the shear key, there was consensus to consider an alternate detail with similar performance features as the current detail. Construction suggested and L-shaped shaped shear key.

Action Item(s):

- ▶ Structure Design will review the bridge deck shear key detail and consider revising it to an L-shaped shear key.

13. ABC SUB-BASE OPTION FOR APPROACH SLABS:

(CONSTRUCTION)

The Construction Unit reported that Contractors seldom opt to construct the 'ABC' stone sub-base detailed on approach slab plan sheets, and requested it be eliminated from the plans.

Structure Design responded by stating that this matter has been discussed in the AGC-DOT Joint Committee meeting, where Contractors have requested eliminating the sub-base altogether. The basis for the request is the approach slabs are supported on reinforced approach fill which can function as the sub-base.

Action Item(s):

- ▶ Structure Design will review the Bridge Approach Slab standard drawings to evaluate eliminating 'ABC' sub-base or eliminate the approach slab sub-base altogether.

14. PRECAST BARRIER RAILS:

(CONSTRUCTION)

The Construction Unit discussed fit-up problems often experienced with permanent precast barrier rails. The discussion noted that only Bridge Management uses precast rails, and in the future their use will be limited because under bridge managed processes Bridge Management not be letting bridges.

Action Item(s):

- ▶▶ None.

15. CROWN LOCATION FOR STAGED CONSTRUCTION:

(CONSTRUCTION)

The Construction Unit discussed challenges with finishing bridge decks on stage constructed bridges. They noted that the screeding machine cannot finish the areas adjacent to the screed rails, and therefore requested locating the crown-point at least 4 feet from the longitudinal construction joint.

Action Item(s):

- ▶▶ Structure Design will revised the Design Manual to require Engineers avoid locating the bridge crown point within 4 feet of the edge of screed on staged construction bridges.

16. SLEEPER SLABS:

(CONSTRUCTION)

The Construction Unit reported that the sleeper slab at the ends of integral abutment bridges is fairly narrow and subject to cracking due to impact from wheel loads. They requested Structure Design consider detailing a wider section of concrete on the beveled end.

Action Item(s):

- ▶▶ Structure Design will identify a project to eliminate the sleeper slab on a trial basis.

17. EVAZOTE JOINT SPECIFICATION:

(CONSTRUCTION)

The Construction Unit discussed problems with the performance of evazote joint seals, as noted in Item 6.

Action Item(s):

- ▶▶ Construction and Structure Design will work on revising the special provision for Evazote Joint Seals (see Item 6).

18. GALVANIZED PILES:

(STRUCTURE DESIGN)

The Construction Unit stated that Contractors are unsure of the intent of the plan note for partially galvanized piles.

Structure Design clarified the intent of the note regarding payment for partially galvanized piles. The discussion noted that the policy and plan note were introduced as a cost-saving measure when partially galvanized piles can be utilized. The intent of the policy is to reduce the unit bid price for galvanized piles when partially galvanizing piles are permitted.

The Construction Unit suggested Structure Design revise the plan note to capture the intent and clarify payment for the partially galvanized piles.

Action Item(s):

- ▶▶ Structure Design will inform Contractors of the intent of the plan note and solicit feedback from Construction to evaluate the need to clarify the plan note for payment for partially galvanized piles.

19. PRECAST 3-SIDED CULVERT STANDARD DETAILS:

(STRUCTURE DESIGN)

The Structure Design Unit presented standard details for precast 3-sided culverts.

The Construction Unit welcomed the idea of standard details, but noted that the proposed details still require construction of footings in submerged conditions. They illustrated the challenges of construction in submerged conditions with pictures of a typical 3-sided culvert construction site.

The discussion explored alternate details, such as footings with walls to support 3-sided culverts above the stream bed. After a lengthy discussion, it was suggested that in many cases a one or two span bridge would have less environmental impact, and therefore should be considered in lieu of 3-sided culverts.

Action Item(s):

- ▶▶ Structure Design will finalize and distribute standard plans for 3-sided culverts.
- ▶▶ Structure Design will distribute culvert details to permit variable height walls to support culvert arch span, for comments.
- ▶▶ Hydraulics will consider the use of single span bridges in lieu of 3-sided culverts.

20. INTERNAL HOLD-DOWNS FOR CORED SLABS:

(STRUCTURE DESIGN)

Structure Design proposed eliminating external void hold-down systems for cored slabs and box beams and requiring internal hold-down systems in their place. They noted that during the prefabricated elements scan tour (see Item 1), the grout used for patching void hold-down recesses was observed to be spalling out of the recesses. There was concern regarding the potential for initiation of corrosion in the un-grouted recesses. Structure Design showed pictures of an internal void hold-down system, which has been used successfully and eliminates the recesses.

After some discussion there was consensus to begin requiring internal void hold-downs, which will be approved via a submittal showing the details of the proposed hold-down system.

Action Item(s):

- ▶▶ Structure Design and Materials and Tests will collaborate on drafting a special provision to require a submittal for internal hold-downs for cored slabs.

21. ADJUSTING END BENT CAPS TO REDUCE BRIDGE LENGTH:

(STRUCTURE DESIGN)

Structure Design proposed an increase in the minimum depth of end bent caps from 2'-6" to 4'-0". Increasing the end bent cap depth will shorten the bridge by approximately 8 feet (4 ft. at each end bent), resulting in a cost savings of approximately \$50,000 per bridge.

After some discussion there was a consensus to proceed with investigating the feasibility of implementing tall (4'-0" min) end bents.

Action Item(s):

- ▶▶ Structure Design will investigate the feasibility of implementing tall (4'-0" min) end bents.

22. BONNER BRIDGE – STAINLESS STEEL REINFORCING BARS:

(STRUCTURE DESIGN)

Structure Design reported that the draft proposal for the Bonner Bridge replacement bridge required use of XM-28 stainless steel reinforcing bars in the splash zone and solicited feedback from the other Units. They noted that VDOT employs strategic application of MMFX, XM-28, or stainless steel reinforcing based on exposure.

Action Item(s):

- ▶▶ Structure Design will proceed with specifying the strategic use of XM-28 stainless steel rebar for B-2500 and draft and IBRD proposal for the same.

23. STANDARD CORED SLAB PLANS AND LOADS:

(STRUCTURE DESIGN)

Structure Design reported that the standard cored slab plans were near completion. The standard superstructure plans are complete and have been used on a few bridges. The standard substructure plans will be completed by the end of July, 2010, and Structure Design will provide the Geotechnical Unit with standard substructure design loads.

It was noted that the Divisions have been informed about the standard plans and the protocol for using them. The plans have been well received by the Divisions and all Units were encouraged to begin using them for bridges that fit the criteria for standard cored slab design plans.

Action Item(s):

- ▶▶ All Units will promote the use of standard cored slab design plans.

24. SHEET PILE ABUTMENTS WITH COUNTER-WEIGHTS:

(GEOTECHNICAL)

The Geotechnical Unit discussed the challenges of designing foundations for bridges with sheet pile abutments. They noted that in many cases brace piles cannot be installed and therefore a counterweight is usually detailed. In addition, there is no consensus on whether the sheet piling should be detailed in front of or behind the end bent H-piles to mitigate the risk of foundation failure due to scour.

During the discussion Structure Design expressed concerns regarding the function and size of the counterweight on cored slab bridges. The Geotechnical Unit agreed that if the size of the counterweight gets too large it may be more cost effective to lengthen the bridge or drive a secondary row of piles to provide lateral restraint. In addition, there was consensus to detail sheet piling on the stream side of the H-piles.

Action Item(s):

- ▶▶ Structure Design will detail sheet piling on the stream side with the end bent piles behind the sheet piling.
- ▶▶ Structure Design and Geotech will collaborate when a counterweight is necessary, to consider alternate strategies for providing lateral restraint.

25. ONGOING RESEARCH PROJECTS:

(RESEARCH & ANALYSIS)

The Research and Development Unit gave a presentation on the status of current Structures and Construction research projects. Current research activities include:

- 7 Geotechnical, Structures, and Construction projects in progress,
- 2 Geotechnical and Structures IBRD projects, and
- Soliciting new projects for the fiscal year 2012 research program.

The presentation provided the objectives of each research project and a progress status. In addition, all Units were encouraged to begin formulating their research ideas for the next research cycle, since solicitations will be sent out in July.

Action Item(s):

- ▶▶ All Units will evaluate their research needs and submit ideas for the FY 2012 Research Program

26. THERMAL SPRAYED COATINGS:

(MATERIALS & TESTS)

The Materials and Tests Unit (M&T) discussed proposed revisions to the special provision for Thermal Sprayed Coatings (Mettalization). Currently, field repairs to metalized surfaces are performed by applying Zinc rich paint. However, this repair method is not suitable for all damaged areas. The proposed revisions are intended to minimize damage and promote enforcement of

required repairs by addressing shipping and handling, shop and field repairs, and size/extent of repairs.

In addition, M&T gave a presentation showing the effects of failure to provide corrosion protection for bearing assemblies and the need for repairing metallized surfaces damaged during welding. The presentation showed pictures of welds on sole plates that were installed less than 10 years ago, which are beginning to show corrosion. The proposed revisions will also address weld repairs.

Action Item(s):

- ▶▶ Materials and Test will revise the special provision for Thermal Sprayed Coatings to minimize repairs with zinc rich paint.

27. NON-STANDARD MIX DESIGN NOTIFICATION: *(MATERIALS & TESTS)*

The Materials and Tests Unit (M&T) reported that there has been an increase in the use of non-standard concrete mix designs, noting that the mix design review process is more efficient when NCDOT standard mix designs are specified.

All Units that specify concrete mixes were encouraged to stick to standard mix designs or when necessary, specify a concrete mix that is based on an existing mix in lieu of specifying a new mix design.

Action Item(s):

- ▶▶ None.

28. DETOUR BRIDGES: *(MATERIALS & TESTS)*

The Materials and Tests Unit (M&T) discussed the need to verify that the submittal for a Contractor designed temporary bridge is consistent with the structure that is constructed on site. Currently, Structure Design reviews the submittal and M&T inspects the temporary structure, on-site, at the request of the Resident Engineer.

The discussion noted that the special provision for construction of temporary structures stipulates that:

- The condition of any used materials should be indicated in the design calculations,
- Material specifications for all new and used materials should be included in the detail drawings of the proposed structure,
- The location of the used materials should be shown in detailed sketches,
- Contractors should provide access to any used materials for inspection prior to assembly.

After some discussion it was suggested that M&T and Structure Design coordinate the as-built temporary structure and the approved submittal. Other suggestions included requiring the temporary bridge design Engineer verify, on-site, that the temporary structure satisfies the design.

Action Item(s):

- ▶▶ Materials and Tests will coordinate, through the Resident Engineer's office, to ensure the temporary structure is consistent with the submittal.

29. LIGHTWEIGHT CONCRETE: *(MATERIALS & TESTS)*

The Materials and Tests Unit (M&T) reported that Stalite now has an approved lightweight sand that meets the 2MS gradation for use in concrete. They added that M&T and Structure Design will be collaborating with Stalite on the design of an all lightweight concrete bridge.

Action Item(s):

▶▶ None.

30. *SPRING FIELD REVIEW ITINERARY:*

(STRUCTURE DESIGN)

Mr. Hanks distributed a proposed itinerary for the 2010 Field Review, which will be in late summer or early fall. He gave a brief overview of the itinerary and solicited suggestions for additional sites of interest that were in the vicinity of the basic itinerary.