

2017 STRUCTURES WORKSHOP MINUTES

The 2017 Structures Workshop was held on April 25th in the Structures Management Unit Conference Room C in Raleigh, NC. Those in attendance included:

Brian Hanks	State Structures Engineer
Wendy McAbee	FHWA-Division Bridge Engineer
John Pilipchuk	State Geotechnical Engineer
Eric Williams	Assistant State Geotechnical Engineer
Matt Lauffer	Assistant State Hydraulics Engineer
Jay Twisdale	Assistant State Hydraulics Engineer
Gichuru Muchane	Assistant State Structures Engineer
David Candela	Area Construction Engineer
Cameron Cochran	Area Construction Engineer
Vickie Davis	Area Construction Engineer
Aaron Earwood	Area Construction Engineer
Aaron Griffith	Area Construction Engineer
John Partin	Area Construction Engineer
Brian Skeens	Area Construction Engineer
Darin Waller	Area Construction Engineer
Kevin Bowen	Division 3 – Construction Engineer
Dean Hardister	Geotechnical – Western Regional Operations Engineer
Chris Kreider	Geotechnical – Eastern Regional Operations Engineer
Scott Hidden	Geotechnical – Support Services Supervisor
Cabell Garbee	Materials and Tests – Fields Operations Engineer
Randy Porter	Materials and Tests – Metals Engineer
Matt Hilderbran	Materials and Tests – Data Collection Engineer
Colin Mellor	Natural Environment Section – ECAP Group Leader
Chris Rivenbark	Natural Environment Section – ECAP Eastern Regional Manager
Joseph Miller	PDEA– Project Development Engineer
John Williams	PDEA– Project Development Engineer
Laura Sutton	Priority Projects – Project Executive
John Kirby	Research and Development – Research Engineer
Tim Sherrill	Structures Management – Staff Engineer
William Goodwin	Structures Management – Staff Engineer
James Bolden	Structures Management – Project Engineer
Dan Muller	Structures Management – Project Engineer
Madonna Rorie	Structures Management – Engineering Supervisor
Emmanuel Omile	Structures Management – Engineering Supervisor
David Snoke	Structures Management – Engineering Supervisor
Trey Carroll	Structures Management – Engineering Supervisor

The following topics were discussed:

WELCOME AND REVIEW OF 2016 STRUCTURES WORKSHOP MINUTES

Mr. Hanks opened the workshop with welcoming comments. His opening was followed by self-introductions by the representatives present at the workshop.

Mr. Muller briefly summarized each topic from the 2016 Structures Workshop minutes and progress of each topic was briefly discussed.

STRUCTURES MANAGEMENT TOPICS

1) *Required Documentation upon Completion of Bridge Project*

Mr. Muller discussed the importance of submitting the required documentation and forms to Structures Management once a bridge is completed. Structures Management is tasked with adding new structures to the state's structure inventory list, inspecting new structures within an allotted time once completed, and providing bridge replacement data as part of the Bridge Maintenance Improvement Plan (BMIP). A delay in providing the required documentation can result in the structure becoming non-compliant with FHWA. Mr. Earwood stated new forms are available in SharePoint and Divisions have been informed of the requirements.

Action Item:

Construction Unit will continue updating Construction Manual with documentation guidance and communicate to Divisions the importance of proper documentation submittals to Structures Management.

2) *Area Construction Engineers Involvement with Division Personnel during Project Development*

Mr. Muller discussed the importance of involving Area Construction Engineers during project development and their expertise in reviewing preliminary plans for constructibility concerns. Mr. Hanks discussed the creation of "Pods" which will include Roadway, Hydraulics, and PDEA Units. The "Pods" will administer "I", "R", and "U" projects. Structures Management will administer bridge projects on primary routes and Divisions will administer bridge projects on secondary routes.

Action Item:

Structures Management will communicate with Division Bridge Program Managers the importance of involving Area Construction Engineers during project development.

3) *Introduction to Polyester Polymer Concrete (PPC) Overlays*

Mr. Snoke gave a presentation on Polyester Polymer Concrete (PPC) overlays and discussed upcoming projects which will utilize the material.

Action Item:

Structures Management and Construction will review the materials placement and performance and discuss future uses.

HYDRAULICS TOPICS

1) Backfill for Culverts

Topic was thoroughly discussed in the Construction topic “*Backfill and Conditioning Material for Aluminum Culverts*”.

Action Item:

Hydraulics and Geotechnical Units will further discuss and investigate specifying stone backfill material in the provision. Mr. Lauffer will follow up with Mr. Joel Howerton regarding the provision.

2) GRS Bridge – Lessons Learned

Mr. Lauffer discussed the pilot bridge project utilizing Geosynthetic Reinforced Soil (GRS) – Integrated Bridge System technology and its use in future projects. Hydraulics and Geotechnical discussed concerns with scour and the amount of undercutting that is required for the system.

Action Item:

Ms. McAbee will investigate the issues and possible solutions.

3) As-Built Coordination

Mr. Twisdale discussed the importance of submitting as-built plans for FEMA regulated stream crossings to the Hydraulics Unit. Units should consult with Hydraulics when they are unsure if a stream is FEMA regulated. Mr. Twisdale emphasized verifying elevations shown on the plans prior to setting girders. Once girders are in place it is challenging for contractors to remove additional material due to limited access under the bridge.

Action Item:

Construction will discuss providing guidance to Resident Engineers to verify elevations prior to setting girders in the Bridge Survey Report or Construction Manual. Structures Management will add a plan note requiring verification of existing and construction elevations prior to setting girders.

4) Pipe Liner Design and Construction Considerations

Mr. Lauffer discussed two FHWA pooled fund studies currently underway that focus on pipe liner design and construction. Hydraulics is currently working on specifications for pipe liner design.

Action Item:

Hydraulics will continue investigating and inform other units of pipe liner installations occurring throughout the state.

MATERIALS AND TESTS TOPICS

1) Drilled Shaft Inspections

Mr. Hilderbran discussed issues with Materials and Tests inspection process of drilled shafts. Currently M&T is given a minimum 2 day notice before a shaft is scheduled to be finished to allow M&T personnel to prepare equipment and mobilize to the construction site. Construction delays are common which results in M&T personnel and equipment being held up from performing other inspections and duties.

Action Item:

Workgroup consisting of Materials and Tests (Mr. Hilderbran – Lead), Geotechnical (Mr. Kreider), and Construction (Mr. Waller) will discuss the issues and possible solutions.

2) Uncontrolled Water on Latex Deck Overlays

Mr. Garbee discussed research conducted by North Carolina State University that investigated shrinkage cracking in latex deck overlays. The research concluded that uncontrolled water added into the mix and/or onto the overlay during curing is a major contributor to causing shrinkage cracks.

Action Item:

Materials and Tests and Construction will develop guidelines for construction best practices.

3) New Latex Concrete Field Technician Certification

Mr. Garbee discussed a pilot Latex Concrete Field Technician Certification class scheduled to debut in June, 2017. Materials and Tests intends for the certification to become a requirement in 2018.

Action Item:

Materials and Tests and Construction will further discuss before the pilot class begins.

4) Update on Metallization Program

Mr. Porter discussed the Thermal Sprayed Coatings (Metallization) Program and the revised Project Special Provision. The TSC program is intended for shop application only and engineer approval will be required for field application. The TSC Program and PSP are both completed and Structures Management is reviewing.

Action Item:

Structures Management will continue reviewing TSC program and revised PSP.

CONSTRUCTION TOPICS

1) Discussion of Fiber Reinforced LMC-VES Research Study Findings

The topic was thoroughly discussed in the Materials and Tests topic “Uncontrolled Water on Latex Deck Overlays”

Action Item:

Materials and Tests and Construction will develop guidelines for construction best practices.

2) **Update on Type III Grout – Acceptance Testing Days (7 vs. 28)**

The topic was thoroughly discussed in the review of the 2016 Structures Workshop minutes and therefore was not discussed again.

Action Item:

Geotechnical will investigate acceptance testing and will revise standard specifications as necessary. Structures Management will review Grout for Structures PSP.

3) **Chloride Ion Test for Grout in Post – Tensioning**

Mr. Earwood discussed testing chloride ion levels in grout used in post-tensioning operations. He explained that currently testing is performed, but the provision does not include acceptable limits.

Action Item:

Materials and Tests will investigate acceptable limits and discuss with Construction and Structures Management.

4) **SIP from Bridge Deck Solutions, Pennsylvania**

Mr. Cochran discussed an instance where the metal decking supplied did not have the correct dimensions at the edges.

Action Item:

No action required. Materials and Tests has addressed the issue with the supplier.

5) **24 Hour Latex Mix (Intermediate Latex Mix)**

Mr. Cochran discussed a current project utilizing a 24 hour latex mix.

Action Item:

Structures Management and Construction will review the materials placement and performance and discuss future uses.

6) **Use of Silane on Bridge Decks**

The topic was thoroughly discussed in the review of the 2016 Structures Workshop minutes and therefore was not discussed again.

Action Item:

Structures Management and Construction will investigate use of Silane with diamond grinding.

7) **Use of High Molecular Weight Methacrylate Combined with Diamond Grinding**

Mr. Earwood discussed the use of high molecular weight methacrylate in combination with diamond grinding and the concern the combination could reduce skid resistance of bridge decks.

Action Item:

Structures Management and Construction will continue to discuss and consider adding requirements to coordinate with manufacturer representative to the specifications.

8) Update on Tucking Fabric Under Caps on Slope Protection

Mr. Earwood discussed the need to tuck slope protection geotextile fabric under caps in order to prevent the fabric from sliding down the slope as the rip rap is placed.

Action Item:

Structures Management will revise Design Manual and slope protection details to include placing geotextile fabric under end bent caps.

9) Flat Caps on Cored Slab and Box Beam Bridges on Grades

Mr. Cochran discussed instances where caps for cored slab and box beam bridges are detailed level, but due to the roadway profile the caps should be sloped transversely to allow for proper seating of the units on the cap.

Action Item:

Structures Management will review Design Manual and revise as necessary.

10) Ends of Box Beams in Conflict with the Backwall on Steep Grades

Mr. Cochran discussed instances where due to steep grades when attempting to properly seat box beam units on the end bent caps the ends of the units are in conflict with the end bent backwall.

Action Item:

Structures Management will add language to the Design Manual to instruct designers to check for this conflict on steep grades.

11) Geometry Explanation for Designers

Mr. Cochran discussed instances where plans include unreasonable geometric features which makes construction of the project challenging. He emphasized the importance of involving the Area Construction Engineer during the planning process. He also proposed adding additional geometric guidance in the Design Manual.

Action Item:

Structures Management and Construction will further discuss and will investigate adding additional guidance in the Design Manual.

12) New Construction Elevations Success

Mr. Cochran discussed the success of the new Construction Elevations policy that was developed by Construction and Structures Management.

Action Item:

No action required.

13) Cast in Place Decks with no Approach Slab

The topic was thoroughly discussed in the Geotechnical topic “Eliminating Approach Slabs for very low ADT Routes”.

Action Item:

Structures Management will investigate details from other states that eliminate approach slabs.

14) Pour Sequence Guidance

Mr. Cochran discussed proper pour sequence directions and general guidelines for proper screed operation. He proposed adding additional pour sequence guidance to the Design Manual.

Action Item:

Structures Management and Construction will discuss further and investigate adding additional pour sequence guidance to the Design Manual.

Area Construction Engineers discussed the pour sequences detailed for bridges with continuous for live load diaphragms. There was no consensus on which pour sequence is preferred.

Action Item:

Construction will discuss further and identify issues.

15) Breaking EJS at Interior Barrier Wall and Temporary Joint Material

Construction and Structures Management discussed expansion joint seals on stage-constructed bridges. During the 2016 Structures Workshop it was agreed to use a temporary gland in the first stage(s) and replace the temporary gland with a permanent gland in the final stage.

Action Item:

Structures Management will investigate temporary glands and will revise the Design Manual to include stage-construction requirements for the expansion joint seal gland for the first stage(s) and to coordinate with Traffic Control regarding the removal of the temporary gland and installation of the final gland.

16) Redesigns for Contractor Error

Mr. Cochran discussed an instance where a contractor error occurred and the contractor elected to hire a firm other than the engineer of record (EOR) for the redesign. Mr. Hanks stated this is acceptable, but the EOR must review the redesign. If the redesign is not performed by the EOR, coordinate with the Structures Management Working Drawings group (Mr. Bolden) to ensure EOR reviews the redesign.

Action Item:

No action required. For future projects coordinate with Structures Management Working Drawings group to have EOR review redesigns for contractor error.

17) Link Slab vs. CFL Diaphragm

Mr. Muller discussed that Structures Management is currently developing link slab standards and is reviewing the current continuous for live load (CFL) diaphragm details. Mr. Earwood stated there are cracking concerns with the current CFL diaphragms.

Action Item:

Structures Management will finalize link slab standards and investigate how other states are detailing CFL diaphragms.

18) Backfill and Conditioning Material for Aluminum Culverts

Mr. Lauffer discussed backfill material, construction methods, and miscellaneous issues that may arise during construction of aluminum culverts. He discussed the need to make certain toe walls, wing walls, and headwalls are installed correctly. Mr. Earwood stated the provision for these culverts does not address type of stone backfill material and there is no consistency throughout the state.

Action Item:

Hydraulics and Geotechnical Units will further discuss and investigate specifying stone backfill material in the provision. Mr. Lauffer will follow up with Mr. Joel Howerton regarding the provision.

19) Precast Soffits – Approval Process, Connection Issues, Use of Precast Panels at Integral End Bents as Forms

Mr. Earwood discussed an instance where a contractor used precast concrete panels as formwork at integral end bents. He shared the contractor drawings for the system and asked if these needed to be submitted to Structures Management Working Drawings group. Mr. Bolden stated these drawings should be submitted for review by the Working Drawings group.

Action Item:

No action required. For future projects, drawings for similar systems utilizing precast concrete panels as formwork at integral end bents should be submitted to Structures Management Working Drawings group.

20) Phased Construction with Wire Fabric Walls

Mr. Earwood discussed instances where wire fabric walls have settled resulting in approach slab settlement when contractors have attempted to remove sheet piling that was driven due to phased construction. He discussed different contractor's repairs to the settlement issue and mentioned some projects have notes on the plans to leave the sheet piling in place. Mr. Kreider recommended discussing this issue with AGC committee to determine an agreeable solution.

Action Item:

Geotechnical will consult with AGC for possible solutions.

21) Integral End Bents Pushing at Roadway

Mr. Earwood and Mr. Cochran discussed concerns with the current integral end bent details. The current details are resulting in the asphalt being pushed at the end of the approach slab.

Action Item:

Construction and Structures Management will continue to discuss. Structures will investigate other states details for integral end bents.

GEOTECHNICAL TOPICS

1) *Proposed Bridge Approach Fills*

Mr. Hidden discussed proposed changes to the standard bridge approach fills. The new fills will be effective with the January, 2018 lettings. Mr. Hidden shared the revised Roadway Standard Drawings.

Action Item:

Structures Management will revise approach slab standards to reflect the new fill types.

2) *Eliminating Approach Slabs for Very Low ADT Routes*

Mr. Williams discussed the possibility of eliminating approach slabs for bridges on very low ADT routes.

Action Item:

Structures Management will investigate details from other states that eliminate approach slabs.

SPRING FIELD REVIEW ITINERARY

Prior to the Structures Workshop, Structures Management and the Area Construction Engineers discussed possible bridge sites to visit on the Spring Field Review trip. Structures Management prepared a map including all of the suggested bridge locations in the western part of North Carolina. Following the workshop, Mr. Muller and the Area Construction Engineers reviewed this map and discussed potential routes for the trip. Structures Management and the ACE's will continue to discuss bridge sites and routes to finalize the trip, which is scheduled for May 2nd – May 4th.