**Minutes of TAP Meeting for TPF 5(269) Project “Development of an Improved Design Procedure for Unbonded Concrete Overlays”, December 20, 2016.**

Written by: Tom Burnham, MnDOT, 12-23-2016

The sixth Technical Advisory Panel (TAP) meeting for the Transportation Pooled Fund Project 5-269 “Development of an Improved Design Procedure for Unbonded Concrete Overlays” was held on December 20, 2016. The meeting was conducted via a web meeting based out of the MnDOT Materials and Road Research Laboratory. The meeting was hosted by Tom Burnham (Project Manager, MnDOT) and the project team members Lev Khazanovich (University of Minnesota), and Julie Vandenbossche (University of Pittsburgh).

Agenda

* Introductions (5 minutes) – Tom Burnham
* Project overview (5 minutes) – Tom Burnham
* Discussion on Task 9 Findings (15 minutes) – Project team
* Project Update/Tasks 3 & 4 (60 minutes) – Project team
* Revised Project Schedule (15 minutes) – Lev Khazanovich
* Schedule next meeting

Meeting Summary

Tom Burnham began the meeting with a short review of the objectives of the project. He mentioned that the contract started in June 2013.

Next, Lev presented an update on several project tasks. He stated that the team is continuing to develop the structural models and will soon begin to assemble the design procedure. He then gave a brief review of the Task 1 and 2 findings. He emphasized that transverse mid-slab cracking is not common in unbonded concrete overlays (UBOL). Longitudinal and corner cracking are more typical. As the team has continued to work on the structural models, they are finding that critical stresses can develop across the entire transverse joint, a different behavior than the focused stresses at the mid-slab edge. Therefore cracks initiating at transverse joints can sometime become longitudinal, or if close to the panel edge, turn into a corner crack. Lev emphasized that reflective cracking rarely forms in unbonded concrete overlays. He then described work on Task 3, describing the use of the Totsky model in ISLAB to model the interlayer behavior.

Lev concluded his first presentation with an update on the status of the remaining project tasks. Tasks 1, 2, 3 and 9 are completed. Tasks 4-8 are behind schedule. Lev also informed the TAP that December 31, 2016 will be his last day at the University Minnesota. He will be moving to the University of Pittsburgh. He stated that he is working with the University of Minnesota to keep the contract there, but it will be assigned to an interim principal investigator that will serve primarily to keep the contract moving towards completion. Lev stated that he and the other team members will continue to be the primary researchers, despite his move. In fact Lev will have less time commitments at the beginning of his new position (no classes to teach) and therefore feels he can devote more focused time toward completing this project. He believes the closer communication with the other team members (in Pittsburgh) will be an added benefit.

Julie presented next on the development of a new faulting model for unbonded concrete overlays. She emphasized the importance of getting the field performance, laboratory testing and modeling to agree. She thanked all of the TAP partners who arranged for field visits for her team, and the shipping of beam samples that were tested in her lab.

Julie outlined the critical performance factors for interlayers for unbonded concrete overlays: erodibility, strength/stiffness, and permeability. Dale Harrington asked for clarification on some of the interlayer types that Julie mentioned. Julie responded that some states have used such unconventional techniques as a chip seal as an interlayer. She next stated that Tasks 2 and 9 were completed and thanked her graduate students for their extensive work in the lab.

Julie next described the phenomenon of interlayer friction versus joint activation. She also described the various tests done on the 6”x6”x30” beam samples to characterize the behavior of the various interlayers. The test set-up in the laboratory was designed to mimic the movement of slabs and joints in the field. Four different interlayer mechanisms were tested:

1. Stiffness of interlayer – LTE & deflections
2. Friction along interlayer system
3. Ability to prevent reflective cracking
4. Vertical resistance to uplift – pull off

The interlayer materials consisted of two fabrics (different weights) and several pervious and dense-graded asphalts (new and aged).

Julie described that permanent degradation of an asphalt interlayer can result from erosion or lower compaction levels during placement. Wheel loads can also create gaps between the overlay slab and the interlayer through consolidation of the interlayer. Test results showed that MnDOT’s PASSRC interlayer did not having much strength/stiffness, and that nonwoven geotextile fabric remains elastic with no permanent deformation. Julie mentioned that there remains questions on whether fabric interlayers stay saturated and cause durability problems for the underlying concrete or concrete overlay. John Donahue informed the group that Missouri’s first UBOL on fabric was placed on a severely D-cracked concrete pavement, and performance has so far been satisfactory.

Julie reminded the group that not all panels activate with small (6’x6’) panels. As part of an effort to understand this behavior, her team monitored the joint movement and deployment of a small panel UBOL project in Pennsylvania. As late as 24 weeks after paving, only 60 out of 400 transverse joints showed movement indicating full-depth deployment, with an average spacing of 44 ft. Tom Burnham mentioned that similar observations have been made in Minnesota for small panel bonded concrete overlays of asphalt. Tom also asked about the potential for increased curling with fabric due to lack of bonding. The research team did not express much concern.

Next, Julie asked Steve Sachs to present on the Task 3 findings. This task involved the development of the structural models to be used in the new design procedure. Steve outlined some of the shortfalls with the current version of AASHTOWare Pavement ME. Pavement ME currently does not account for pumping and faulting for UBOLs, principally due to the lack of data. It also does not provided means to differentiate between HMA interlayer types.

Steve continued to outline the various components that went in to the structural models (details are not repeated in these minutes, please review the presentation slides). Tom asked if the faulting model applied to all panel sizes, as well as doweled and nondoweled panels. Julie said yes. John Donahue asked about the erodibility model. Julie stated that it was developed using a combination of field and lab data.

Julie then outlined the remaining items that need to be enhanced prior to creation of the design procedure software.

Lev next described the work completed and to be done on the cracking models. He stated that there was agreement in structural behavior between previous MinneALF testing results and Julie’s work. He stated the current thought is to create a software set-up similar to MnPAVE Rigid. MnPAVE Rigid is a catalog type design spreadsheet incorporating MEPDG inputs to design standard concrete pavements on grade. After the web meeting had concluded, Tom suggested to Lev that thought should be given to using a frontend software format similar to the bonded concrete overlay of asphalt mechanistic-empirical design procedure (BCOA-ME), since many states are familiar with this interface. He stated this will have to be discussed by the team and state TAP members prior to the Spring 2017 release of the alpha version of the new procedure.

The meeting concluded with Lev stating there needs to be another contract modification. This will address the change in principal investigator as part of his departure, and the need for more time to complete the final tasks. Lev provided the revised schedule of tasks as:

* Task 4: UBOL procedure development – April 30, 2017
* Task 5: Procedure user guide development – July 31, 2017
* Task 6: Evaluate guidelines on suitability of UBOL – August 31, 2017
* Task 7: Draft final report – September 30, 2017
* Task 8: Final report – December 31, 2017

The state pooled fund members were encouraged to express their support or concerns to Tom over this contract extension.

Time ran short and there was no discussion on next TAP meeting, however it seems most suitable to hold one shortly after the release of the alpha version of the design procedure (late May 2017). Tom thanked the research team for their work on this complex effort.

The PowerPoint presentations will be distributed with these minutes.