Questions & Answers

FHWA PMEUG Software Training Webinar #2

| Training Topic | Question | Response  (Note: Shaded cells reflect responses given in the webinar, while unshaded cells contain responses to questions that went unanswered during the webinar) |
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| Topic #1—Design of Pavements using Full-Depth Recycling (FDR) and Cold In-place Recycling (CIR) | How can they raise the profile by 12 inches? | The pavement section used in the design example was provided by the Virginia DOT. As presented, the existing pavement thickness was 10 to 12 inches of asphalt pavement over approximately 6.5 inches of aggregate base. The existing asphalt layer was milled to the appropriate depth to accommodate both the FDR and CCPR layers. Therefore, the pavement profile was not increased by 12 inches. |
| How long was the project on I-81? | The project length was 3.66 mi, two lanes, one direction. |
| It appears that the effective binder content of the SMA seems a little low. | The properties of the SMA were provided by the Virginia DOT, albeit for a different project. |
| Could you explain why the SG is separated out as 2 layers again? | Two layers are required in order for the Enhanced Integrated Climatic Model (EICM) within PMED to correctly model drainage. The NCHRP 1-37A MEPDG Final Report (Part 2, Chapter 3, Section 2.3.2.5) states: “The layer thickness of each material in the pavement structure should correspond to layers that are more or less homogenous. EICM internally subdivides these layers for more accurate calculations of moisture and temperature profiles. The procedure always requires two unbound layers under the last stabilized layer for computational purposes (e.g., one layer could be compacted subgrade and the other natural subgrade, or one layer could be compacted granular fill and the other natural subgrade).” |
| VDOT limits MR value to 15,000 psi for design purposes. For this example, they are using 16,000 psi. Is this a change from VDOT's Manual? | The 16,000 psi was provided in the Virginia DOT \*.dgpx file. Therefore, this value was used in the design example. |
| Great presentation, but why no AC bottom-up cracking is available when FDR is used as a stiff unbound layer? Thanks! | Bottom-up cracking is a predicted distress with this type of pavement structure when modeled as a semi-rigid layer. The predicted bottom-up fatigue cracking was 4 percent. |
| I'm interested to see if measured stays lower than predicted at year 15. It may be lower now, but once it hits an inflection point, IRI may start to increase relatively quickly. | Agreed. The pavement condition data only represents 7 in-service years. Performance over the next 5 to 8 years will definitely be of interest. |
| In order to get 80,000 psi, was the resilient modulus test run on the FDR material? | The information provided by the Virginia DOT did not include background information on how the 80,000 psi was determined. However, this value is included in the Virginia DOT MEPDG User Manual. |
| In the CIR run, the same HMA rutting models and calibration factors were used to predict performance? | The asphalt material properties and calibration factors were the same values used in both the CIR and FDR examples. |
| Should the FDR stabilized with asphalt be modeled as flexible and FDR with portland cement as semi rigid? | While that may be a good approach, it would require a more in-depth evaluation of the various materials/mixtures used for the FDR layer. As noted in the MEPDG, paragraph 3.3, FDR “…was not included in the global calibration…” |
| In CIR results table, why when thickness changed, but rutting and cracking are predicted as same number? | A broad range of pavement sections was not analyzed for this example. For the combination of pavement sections evaluated, PMED indicated no significant difference in predicted condition. |
| If subgrade has higher moisture content, is it still a candidate for FDR? | Please see other references, for example, <https://www.cement.org/docs/default-source/fdr/guide_to_fdr_with_cement_jan_2019.pdf>. |
| So, none of the CIR structures met the target requirements. Did you find one that did? | Of the analysis conducted, that is correct. Also, the Virginia DOT only considers total pavement permanent deformation (which was 0.05 inches higher than the target value) and bottom-up cracking (which met the target criteria).  Additional analysis was not conducted to determine a pavement section that would meet all condition criteria. |
| Topic #3—Unbonded Concrete Overlays of Existing Flexible Pavements (Conventional Whitetopping) | Could you send a complete "family tree" of decisions for whitetopping? I know that this is recorded, but I kept seeing the slides change and hide parts of the tree. | The presentation slides will be made available to the attendees, so you can look at these family trees more closely. Feel free to reach out to the project team if you have any questions on them. |
| Does new AC (Less than 3 months old) have the same bond and frictional properties as 1- or 2-year old AC? | Most likely not. But, depending on the design, it still might provide the bond that you need. |
| For US 71, the k-value of 100 pci seems high. Is that corrected or uncorrected k-value? | This value was provided by the Iowa DOT, but it seems reasonable for the conditions they described. |
| What is your recommendation to design a COA when the thickness of the asphalt is less than 3 inches or the existing asphalt is not in good condition? Thanks in advance! | If the asphalt is less than 3 inches, then the JPC overlay will behave more as an unbonded overlay. If the asphalt is not in good condition, then the design thickness of the overlay as the amount of fatigue cracking entered into PMED increases. If you end up with an overlay thickness > 6 inches, then you should design with the JPCP over asphalt overlay option. If less than 6 inches, you should use the SJPCP design option, as long as the panel size is less than the full lane width. If > 6 inches, the BOCA ME can also be used regardless of lane width. |
| Normally binder differs from base to surface layers. So, 7.5 is for base? That is pretty high. | The surface layer would have been milled off in this design example, so the intent was to use the binder from the base layer. The binder type was not provided by the agency, so I used my best guess based on online documents.  7.5% does seem high but this is what the agency provided. |
| Is the webinar going to be recorded and presentation will be uploaded? | Yes, the webinar is being recorded and we will send an email containing a link to its posting in a few weeks. PPTs also. |
| Instead of PMED, you can also use AASHTO chart to estimate k-value. However, I don’t think 2-inch layer option is available. | It is possible to use the AASHTO design guide with a thicker base and that would give you a first guess, but it is pretty easy to put your guess in PMED and let it determine the k-value for you since the output of the AASHTO ’93 table might be different than what is obtained with PMED. |
| What do you recommend for the existing pavement widened in the past (from 18 ft to 20 to 24 ft) when we consider thin concrete overlay 4 to 6 inches | For this situation, it is recommended that tie bars (e.g., 36-inch long #4 bars) be placed in the thin concrete overlay across the old widening joint in case the widened portion of the existing pavement moves (horizontally and/or vertically) and propagates a crack in the overlay. For expediency, the tie bars can be secured directly to the AC in lieu of placing them on a chair. While the tie bars may not prevent the slab from being cracked, they will at least keep the crack tight. |
| Why not take into account the bond between the asphalt (original or milled surface) and Whitetopping and model that. It may contribute to longer performance life | PMED does consider the concrete and asphalt layer to be one bonded layer and it is recommended in the MEPDG Manual of Practice to assume the bond is maintained throughout the design life. |
| How do you select for bonding/no bonding in the field? | It is based on the thickness and quality of the asphalt. If the asphalt is 2 inches or less after milling that design and an unbonded overlay. If the asphalt is 3 inches or greater and is in adequate or marginal condition or can be brought up to adequate or marginal with a few minor repairs, then it should be designed as a bonded overlay, If the asphalt is 3 inches or greater and the quality is less than marginal, then it should be designed as a JPC over AC overlay. This CPTech Center Overlay Guide can be used to provide guidance on the correct selection: <https://intrans.iastate.edu/app/uploads/2018/08/Overlays_3rd_edition.pdf>. |
| Would you be covering overlay over composite in your future seminars | Bonded and unbonded concrete overlays of existing composite pavement were covered in the 2020 User Group meeting. For the case where the AC portion of the existing composite pavement is ≥ 4 inches thick, a demonstration was given on the use of the short-jointed plain concrete pavement (SJPCP) design procedure within PMED. In addition, a comparison was made with the University of Pittsburgh bonded concrete overlay of asphalt (BCOA) design procedure. For the case where the AC portion of the composite pavement is < 4 inches, a demonstration was given involving the PMED JPC overlay design procedure, the PMED BCOA procedure, and the University of Pittsburgh unbonded overlay mechanistic-empirical (UBOL-ME) procedure. A recording of the 2020 User Group meeting is available on the AASHTO Pavement ME Design website (<https://me-design.com>). The flow chart on slides 14-19 of PMEUG webinar #2 can be used to determine the correct design procedure, depending on the composite pavement conditions present. |
| Do you recommend dowels for 6-inch concrete overlay? | First, perform the design to see if you anticipate faulting to develop. Use PMED or BCOA-ME. BCOA-ME has the advantage of being calibrated with just whitetopping sections. If you include dowel bars, you must ensure the baskets are pinned well to the asphalt. A 6-inch thick 10 ft x 12 ft section was successfully placed at MNRoad with 1-inch dowels and did not develop faulting. The rate of fault development will depend on the type of material (% fines) directly below your asphalt for most 6-inch slabs. If you are building a 6-inch thick 6 ft x 6 ft design, you might consider adding fibers if the predicted faulting is greater than that desired during the targeted design life. Unfortunately, we don’t currently have a design procedure that predicts faulting for overlays **with fibers**. |