

## 1.1 WEBINAR QUESTIONS

Webinar 1 Questions and Answer: Use of reflection cracking control measures and their simulation in the PMED software

The following provides an answer or response to all questions asked during the webinar. Some of the questions were asked in the Question and Answer Box, while others were asked and answered in the Chat Box. Response to both are summarized below.

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Prajwol - 11:25 AM

Q: Can you also comment on the use of geosynthetics interlayers for Rehab strategies?

A: I kind of figured that that one was going to be asked. There are some of the LTPP sites that have geosynthetics within the LTPP test sections for rehabilitation as part of the rehabilitation strategy. They're really too few to make any decision or changes to the calibration coefficients. The one thing that I will note is that the task force is considering the other NCHRP project on geosynthetics to be added or integrated into the future. So that's the reason I kind of decided not to include any comments on geosynthetics because that might be included some time into the future in the Pavement ME program. It's being prioritized with others this year. But the data that was in the LTPP database, the use of geosynthetics really didn't result in a substantial or significant increase in delay of time. So agencies that routinely use geosynthetics and have the data they should use those to update the calibration coefficients for that specific condition. I hope that answered it.

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Jay Goldbaum - 11:39 AM

Q: If there is high severity top down cracking, how would we estimate the severity and amount if we are milling off 1 to 2 inches?

A: Yes, if let's say we have a pavement and let's say a flexible pavement and let's say we have high severity transverse or fatigue cracks either one or both. That's what we see at the surface. We're doing our visual survey and there are high severity transverse and fatigue cracks. If we don't do any cores, then if I was a designer and I really don't know how deep those cracks go and if I have no deflection measurements around those cracks, then, I would assume those cracks go through our full depth and or bottom up cracks. And so, I would include the high severity cracks. The load transfer efficiency default would be selected for high severity cracks. However, That's why I always suggest cores be done for rehabilitation designs. If I do cores and through those high severity cracks, I find that those cores are confined or limited to a certain layer and or depth, like what typically can occur in segregated areas and maybe an overlay that's become debonded or has lost significant bond. And or maybe that wearing surface is starting to exhibit stripping. And I confirm that with cores that the high severity cracks crack is limited to, let's say, two inches or two and a half inches, then I would not necessarily assume high severity through the entire layer.

I would, depending on the condition of those cracks, I might assume as a designer, a low severity and if I'm removing all the cracks for the high severity and still do not have FWD to do the back calculation. I would assume the same area and or length of transverse and fatigue cracks, but then use a low severity. For those cracks, if that high severity is only confined to the surface, like there's loss of surface material due to the debonding. So that question to be answered, it kind of depends. And it is something that a designer is going to have to decide for a specific project. I would say that there is a document that has been or is being prepared for the task force to expand some of the discussion in the MEPDG Manual of Practice. The next time it gets edited and balloted. But that document would have to go through the COMP balloting process before it ends up in the MEPDG Manual of Practice. So, I hope that answered the question.

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Jay Goldbaum - 11:46 AM

Q: Can an interlayer be modeled using a geogrid?

A: The interlayer is a non-structural layer to kind of complement the geo grids and also other types of materials that can be included. I'm going to remind the group, though, that interlayer, because there were so few to be used and that interlayer does not include the NCHRP product for geo synthetics and or geo grids that Bob Litton did. That is yet to come. But if you use the interlayer for the geo grids and other similar materials, you're not going to get a significant difference in. You'll get a small delay, but that's about it and transverse cracks, for sure. And also bottom up cracks. So, I hope that answers that question.

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Endri Mustafa - 12:38 PM

Q: How was the 30Hz frequency determined (where the elastic modulus, frequency, and temperature were shown)? Was it based on the average speed of traffic for the roadway or directly related to the FWD testing impact load frequency?

A: It's directly related to the FWD. The drop loads from the FWD, the back-calculation tool user guide provides the document that gives the reference for defining the 30 Hertz. That's the default value for the back-calculation tool. So that's defined in the back-calculation tool. There is a document on that. It's an FHWA sponsored set of research work and that reference is reported in the BCT. I believe that reference is also included in the MEPDG Manual of Practice. So hopefully that answers that question.

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Endri Mustafa - 12:38 PM

Q: In the fractured slab example, is the leveling course the same mix as the dense graded overlay?

A: The answer to that would be no, not in the example I used. The leveling course would be a more finer material than the wearing surface. So, in that example it was simulated as a fine graded that has a higher binder content, lower air void mix, and the wearing surface has coarser, more coarser

material in it. So, it has a little bit lower percent asphalt by volume but a higher density, I believe. So that can be simulated as separate materials in separate layers.

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Matt Shinnars - 12:41 PM

Q: The simulations of fractured (crack & seat) PCC and asphalt overlay assumed 3 feet crack spacing. Do you know how sensitive that parameter is to shorter or longer crack spacing?

A: The crack spacing is rather limited. That's allowed in Pavement ME. I think the minimum is two if I remember correctly, and the maximum is about five, there is a minimum and maximum limit. Obviously, the amount of transverse reflection cracks, it's going to be dependent upon that because if you have a two-foot crack spacing, versus a five foot you're going to have a lot more. It's, close to 2.5 amount greater from a two-foot crack spacing to a five-foot crack spacing relative to the cracks coming to the surface of the overlay. So, it will make a difference because of the magnitude of cracks in the fractured PCC Slab.

And to add on to that, it'll also have greatly affect your IRI predictions. It can yes, through the transverse reflection cracks. The typical is three feet, and that's the reason for that. The three foot is the default.

I think you can go down to one foot, but I'll check too.

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Denis St-Laurent - 12:42 PM

Q: Can you tell us something about climate effects on these simulations? (Or which climate did you use?) (And Does PMED simulate effect of temperature on LTE?)

A: The second part of that question, Load transfer efficiency is not affected by temperature in any way in the Pavement ME. In reality, we all know it probably is, because as the cracks contract and expand, just like in a concrete payment, you're going to lose and or gain load transfer efficiency. But it's assumed to be constant once it's measured. So, it is a constant that is entered by the user or the designer. And it's not temperature dependent. The climate sites I used, there's a huge difference. I used sites in Texas and one up in the Canadian provinces to be kind of on the cold side, but the reflection cracking is less dependent on climate. It's not a relative to reflection cracking now, climate is not a big or significant factor. Climate is a big factor for rutting, IRI, transverse cracking, and that's new transverse cracking at the surface of asphalt layer. So, it is important, but for reflection cracking specifically, it's less important.

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Haifang Wen – 12:50 PM

Q: For asphalt layer over CTB, how is the spacing of cracking in CTB determined if it is covered with asphalt layer?

A: That's a good question. That's a designer specific input. Some agencies have it where they were fractured prior to putting on the asphalt overlay or crack, cracked ACTP. The University of

Washington through an NCHRP project and that is not integrated in Pavement ME, but it's one of the suggested enhancements down the road, to use that regression equation or equation from think it was the University of Washington, it may have been Washington State. I don't want to get the wrong university here, but they have a regression equation. That's what I suggest initially be used for predicting the crack spacing in the CTP that is the user enters that value, and so depending upon that crack spacing, the amount of transverse reflected transverse cracking is going to be proportional to the crack spacing. You know, so I generally suggest that that regression equation be used and that hopefully in the future that will be integrated in Pavement ME. So, the designer could use that model if he or she desires that. But right now, that's a designer input.

The attendee also updated or stated it was Washington State University.