

FY23 Webinar #2  
Integration of NCHRP product 1-51 in V3  
9/13/22  
Questions and Responses



Question from Prajwol Tamrakar:

***Is there a graph showing measured vs predicted crack before integration of NCHRP 1-51? Just curious to see the improvements contributed by NCHRP 1-51***

Response from Harold Von Quintus:

Yes there is. The calibration process did include the original calibration coefficients prior to v3.0 in comparison to all improvements included in v3.0. Wouter did not show or include these because of time. There definitely was an improvement based on the statistical variables.

Please note that Wouter is not showing a graphical comparison, but he is tabulating the difference between v2.6.2 and v3.0 in terms of the statistical parameters which show an overall improvement.

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Question from Peter Kemp:

***This is a valuable update. We are currently not designing and constructing PCC pavements the same as the old LTPP sites. How are advances in practice accounted for?***

Response from Harold Von Quintus:

This has always been a question or issue in using the LTPP test sections for calibration. In my opinion (Von Quintus) there is a bias between standard practice and what was included in the LTPP program. But that is just my opinion based on comparisons many years ago. However, it is also my opinion that the LTPP program does for the most part represent standard practice in terms of the design parameters for both flexible and rigid pavements.

The LTPP experiment was planned very well based on the variables included when the LTPP experiment was initiated. In my opinion, the LTPP sections do represent the standard practice especially for rigid pavements. The bias or difference comes from the performance of the sections selected -- do represent those that performed better than on the average for both pavement types - at least that is my opinion.

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Question from Joshua Freeman:

***Did the JPCP cracking model differentiate between doweled and non-doweled pavements?***

Response from Harold Von Quintus:

Yes, that did not change. In fact, when the JPCP was calibrated the data sets were grouped between doweled and undoweled pavements to determine what the differences were and if there was a bias between the two data sets.

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Question from Joshua Freeman:

***When referring to Asphalt Base and Cement Treated Base, are these permeable bases?***

Response from Harold Von Quintus:

No, not necessarily. In the LTPP program there are permeable stabilized layers in the SPS experiments, but that is not the case in the GPS experiment. I am not sure about the percentage of stabilized base layers that were permeable and those that were dense graded stabilized bases. My initial guess is that 75 percent were dense graded and only about 25 percent were permeable - BUT that is a guess right now. The data sets do designate the type of stabilized bases in terms of permeable versus dense graded bases.

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Chat Box

Question from Joshua Freeman:

***Did the JPCP cracking model differentiate between doweled and nondoweled pavements?***

Response from Harold Von Quintus:

Yes, that did not change. In fact, when the JPCP was calibrated the data sets were grouped between doweled and undoweled pavements to determine what the differences were and if there was a bias between the two data sets.

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Question from Ali Gerami Matin:

***Hi, Thanks for your presentation. Did you also evaluate Pareto efficient frontiers on JPCP Faulting - Verification? One follow-up question: Did you also cross validate your predictions?***

Response from Harold Von Quintus:

I am not sure about the answer to this question. May want the individual to explain - I am not familiar with some of the terms used in the question.

The predictions and resulting calibration coefficients were validated with a separate data set: 80% calibration and 20% validation.

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Verbal Q&A:

Harold Von Quintus:

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***You had summarized type of pavements especially the JPCP on the cement treated bases, asphalt treated bases, lime treated bases and granulated treated bases, but we did have some where the concrete was sitting directly on the embankment soils.***

**Response from Wouter Brink:**

Yes, lumped into the granular bases. But when we looked at just those themselves, there wasn't a big difference, and they were combined into the granular base ones.

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**Harold Von Quintus:**

***There was also a question in the chat- Did we also evaluate Pareto efficient frontiers on JPCP Faulting - Verification?***

**Response from Harold Von Quintus:**

I was unsure of the terms, the definition of the terms so did not really answer it, other than there was a question on the validation and we did have, I think you used 80 percent of the calibration of the data set and 20 percent for validation. I don't know if that's where the question was going, but if you understand Pareto coefficient frontiers, you may want to comment on that.

**Wouter Brink:**

I don't have a specific comment on that, but the other thing on the calibration validation portion, when we initially split the calibration dataset using 80/20. We also ran that's one way and the constant joint spacing/random joint spacing, that was another way to kind of verify the models and capture some of the portions which showed larger differences in predictions. I also looked at a bootstrap sampling just to kind of see a distribution of residual errors with resampling, basically after the calibration was done, so the entire data set or the 80 percent basically used those sections and calculate the standard error of the estimate and residual error. We kind of briefly looked at that as well.

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**Harold Von Quintus:**

***The other comment just that you may want to comment on, had to do with punchouts. The number of punchouts per mile in the statistic parameters at least some of them weren't very good but just how we determine within a 500 foot section the number of punchouts per mile when its only 500 feet.***

**Response from Wouter Brink:**

There is a conversion of the number of punchouts per the 500 feet to the number of punchouts per mile that we use to get to punchouts per mile.

**Response from Harold Von Quintus:**

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Let's make a point and the same is true for flexible pavement on transverse cracks. Because its only 500 feet and the program predicts feet per mile of transverse cracks and so anytime you do that, the error term is going to go up. That's the reason for many of those statistical terms being a lot less because the assumption that we are making is that 500 foot section is representative of a mile. And it may be more detrimental or less detrimental to a mile section and so there an increase error there that shows up in the statistical variables.

Clark Morrison read a Chatbox Question from Affan Habib:

***What may be the difference in design thickness using the revised factors and the older version?***

Response from Wouter Brink:

I did run some examples. I didn't see cracking itself. The design thicknesses weren't that different depending on your base type. The bigger item I'd say, is your reliability levels, as it captures the global model specifically, you will see thicker and thinner pavements, it depends on the what level of reliability you are using and also the traffic level for cracking, I don't think its going to be a major difference.

Response from Harold Von Quintus:

For granular bases, untreated, or concrete directly on embankment soil, I don't think there is going to be much of change at all in terms of thickness. For cracking there may be for asphalt stabilized base as well as cement stabilized bases. There will be a difference there. I think the one question external to this webinar and I think you were about to mention it, on the reliability for IRI, I think that, correct me if I'm wrong, the IRI standard deviation equation is going to be generally lower and if its lower than the higher reliability, the users will see a net decrease in concrete thickness compared to the older version, I believe.

Response from Wouter Brink:

Yes. That's the bigger update, especially for IRI.

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Wouter Brink read Chat Question from James Mack:

***On the JPCP IRI model, the J4 factor (site factor) increased dramatically and that will mean a big increase in IRI in more northern climates the A-7 soils. We know that model want the biggest already-How do we address this best?***

Response from Wouter Brink:

Yes, it did, but the factor that really impacts your IRI predictions is faulting, so the faulting factor actually reduced quite a bit, so overall I think it won't have as big an effect, it is something that has the potential

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to but if we look at the summary. Faulting is also reduced so the faulting went from 1.4929 to 0.993 and that's really what affects your IRI prediction the most. Because even at small faulting levels, the average faulting is 0.01 inches that is multiplied by the total number of joints within your section within a mile to get your average total joint faulting in the IRI calculation. I think it will kind of even out, but its something to look at.

**Response from Harold Von Quintus:**

The term Wouter, also the age term, the exponent to the age term is still 1.0 in the site factor, correct?

**Response from Wouter Brink:**

Yes.

**Response from Harold Von Quintus:**

So, as you go down the road in time, the impact of the site factor on a time basis still remains the same. Relative. That exponent is still 1.0

The other thing to remember, related to the site factor, we should mention is that NCHRP 01-59 is complete and the task force and the comp committee will review the results and probably a decision on that will be made sometime next year or within this fiscal year. My guess is that may have an impact on the site factor for both concrete as well as flexible pavements. I know Claudia Zapata was the PI on that and she will be making a presentation to the task force in the October meeting on the result and the impact of that NCHRP study on Pavement ME.

**Response from Wouter Brink:**

Another thing to add on Jim's question on the site factor, the reliability is going to be quite a bit less. If you look at the standard errors, residual errors, that is a big update there. I think its not going to have as big of a, site's not going to control as much in the firm model.