Bob Kieswetter - Comments

This is a Comment on the **Federal Highway Administration** (FHWA) Proposed Rule: **National Performance Management Measures: Assessing Pavement Conditions and Bridge Conditions for the National Highway Performance Program**

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Comment

One of the most critical problems in asphalt pavement construction today is achieving a long lasting longitudinal joint. It is costing agencies billions worldwide in premature repair of the joint. This problem has been recognized for a couple of decades, and discussed at many asphalt pavement seminars, the subject of much research, with little or no progress in many jurisdictions.

The problem stems from a lack of density on the edge of the first paved lane, as the compactor has nothing to compact against. This results in a push sideways at the edge, and a lack of compacted density on the outer 3-6 inches, typically 4-6 per cent less than the density of the mat. This lack of density, according to considerable research, can translate into a reduction of 20-35% in the life of a pavement, because a low density means more water penetration, more freeze thaw action, more moisture deterioration of the bitumen/aggregate bond. Further, it means a lower strength that is not capable of withstanding todays heavy traffic loads, and once the crack occurs, a concentration of load on each side of the crack as the wheel passes over, to further stress the joint area.

Historically, paving contractors were able to produce a better joint by limiting the length of a paved lane, moving back and matching the joint while reasonably hot. With traffic control making short paved lanes impractical, plus the advent of multi lane highways, moving back to match the warm joint has been all but eliminated on highways. Hence, a lack of density and water impermeability, and early deterioration of the joint.
In a 2012 Asphalt Institute/Federal Highways Report: Best Practices for Constructing and Specifying HMA Longitudinal Joint, a 2002 Kentucky Transportation Center quote is provided :" Many pavements have been, or are in the process of being, resurfaced as a direct or indirect result of longitudinal joint deteriorations. This statement is relevant today.

The report also cites an FHWA Division Office survey: half the respondents were not satisfied with the overall performance of longitudinal joints in their states. Thirty-five (35) states said they had some sort of longitudinal joint specification or special provision, but only half of those states (17) reported that they had a minimum density requirement at the joint. "The minimum density required was as low as 89% leaving the pavement with a 35% reduction in life.

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Some states have actually specified that any quality control cores must be taken certain distances from the joint since it would not represent mat densities, and have no requirement to test the joint.

The AI/FHWA study just covered the United States. The same problem exists in Canada, and worldwide.

With the serious lack of funding to continue maintaining our infrastructure, it becomes critical that this longitudinal joint construction problem be eliminated, so our roads can last longer.

FAA (Federal Aviation Authority) has handled this lack of joint density by specifying the removal of the cold un-compacted edge prior to matching with the new hot lane, then cores to verify density.
In the last several years, contractors have been allowed to re-heat the cold, un-compacted edge using infrared joint heaters to allow re-compaction along with the new hot lane being applied. This has proven much cleaner, faster, and less costly than removing the edge. Follow-up density testing has proven the joint to be constructed properly.

At the same time infrared joint heaters were proving themselves on critical airport pavements, progressive pavement owners started evaluation of joint heaters along with other joint making techniques to improve joint quality.
Independent studies by University of Tennessee and Arkansas for their respective DOTs came out with the results that joint heating produced the highest density and lowest water permeability of several joint making techniques studied.
Dr Baoshan Huang, Associate Professor, and lead researcher for the University of Tennessee study stated in his final report published in the American Society of Civil Engineering Journal: The infrared heater exhibited the best effectiveness in improving joint quality among all the joint construction techniques used in this study.
Some agencies require echelon paving to eliminate a joint but this is not often practical.
I At a recent Ontario, Canada Hot Mix Producers Seminar, the county engineer of one of the municipalities reported a unit cost quoted for echelon paving was about $2.00 per tonne as an extra, and about 0.25 cents per tonne for joint heating.

There has been a lack of emphasis on making the contractor produce a better joint since it appeared there was not a viable solution. Now there are solutions. One is the FAA solution which has been ignored, There is now echelon paving and allowing the contractor to re-heat the edge with infrared.

By requiring a compacted joint, the highways will last longer.