

Question: Should we be concerned about rutting using thin overlays and smaller sized aggregates?

Answer: The best information on rutting of thin overlays or mixes with smaller aggregate size comes from the NCAT test track. The following are excerpts from NCAT Report 13-05, THIN HMA OVERLAYS FOR PAVEMENT PRESERVATION AND LOW VOLUME ASPHALT ROADS.

Page 12: "Some highway agencies were not using 4.75 mm mixture due to issues with rutting under heavy traffic. In past years when finer mixtures were used a significant amount of the aggregate consisted of natural sand. This natural sand which tended to be rounded increased the potential for rutting and the problem was blamed on the 4.75 mm mixture. The problem was the rounded aggregate and not the gradation of the aggregate. A 4.75 mm mixture using a more angular crushed sand is not expected to have significant rutting issues if properly designed and constructed. A good example of the rutting resistance of a 4.75 mm mixture is a 2003 test section constructed on the NCAT test track. This surface layer was placed ¾ inch thick and has supported 30 million ESALs of traffic over a 9 years period without performance problems (9). This good performance at the test track shows the potential for using properly designed small NMAS ,fine mixtures on high volume roads."

Page 15 about the Mississippi mix referenced above: "The test section has now been subjected to approximately 30 million ESALs over a nine year period. There has been no cracking in the surface of the mixture. Rut depths are approximately 7 mm which is slightly over ¼ inch which would not even be considered rutting by most DOTs. The IRI has remained very smooth, about 50 inches/mile through the nine years of heavy trafficking. Based on this proven performance some state DOTs have begun to use more 4.75 mm mixtures."

Page 16: "Another fine mixture was placed at the track in 2003 and it also has provided good performance through 3 traffic cycles (10). This second fine mix (9.5 mm mix) was a little coarser than a 4.75 mm mix but it is very similar. The properties of this mix are shown in Table 6. The mixture was produced using a PG 76-22 and it contained 19 percent natural sand. The mix was compacted to a density of 93.7 percent of maximum theoretical density at a thickness of approximately 1 inch.

The performance has been good to date with an average rut depth of less than 5 mm. Again, this indicates that the amount of rutting was insignificant. The IRI has stayed at slightly over 50 for the last few years. There is some slight cracking in one area of the test section but this is not significant."

Page 23, Conclusions: " Asphalt mixtures using 4.75 mm NMAS aggregates have been successfully used for low volume roads. These mixtures have been shown to be resistant to rutting and have low permeability if compacted to 12% air voids or less. 4.75 mm mixtures can be properly placed and compacted in thinner sections and are ideal for areas needing thin surface preservation. 4.75 mm mixes have also been shown to perform well at the NCAT test track where the mix was subjected to high traffic volume."

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