

1. Report No. UND 04-01	2. Report Date December 2005	3. Contract No.	4. Project No.
5. Title and Subtitle Evaluation of North Dakota's Asphalt Cement Binder Properties and Performance in Locally Produced HMA Mixtures		6. Report Type <i>Click on link to open report</i>	
		7. Project No.	
		8. Project No.	
		9. Project No.	
		10. Project No.	
11. Author(s)/Principle Investigator(s) Dr. Nabil Suleiman			
12. Performing Organization Name and Address NDDOT M+R <input type="checkbox"/> NDDOT OTHER* <input type="checkbox"/> NDSU <input type="checkbox"/> UND <input checked="" type="checkbox"/> UGPTI <input type="checkbox"/> OTHER* <input type="checkbox"/> *see supplementary notes		13. Sponsoring Agency Name and Address Department of Civil Engineering University of North Dakota Grand Forks, ND 58202	
13. Sponsoring Agency Name and Address North Dakota DOT Materials and Research Division 300 Airport Road Bismarck ND 58504-6005			
14. Supplementary Notes			
15. Abstract			
<p><u>Purpose and Need</u> Due to the extreme temperature conditions prevalent in North Dakota, the NDDOT has used a variety of modified asphalt binders including polymer modified and partially air-blown asphalt binders. The NDDOT is in a transitional state from using conventional Class mix design to Superpave mix design method, thus, a study to compare and relate results from both mix design methods is needed.</p> <p><u>Objective</u> The main objectives of this research study are: (1) to evaluate the hot mix asphalt properties and performance when using Superpave and Conventional Class mix design methods utilizing air-blown, and polymer modified asphalts as binders; (2) to evaluate and compare the hot mix asphalt properties and performance when adding 1% lime to the Superpave mix; and (3) to conduct cost comparisons of the different mixes based on initial cost and the tested performance.</p> <p><u>Scope</u> In this research study, a Superpave mix design and Conventional Class 31 mix design will be prepared using North Dakota's locally processed aggregates which meet the NDDOT specifications (Sections 816, 409, and 410) that have been historically employed for NDDOT projects. Air-blown and polymer modified asphalt binders from three suppliers will be used. Appropriate laboratory tests and analysis will be done on the HMA mixes to evaluate the effect of the inherent binder characteristics on the HMA properties and performance. Moreover, cost comparisons based on initial cost and the tested performance will be examined.</p> <p><u>Summary</u> Finally, the HMA with a non-polymer modified binder (partially air-blown) has generally performed well according to the APA depth metric and moisture sensitivity results. Therefore, the PI does not recommend precluding them based on this study. However, the HMA with polymer modification has outperformed the one with non modified binder; thus, the use of polymer modification is highly recommended. The results of this study indicate that the addition of a small percentage of lime does help the mix against moisture damage. However, attention should be made so that the %Gmm @ Nmax must not exceed 98%. Accounting for the lime as part of the dust in the aggregate blend could be a safer way of doing it. Further experimentation with lime is necessary such as allowing the lime to cure to gain strength.</p>			
16. Key Words Asphalt Pavement Aggregate Binder Superpave	17. Distribution Statement No restrictions. This document is available to the public from: North Dakota Department of Transportation Materials and Research Division: 300 Airport Road Bismarck ND 58504-6005 Office: (701) 323-6900 Fax: (701) 328-6913		18. No. of Pages 85
			19. File type/Size PDF/0.9 MB

