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14. Supplementary Notes					
1. Abstract					
<p><u>Purpose and Need</u> The aim of this study is to conduct a literature study and collect data on the materials, construction, and performance of WMA to determine the additives and processes that would perform best on NDDOT projects.</p> <p><u>Objective</u> The main objectives are: a. Evaluate the applicability of WMA processes and additives, as used in target states, to North Dakota projects. b. Recommend techniques, equipment, and additives that are most suitable for the use of WMA in North Dakota. c. Recommend specification changes to account for differences in production and/or placement of WMA, as compared to HMA.</p> <p><u>Scope</u> A literature review of published data and information on the processes, the specifications, and the materials as used in the construction of WMA in the northern and central tier states will be performed. Also a questionnaire will be sent out to target states, followed by phone interviews to collect additional data/information on using WMA from local authorities and state agencies (DOTs) of other states.</p> <p><u>Summary</u> Most DOTs develop their own list of approved WMA technologies. Not all technologies would succeed in ND considering extreme weather conditions as well as different petroleum resources. It is recommended that a short list of approved processes be developed that consists of those processes most frequently used in ND that have had acceptable performance. Additional specification requirements shall be added for each approved technology/additive based on local evaluation.</p> <p>The following recommendations are made based on the survey results: the results of survey show foaming processes are most favored (among which Double Barrel Green is the most widely used) and after that are chemical processes (with Evotherm being mostly used).</p> <p>This study provides details current WMA specifications and documents experience of other states in implementing WMA technologies. Following the survey conclusions that most states do not require additional testing for WMA projects as compared to HMA project, no immediate changes to current acceptance testing are recommended. But specific concerns are considered for future WMA implementation. The main items of concern of WMA future specifications that must be evaluated based on local conditions are: (1) temperature control, (2) moisture sensitivity, and (3) selection of binder grade.</p>					
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