

Implementation Report

Development of a 3/4-inch Minus Base Course Type A Specification for Montana

http://www.mdt.mt.gov/research/projects/mat/crushed_base_course.shtml

Introduction and Purpose

For some construction projects in Montana, obtaining materials that meet the current specifications for crushed base course aggregates having a maximum nominal size of 2 in. (CBC-5A) and 1½ in. (CBC-6A) is becoming uneconomical due to declining resources. This research project was initiated to examine multiple sources of crushed base course aggregates from around Montana to determine whether gradations having a maximum particle size of ¾ in. would perform at least as well as Montana CBC-6A and CBC-5A materials. Information from this research allowed a new standard specification to be suggested for ¾-inch minus crushed base course aggregates (CBC-7A) for the Montana Department of Transportation.

The four main project tasks are listed below.

- Review federal and state ¾-in. minus base course

specifications.

- Conduct laboratory testing of ¾-in. minus base course mixes from eight independent sources in Montana.
- Analyze laboratory data to determine the statistical relevance that changing the maximum nominal particle size had on the performance characteristics by comparing laboratory results to an earlier study conducted on Montana 5A and 6A materials (Mokwa et al., 2007).
- Determine the effect that changes in the ¾-in. minus gradation had on its performance characteristics.

One of the primary products of this research was a gradation specification for ¾-in. minus crushed base courses for the state of Montana.

Implementation Summary

Results from laboratory tests performed on crushed aggregates collected from

various locations in Montana indicated that, overall, ¾-in. minus crushed base course aggregates performed at least as good as Montana CBC-6A materials and better than the CBC-5A materials. Based on this result, a standard specification outlining the upper and lower limits of acceptable material sizes was verified for ¾-in. minus base course aggregates.

The recommendation made by the researcher in the final report are listed below, along with the technical panel's responses.

Implementation Recommendations

Recommendation 1:
Incorporate a Standard Specification for ¾-in. Minus Crushed Base Course Aggregates

MDT Response:
Modify Section 701.02.4 of Montana's standard specifications for road and bridge construction to include Crushed Base Course Type 7A, having a maximum nominal size of ¾ in. This

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specification will allow gravel producers to maximize production of crushed aggregates, especially in areas where larger sized materials are becoming limited.

Recommendation 2:

Limit Amount Passing #40 Sieve to Ensure Good Permeability

MDT Response:

Restrict the amount passing the #40 sieve to 25 percent in the ¾-in. minus mixes. The range of particle sizes was selected based on information from federal and state sources as well as a preliminary specification from the Glendive District. These preliminary specifications allowed the researcher to create ¾-in. minus mixes for testing purposes. From these tests it was noticed that as the amount passing the #40 sieve approached the upper bound of the specification, permeability was significantly decreased. Limiting the amount passing the #40 sieve will improve the drainage characteristics of the constructed aggregate layer. The practicality and constructability of

producing mixes that fit within the suggested bounds still needs to be determined.

Recommendation 3:

Maintain Current Levels of Plasticity, Wear and Fractured Face Requirements

MDT Response:

Maintain current requirements for the plasticity, wear factor, and fractured face requirements until definitive research has been conducted to specifically study the effect that changing these requirements has on the performance characteristics and the cost-benefit of these mixes.

References

Mokwa, R., Trimble, N. and Cuelho, E. (2007) "Experimental Assessment of Aggregate Surfacing Materials," Final report for the Montana Department of Transportation, FHWA/MT-07-011/8117-30, pp. 74.

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