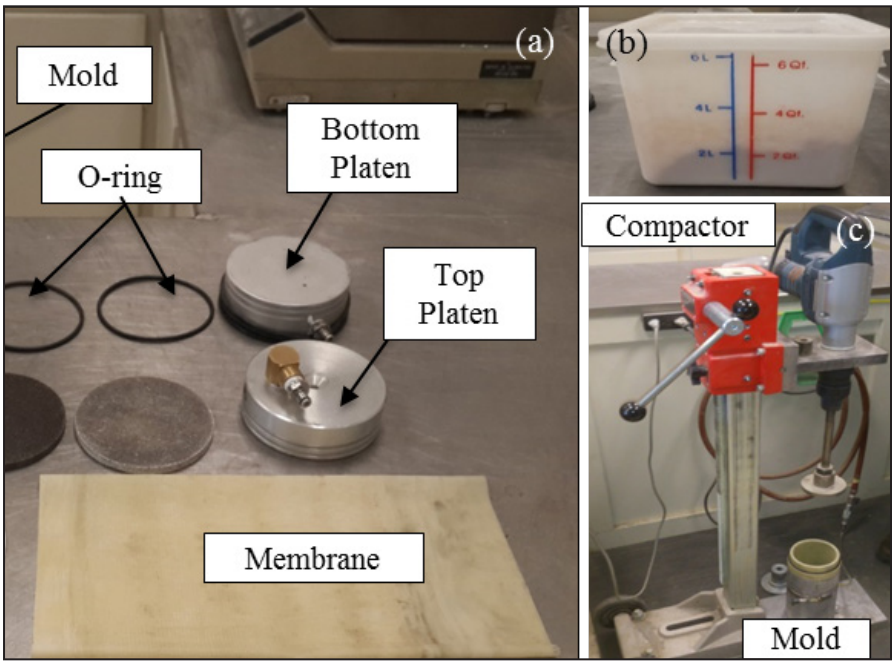
MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 19-378 (project 503) | March 2019

Characterization of Crushed Base Materials in Wyoming



the **ISSUE**

To improve the pavement design and construction in Wyoming, the Wyoming Department of Transportation (WYDOT) is adopting the Mechanistic-Empirical Pavement Design Guide (MEPDG). A full implementation of MEPDG requires the characterization of local crushed base materials. In this research, laboratory experiments on resilient modulus were performed to characterize the local crushed base materials in Wyoming.

the **RESEARCH**

A comprehensive resilient modulus test program was completed by following the WYDOT modified American Association of State Highway and Transportation Officials' testing protocol (AASHTO T 307), which incorporates WYDOT design and testing practices. The cyclic triaxial testing chamber for confining load application, two axial load sensors, and two spring-loaded linear variable transducers (LVDTs) to measure the recoverable axial strain of an aggregate specimen were used in determining the laboratory resilient modulus. Effects of moisture content, percent fine, stress, gradation, and fractured face on base resilient modulus were assessed, and estimation models were developed using statistical methods. The coefficients of constitutive models developed by NCHRP (2004) and Hicks and Monismith (1971) were calibrated for the locally available crushed base materials.

MOUNTAIN-PLAINS CONSORTIUM REGION 8

A University Transportation Center sponsored by the U.S. Department of Transportation serving the Mountain-Plains Region. Consortium members:

Colorado State University
North Dakota State University
South Dakota State University
University of Colorado Denver
University of Denver
University of Utah
Utah State University
University of Wyoming

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Project Title

Characterization of Crushed Base Materials in Wyoming

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USDOT, Research and Innovative Technology Administration

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the **FINDINGS**

Results from this study are intended for the roadway conditions, base materials, and construction practices in Wyoming, but the methodology of testing and statistical analysis can be adopted by other Departments of Transportation. The resilient modulus of base material increases with increasing confining stress at both low and high bulk stress levels. The resilient modulus of the base materials was found decrease as moisture content increases. Due to a narrow range of percent fines, the influence of percent fines on resilient modulus was not significant. The R-value and resilient modulus of the L-graded base materials were found to be higher than that of the W-graded.

the **IMPACT**

The research findings provide WYDOT, as well as other transportation agencies nationwide, the necessary models to estimate resilient modulus of granular crushed base materials. The locally calibrated resilient modulus of base materials and aforementioned deliverables will enhance the pavement design efficiency and facilitate the full implementation of MEPDG in Wyoming.

For more information on this project, download the entire report at http://www.ugpti.org/resources/reports/details.php?id=936

For more information or additional copies, visit the Web site at www.mountain-plains.org, call (701) 231-7767 or write to Mountain-Plains Consortium, Upper Great Plains Transportation Institute, North Dakota State University, Dept. 2880, PO Box 6050, Fargo, ND 58108-6050.