

MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 21-435 (project 497) | May 2021

Compaction Testing of Granular Material



the ISSUE

Adequate compaction of soil and aggregates provides crucial support for pavements and other transportation infrastructure elements. The South Dakota Department of Transportation (SDDOT) has identified a need to reevaluate methods in determining whether granular materials have been compacted to the desired density. SDDOT and other departments of transportation (DOTs) use the Ohio Highway Department's Typical Moisture Density Curves for granular material compaction quality control. However, these long-held standards, which are based on the relationship between soil weight and moisture-density curves under given levels of compaction, may not be adequate for testing compaction of unprocessed and recycled materials as the curves were based on finer-grained soils.

the RESEARCH

A survey was conducted to gather additional information of compaction practices utilized by surrounding DOTs. Data provided by the SDDOT were analyzed to evaluate the adequacy of using the Ohio Highway Department's Typical Moisture Density Curves. These data were also analyzed to create a new family of compaction curves based on granular base course and subbase materials previously tested by the SDDOT.



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



Lead Investigator(s)

Allen Jones
South Dakota State University
allen.jones@sdstate.edu
jonesallu@outlook.com

Research Assistant(s)

Jason Weber, GRA, MS

Project Title

Compaction Testing of
Granular Materials

Sponsors | Partners

South Dakota Department
of Transportation

USDOT, Research and
Innovative Technology
Administration

the FINDINGS

Based on collected data, researchers developed a new family of compaction curves to be utilized in base and subbase material compaction quality control. These curves follow a more effective regression model than the previously used curves.

the IMPACT

The newly developed curves may reduce the time required to obtain target density and the optimum moisture content associated with assessing compacted granular materials. This may lead to better approximations in achieving acceptable percentages of the target density when conducting in-place field testing. This would also likely reduce over compaction, saving time in the compaction process and reducing costs.

For more information on this project, download the Main report at <https://www.ugpti.org/resources/reports/details.php?id=1039>

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.



This publication was produced by the Mountain-Plains Consortium at North Dakota State University. The contents of this brief reflect the views of the authors, who are responsible for facts and the accuracy of the information presented herein. This document is disseminated under the program management of the USDOT, Office of Research and Innovative Technology Administration in the interest of information exchange. The U.S. Government assumes no liability for the contents or use thereof.



NDSU does not discriminate in its programs and activities on the basis of age, color, gender expression/identity, genetic information, marital status, national origin, participation in lawful off-campus activity, physical or mental disability, pregnancy, public assistance status, race, religion, sex, sexual orientation, spousal relationship to current employee, or veteran status, as applicable. Direct inquiries to Vice Provost, Title IX/ADA Coordinator, Old Main 201, 701-231-7708, ndsueoaa@ndsu.edu.