

MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 21-440 (project 541) | November 2021

Assessing Road Conditions for Wyoming County Gravel Roads



the **ISSUE**

Although gravel roads represent a substantial proportion of the nation's roadway network, there has been little research related to assessing the condition of county gravel roads in a way that will help local agencies manage, maintain, and optimize gravel road performance.

the **RESEARCH**

This research was part of a multi-year study conducted by the Wyoming Technology Transfer Center/ Local Technical Assistance Center to assess road conditions for Wyoming county gravel roads. The research study was divided into two objectives and included the use of smartphones, machine learning, optimization techniques, collected data, and statistical analysis. The first objective was to continue the efforts of the WYT2/LTAP office to develop and implement smartphone applications and technologies to assess gravel road conditions and performance. The second objective was to develop user-friendly tools, using JavaScript and other programming languages, which implement an optimization model based on genetic algorithms (GA). The developed tools will help decision-makers and local agencies manage gravel roads more efficiently. Using these tools, decision-makers will be able to identify the most appropriate treatment type for each road based on service level, estimated project costs, predicted road conditions, and whether or not to fund a project.



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

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Project Title

Assessing Road Conditions
for Wyoming County Gravel
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the FINDINGS

This research study has developed several methodologies to assess the gravel road conditions in Wyoming. Main findings:

1. Dust Classifier
2. Corrugation Classifier
3. Optimization Tool for Selecting Gravel Roads Maintenance
4. Performance Prediction Models for Gravel Roads

The research showed the developed tools can be applied to large-scale optimization problems (i.e., gravel road network). The tools operate with minimal data requirements that are in line with procedures regularly followed at local road agencies. A case study using data from Laramie County was used to develop these tools. Different types of analyses were conducted to carefully validate the performance of tools.

the IMPACT

Ultimately, as part of the University of Wyoming Technology Transfer/Local Technical Assistance Program efforts to develop a gravel roads management system (GRMS), researchers developed user-friendly tools that implement smartphones, machine learning, and optimization techniques. These tools will help decision-makers and local agencies manage roads more effectively and allocate limited funds efficiently. Using these tools, decision-makers will be able to identify the most appropriate treatment type for each road based on service level, estimated project costs, predicted road conditions, and whether or not to fund a project. The optimization models aim to maximize the overall condition of the gravel roads network subject to the average daily traffic (ADT) on each road.

For more information on this project, download the Main report at <https://www.ugpti.org/resources/reports/details.php?id=1051>

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.



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