

MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 19-397 (project 472) | November 2019

Developing an Optimization Model for Managing County Paved Roads



the **ISSUE**

In Wyoming, most county paved roads were built decades ago without following minimum design standards. However, the recent increase in industrial/mineral activities in the state requires development of a pavement management system (PMS) for local paved roads. There are two major issues related to the development of a PMS for county roads: the difficulty of predicting suitable PSI prediction models and road roughness, and the high costs related to pavement maintenance planning within limited budgets.

the **RESEARCH**

Researchers investigated these issues by developing exclusive PSI pavement prediction models to be more representative for county roads. In addition, they tested smartphones as a cost-effective solution to minimize the costs of collecting pavement condition data. The initial validation results suggested that smartphones can predict with high certainty the actual values of road roughness represented by the international roughness index (IRI). An optimization methodology was then developed to identify the best mix of pavement preservation projects on county roads for maintaining pavement and improving safety. The maintenance planning takes budget limits, traffic volumes, weighted performance, and associated risk into account.



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

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the FINDINGS

The new pavement serviceability (PSI) model for county roads provides more realistic representation of the county roads conditions. In addition, the difference between the predicted and the actual International Roughness Index (IRI) values was not statistically significant. The process of maintaining county roads were optimized within an annual budget of \$13M and it was able to raise the weighted average PSI of county roads in Laramie County to a value of 3.26. The critical budget for statewide analysis was found to be \$25M and \$0.275M for pavement maintenance and safety projects, respectively. It was found that the results from this report will facilitate a statewide implementation of a PMS for counties in Wyoming.

the IMPACT

- Developing more representative pavement serviceability models.
- Providing a better description of the pavement condition for county roads according to the local perspective.
- Establishing a reliable road roughness measurements using smartphones as a cost effective solution.
- Help law makers assign appropriate maintenance funding to preserve the condition of county roads network in the state.

For more information on this project, download the entire report at <https://www.ugpti.org/resources/reports/details.php?id=975>

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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