

# MPC-541

## November 2, 2017

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**Project Title:**

Assessing Road Conditions for Wyoming County Gravel Roads

**University:**

University of Wyoming

**Principal Investigators:**

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**Research Needs:**

There are over 1.6 million miles of unpaved roads (53% of all) in the United States. In the state of Wyoming, there are around 12,000 miles of gravel roads maintained by Counties in Wyoming. Though these gravel roads generally serve less traffic, they still need a large portion of the counties' budgets to remain in good enough condition to provide service at levels that are acceptable to the traveling public. The fundamental gravel roads maintenance and management challenges faced by county road departments are to provide service at acceptable levels within an acceptable budget. To tackle these challenges, there is a need to develop a Gravel Road Management System (GRMS). A GRMS is a strategic and systematic process to maintain the road network efficiently. This system basically identifies the best mix of road preservation projects maximizing the overall road condition within limited budget. To develop a GRMS, assessment of existing gravel roads is the first step followed by developing performance and optimization models.

The development of a GRMS includes several major tasks: collect data, develop performance and optimization models. It is not feasible to collect the data for each segment for a statewide GRMS as they serve less traffic. As counties face major challenges to get sufficient funding to maintain their gravel roadways, they also look for cost-effective tools to use their resources efficiently. This study aims to conduct the tasks in a cost-effective manner and also, to develop a GRMS that will be implemented efficiently within available budget.

This proposal describes data collection, analysis and modeling techniques for assessing current gravel road conditions that will allow appropriate measures to be taken by Counties to use their resources efficiently. In addition, the development of performance and optimization models are also discussed briefly in the following sections that will provide necessary tools to develop a GRMS.

### **Research Objectives:**

1. Develop a comprehensive GRMS methodology to manage gravel roads.

The main objective of this study is to develop a comprehensive GRMS methodology to manage gravel roads. The GRMS will be applied in Laramie County as a pilot study. Laramie County has more than 1,000 miles of gravel roads and can be considered as the representative county in Wyoming. The proposed GRMS will be responsive primarily to potential increase in future traffic volumes due to industrial activities.

### *Study Benefits:*

Several specific benefits may be realized from the proposed GRMS study. The primary benefits would include:

- Current gravel road surface conditions could be directly identified, allowing appropriate decisions to be made.
- Appropriate maintenance, repair and rehabilitation strategies could be developed for individual roads.
- Future maintenance and rehabilitation needs could be projected using surface condition data.
- Counties with limited resources would not need to develop their own methods for analyzing their gravel roads.
- The state legislature could be provided with defensible data justifying funding for county gravel roads.

### **Research Methods:**

To achieve the objectives mentioned above, a methodology will be developed and applied on the gravel roads of Laramie County as a pilot study. Then, the methodology will be enhanced to apply for the statewide implementation. The proposed methodology is divided into four phases: 1) roadway segmentation, 2) data collection, 3) performance models, and 4) optimization model. The roadway segmentation is to create a list of roadway segments that have uniform performance conditions along the lengths. The data collection includes traffic counts, road width, road conditions and aggregate quality. The performance models predict future road condition based on existing condition. Finally, the optimization model identifies the best mix of improvement projects within limited budget.

### **Expected Outcomes:**

The research outcomes will provide local governments and state agencies as well as other transportation agencies nationwide the necessary tools to optimize budgets for managing county gravel roads. It is believed that the research outcomes will be of immediate interest not only to local governments in Wyoming but also other states.

**Relevance to Strategic Goals:**

- State of Good Repair

The project outcomes will address the state of good repair strategic goal associated with the MPC program and USDOT. The proposed GRMS would result in improving the overall quality of gravel roads which are essential in rural areas.

**Educational Benefits:**

Both graduate and undergraduate students will be working on this study. The study will provide the students with an excellent opportunity to interact with transportation professionals and learn about transportation related studies. In addition, the techniques developed in this study will be incorporated in the Pavement Management System class taught at UW.

**Tech Transfer:**

1. Publish papers to recognized journals.
2. Present outcomes to recognized conferences including TRB.
3. Present outcomes to local and states agencies.

**Work Plan:**

1. Conduct a comprehensive literature search
2. Develop methodology
3. Secure information about location of gravel roads from WYDOT and counties.
4. Pilot study in Laramie County
5. Collect data
6. Develop performance models for low, medium and high volume segments.
7. Develop an optimization model
8. Report preparation
9. Present Findings

The overall methodology of this study is summarized in previous section. The proposed methodology is structured as a three-year effort. It is envisioned that the aforementioned study objectives will be achieved by completing the nine major tasks described below. Tasks 1 and 2 will be performed in Year 1, tasks 3 and 4 are in Year 2, and the remaining tasks, 5 through 8 will be completed in Year 3.

**Project Cost:**

Total Project Costs:	\$178,436
MPC Funds Requested:	\$90,476
Matching Funds:	\$87,960
Source of Matching Funds:	University of Wyoming

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