Identifying Numbers: Technology Transfer

Project Title:

Pilot-Scale Implementation of a Gravel Roads Management System

University:

University of Wyoming

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Research Objectives:

The Wyoming Technology Transfer Center (T2/LTAP) undertook a project that brought together leading gravel roads management experts. That project resulted in the development of widely accepted methodology for Gravel Roads Management System (GRMS). The goal of the gravel roads management methodology development was to enable local agencies, such as Wyoming's counties, to implement and maintain a GRMS.

The main objective of this study is to implement the GRMS methodology developed in two or three counties in the state of Wyoming. Such implementation will result in fine-tuning the GRMS.

Description of Research Problem:

As formal asset and roadway management systems become more commonplace, their implementation by small, local agencies is increasing. However, for many agencies whose most valuable asset is unsealed dirt and gravel roads, there is a major hurdle to applying management principles to their road networks: There is no unsealed roads management methodology that is well-suited to their type of organization. This problem is faced by many rural counties of the Great Plains and Intermountain West.

To address the lack of an accepted gravel roads management methodology suitable to the counties of the rural west, the Wyoming Technology Transfer Center (T2/LTAP) undertook a project that brought together leading gravel roads management experts. They addressed the lack of an appropriate gravel roads management system (GRMS) for small agencies and generated several basic conclusions and specific recommendations including these:

- Simplicity is critical to making a GRMS work for small agencies. They have very limited resources. This fact, combined with the reality that it doesn't make economic sense to spend a whole lot of time or money managing very low volume roads, dictate that any GRMS must not consume a lot of resources while still producing useful results, both for elected officials and for road managers.
- Functional classes should follow those described in the two AASHTO publications, *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)* and *A Policy on Geometric Design of Highways and Streets*.
- Maintenance activities should be assigned and tracked using these eight tasks:
  - Blading
  - Reshaping
  - Regravel
  - Dust Control
  - Stabilization
  - Isolated Repairs
  - Major Work
  - Drainage
- A transition to these tasks is needed since, historically, many gravel road networks' costs have been tracked using line items and procedures useful to accountants, but of lesser value to roadway managers.
- Cyclic maintenance procedures can be implemented with relatively little effort.
- Visual 'windshield' survey methods are currently the most easily adapted to small agency operations.

With these recommendations in hand, the next step is to implement them on a pilot scale. There should be several basic elements to such a project. The list below provides a brief overview of the main elements of such a pilot-scale implementation:

- Assess the agency's **cost tracking system**, and adjust it so that the **line items** needed to manage a gravel roads network are in place and used. This will begin the process of collecting data in a way that is more useful to road managers.
- Verify that the gravel road network **inventory** is adequate, both in terms of its content and its storage media, and upgrade it if it is not. Divide the network into maintenance management sections.
- Implement a **cyclic maintenance schedule**, adjusted with surface condition evaluations collected by the maintainers as they perform routine maintenance.
    - Evaluate and monitor the success of the cyclic maintenance scheduling.

The goal of the gravel roads management methodology development was to enable local agencies, such as Wyoming's counties, to implement and maintain a GRMS. Similarly, there should be two goals of a pilot project using these recommendations. First, it should determine where changes to the initial recommendations should be made. Second, it should provide the pilot agencies with both data and a GRMS that will be used for the foreseeable future.

Research Approach / Methods:

The following task list delineates the process of the proposed pilot-scale GRMS implementation:

1. Determine which county road and bridge departments are good candidates for the pilot project.
    a. Establish whether they are willing and able to make the necessary changes in how they track their maintenance costs.
    b. Establish whether their maintainers are willing to participate in the cyclic maintenance scheduling aspect of the project.
    c. Assess the willingness of county commissioners to participate and support changes in maintenance practices.
2. Select candidate counties.
3. Modify cost tracking line items.
    a. Work in conjunction with accounting personnel to devise a system that will work for both accounting and engineering purposes and with any existing cost tracking software.
    b. It may be advantageous to perform similar changes for asphalt roads, bridges, culverts, signs, and so on.
4. Modify the unsealed road inventories so they will work well for gravel roads management.
    a. Divide the network into maintenance management sections.

    b. Collect as much inventory information as practical.
        i. Collect traffic counts.
    c. Assign minimum acceptable surface conditions.
        i. Consider various factors including connectivity, school bus routes, road use, traffic volume, traffic type, and user costs.
5. Convert as much of the existing maintenance, rehabilitation, cost and traffic data to the new inventory and line items as practical.
6. Develop a means for entering future cost and maintenance data into the new line item and inventory database structure.
    a. Options include existing software, work orders, time cards, and other field work reports.
7. Develop standard maintenance strategies.
8. Assign a maintenance strategy and minimum acceptable surface condition to each maintenance management section.
    a. Assign a standard maintenance strategy to each maintenance management section.
    b. Assign a minimum acceptable surface condition to each section.
    c. Apply a timing adjustment factor based on the section's durability.
    d. Determine where in the maintenance cycle each section is currently.
9. Write software code to generate cyclic maintenance schedules.
10. Begin a cyclic maintenance program.
    a. Generate weekly prioritized blading and reshaping lists for each maintainer.
        i. Perform maintenance as directed by the list and adjusted by the maintainer.
        ii. Evaluate surface conditions at the time of maintenance.
    b. Generate weekly prioritized drainage, regraveling, dust control and stabilization lists for the supervisors.
        i. Perform maintenance as directed by the list and adjusted by the supervisor.
11. Adjust the timing of the cyclic maintenance schedule for blading based on the relationship of the surface conditions observed during routine blading to the minimum acceptable surface conditions.
12. Develop prioritized surface condition and gravel thickness evaluation schedules.
13. Begin condition and gravel evaluations based on prioritized lists.
    a. Visual 'windshield' condition survey
    b. Gravel thickness measurements
14. Adjust the timing of cyclic maintenance schedules based on evaluation results.
15. Evaluate and Monitor the Cyclic Maintenance Process.
    a. Interview county personnel.
    b. Evaluate complaint and request frequencies.

c. Assess changes in maintenance costs.
d. Estimate user costs.

16. Prepare and present final report.

MPC Critical Issues Addressed by the Research:

This project fits under the integrated asset management system critical research area.

Contributions/Potential Applications of Research:

The literature review which will be conducted will insure that the findings of similar projects will be considered in the development of the methodology of this study.

Potential Technology Transfer Benefits:

The Wyoming LTAP center will insure the dissemination of the findings of this study.

This technology transfer study will help counties in implementing a systematic GRMS. The successful implementation of GRMS in three pilot counties will insure that the methodology developed for managing gravel roads is ready for implementation by other agencies in the region.

Time Duration:

July 1, 2010 - June 30, 2011

Total Project Cost Year 1:

$157,586

MPC Funds Requested:

$77,077

Source of Matching Funds:

University of Wyoming: $80,509

TRB Keywords: gravel roads, asset management, maintenance.