Putting Research into Practice: New Spreadsheet Tool for Managing Gravel Road Systems

What Was the Need?
About one-half of Minnesota’s roadway system consists of gravel or crushed rock roads. These 70,000 miles or more of loose-surfaced roadways connect farmlands and other rural locations to the state’s mainstream economy.

Aggregate and gravel roads can lose about an inch of surface rock each year. Frost damage to road surfaces, potholes, washboarding and other damage require repair. But the quality aggregate material used to maintain roads is expensive and local agency funding is limited, which increases the need for maintaining low-cost gravel road alternatives.

Managing these gravel road networks requires tracking road conditions, past repairs, gravel stocks, budgets and future roadway needs. While tools for managing asphalt and concrete road systems are widely available, a 2014 MnDOT survey found that 84 percent of local Minnesota agencies have no tool with which they can track this information for gravel roads.

What Was Our Goal?
The Local Road Research Board (LRRB) needed a data management resource that local agencies could use to track and manage gravel road systems. The tool needed to be easy to use by engineers and maintenance superintendents with a wide range of technical facility and resources, and scalable to available data that may also vary significantly from user to user.

What Did We Implement?
Investigators identified the functions the management tool would need to offer, similar management tools that are currently available, and the software expertise and resources required of county engineering offices. Based on these requirements, the project team determined that a spreadsheet tool was the simplest, most scalable method for tracking and inputting a range of relevant data.

How Did We Do It?
The team included roadway inventory information, maintenance records, desired aggregate thickness levels and segment-by-segment evaluation and rating tools in the spreadsheet. Based on available records and other input, investigators populated the spreadsheet with default values and customization options. They also prepared optional linkages to the MnDOT roadway geographic information system (GIS) platform for populating the tool’s roadway data.

The tool includes a rating system for evaluating road conditions, allowing users to compare past maintenance activity with current performance in order to project maintenance and gravel budgeting and supply needs.
What Was the Impact?

The new gravel road management spreadsheet tool features four functional tabs:

- **Roadway Segment Inventory**: Record road names, size and dimensions, surface type, construction date and soil information.

- **Maintenance Record**: Record data for a specific roadway segment, including information about grading, drainage work, regraveling, dust control and other maintenance, work dates and costs.

- **Desired Thickness**: Record gravel type and source, gather cost information for the amount of gravel added to road segments, and filter the information for each road per season from year to year.

- **Segment Evaluation**: Review roadway segments, enter evaluation information and distress ratings, and generate roadway usability ratings.

Additional tabs provide evaluation guidelines and allow users to customize dropdown menus.

County agencies may use the tool to record and plan grading, resurfacing and repair based on conditions and past maintenance; examine staff time and funding allotments; and strategize gravel road system needs. The tool can help users with budget planning and funding requests, and identify where road surface upgrades may be warranted.

Investigators have presented the spreadsheet tool and guidebook to the Minnesota chapter of the American Public Works Association and at the National Association of County Engineers 2019 annual conference.

What’s Next?

The user-friendly tool will be available on the LRRB website. A training webinar or video may be developed to supplement information provided in the guidebook.

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