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LRRB
LOCAL ROAD RESEARCH BOARD

TECHNICAL SUMMARY

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$100,047

A severely distressed asphalt road in a rural area shows cracking, crumbling, holes and debris.

DEPARTMENT OF TRANSPORTATION
OFFICE OF RESEARCH & INNOVATION

# Guide for Converting Distressed Low-Volume Paved Roads to Unpaved Roads

*Working with an advisory panel of road managers from local agencies, researchers developed a practitioner-ready guide for converting severely distressed low-volume paved roads to improved, easily maintained gravel roads. The guide includes decision-making tools and an online webinar for training.*

## What Was the Need?

Across Minnesota, many local transportation agencies are faced with how to address aging low-volume paved roads in primarily rural areas. In the 1970s and 1980s, both asphalt and construction costs were relatively inexpensive, allowing many miles of rural roads to be paved. Over the decades, those paved roads have aged and deteriorated, while costs of resurfacing materials and labor have risen. At the same time, local city and county budgets have tightened, with agencies often working to do progressively more with fewer resources. Many road maintenance professionals today find themselves facing maintenance costs for distressed low-volume roads that their organizations simply cannot meet.

The concept and process of converting distressed low-volume paved roads to economical and qualitatively better unpaved (gravel) roads are used nationwide, though information about the practice is not widely available. A 2015 National Cooperative Highway Research Program (NCHRP) synthesis report, Converting Paved Roads to Unpaved, identified states and agencies that have conducted road conversions; the relevant tools, metrics and procedures involved in the process; and related concerns and needs.

The Local Road Research Board (LRRB) wanted to develop a guide specific to Minnesota that was based upon the NCHRP study's findings and was available in an accessible form for road maintenance practitioners in local agencies.

## What Was Our Goal?

The objective of this project was to develop a Minnesota-relevant guide that would serve as a comprehensive information source on effective practices for converting severely distressed paved roads to acceptable engineered unpaved surfaces. Ultimately, a broader goal was to provide a case for acceptance of road conversion as another low-volume road management strategy.

## What Did We Do?

The research team included representatives from the Western Transportation Institute and University of California, Davis who were members of the original NCHRP study cohort. A MnDOT Technical Advisory Panel and professionals from many Minnesota local agencies that manage low-volume roads also participated. For cases of this conversion, a low-volume road is defined as having an average daily vehicle count of fewer than 150 per day.

The team's work involved selection and transformation of the extensive information presented in the 2015 study into a shorter scope and more visual format that would be comprehensive, succinct and accessible. First, they developed relevant reference materials along with a list of graphics, flowcharts and photographs for each chapter. Then they developed guidance for the following topics:

*continued*

*"Many local engineers have reached the same low point in considering their severely distressed low-volume roads. They can now find in this guide a consistent and innovative approach for distressed road management in Minnesota and surrounding states."*

**—Tim Stahl,**
County Engineer,
Jackson County

*"This project provides an accessible, practitioner-ready guide for local agencies with severely distressed pavement on low-volume roads. Unpaved roads may offer an economical and functional solution."*

**—Laura Fay,**
Research Scientist and Program Manager,
Montana State University Western Transportation Institute

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Gravel roads are more economically constructed than asphalt roadway surfaces. Maintenance is also efficient and economical. If necessary, gravel roads can be easily converted to asphalt in the future.

- **Methods to determine if a road is a candidate for conversion**, including how to determine an existing road's materials and condition. Essential steps, such as walking the road; road history; materials testing and analysis, including dynamic cone penetrometer tests; drainage; and safety are discussed.
- **Methods to convert a road from paved to unpaved**, including design, construction, maintenance, performance-based materials specification, chemical stabilization and dust control. Decision tools include the online Unpaved Road Material Design Tool and a chemical treatment selection tool.
- **Life-cycle cost analysis tools**, specifically the North Dakota State University Local Road Surface Selection Tool, which compares the life-cycle costs of unpaving versus maintaining the road in its current condition or rehabilitating the road to its original condition.
- **Tools to effectively inform and communicate with the public**, since most people who will be affected by a road conversion project will not immediately expect or desire a gravel road as a maintenance solution for a severely distressed paved road. Early and effective communication is essential for road user understanding and acceptance of the process.
- **Safety implications** of unpaving.

Researchers also surveyed road managers in Minnesota local road agencies, which aided them in developing guidelines addressing when and how to communicate with the public about road conversion projects.

Finally, researchers developed a video presentation of report findings that was recorded as a webinar and training tool.

## What Was the Result?

The final guide and video, both titled "Converting Severely Distressed Low-Volume Paved Roads to Engineered Unpaved Roads," are designed to enable road managers to easily find answers among presentations of the most common questions and concerns regarding road conversion, from how to determine if a road is a good candidate for unpaving to methods of conversion and life-cycle cost. Researchers presented and recorded a 90-minute webinar of the study in October 2019.

## What's Next?

The guide and webinar will be available on the LRRB website.

*This Technical Summary pertains to Report 2019-42, "A Guide to Successfully Convert Severely Distressed Paved Roads to Engineered Unpaved Roads," published December 2019. The full report can be accessed at* mndot.gov/research/reports/2019/201942.pdf.