



Local agencies learned about cost-effective methods for maintaining gravel roads, important local links to the network of roads that connect communities and commerce across the state.



Sound design and regular maintenance keep gravel roads in good condition.

Gravel roads in the spotlight

GRAVEL ROADS in Wisconsin are important local links to the network of roads that connect communities and commerce across the state. Most of them fall under the jurisdiction of towns that have the job of keeping these roadways in good condition.

The Wisconsin Transportation Information Center (TIC) recently sponsored a series of workshops on gravel road maintenance where these agencies learned about cost-effective methods for maintaining their gravel roads. They discussed strategies for selecting gravel materials, shaping the road for improved ride and drainage, and reducing loss of fine material through proper compaction and dust control. Another topic on the agenda was evaluating the condition of gravel roads using the PASER pavement rating system.

This overview of information presented in the workshop sessions provides local road officials with a helpful review of best practices when it comes to gravel roads.

Good gravel, good grading

Roads surfaced in gravel account for more than 30,000 miles of Wisconsin's local roads. A practical travel surface in many areas, gravel roads serve areas with low traffic volume. The workshops explored the role factors like correct road crown, use of quality materials and ongoing maintenance play in keeping gravel roads in good condition.

Workshop instructor and engineer William Heiden brought extensive private and public sector experience in road construction and maintenance to the discussion of how to maintain gravel roads. Heiden specializes in rural roadway problems with an emphasis on dust control and soil stabilization on gravel roads. Poor maintenance of gravel roads puts a burden on tight road budgets, he notes,

suggesting that local governments can generate significant savings by regular attention to managing unpaved roads that includes planning and training.

Road characteristics

Certain characteristics influence how the roadway crown affects drainage and how a road wears over time. Heiden explains that it is important a road have enough crown to allow water to drain away from its surface and prevent the saturation that weakens road structure and produces potholes and washboards.

The quality of the surface materials that go into a gravel road affects how well it holds up to traffic and weather. Heiden says a good gravel blend is one that combines hard stone for strength and enough silt or clay to bind the surface mix together.

At the workshops, Heiden also reviewed grading techniques and the type of equipment used to spread the gravel material and shape the road. As long as crews perform regular maintenance to preserve the original correct shape of a gravel road with regrading or repairs, he observes, the roadway stays in good travel condition.

Adding water to the gravel when placing it and using the right equipment to achieve proper compaction of the gravel layer

are other important maintenance practices. Heiden recommends having a water truck and compaction equipment on hand when placing gravel or regrading existing gravel. Since many small local road departments lack such equipment, an alternative is to grade after a rainfall and use a loaded dump truck to make multiple passes across the entire surface to compact the gravel.

A good example of using water in a gravel road grading operation comes from the Town of Athelstane in Marinette County. The town fabricated a water tank to slide into the bed of a dump truck. It allows the town crew to bring water to the maintenance operation, which improves compaction of the gravel surface. The town can then do an effective job of grading gravel roads even in dry weather conditions.

Eliminate hazards

Preventing encroachments on the gravel road is another critical element Heiden says belongs to effective gravel road maintenance. Overgrown roadside weeds and grasses that crowd the roadway, or mailboxes, trees, power poles and fences placed close to the road are potential problems. Driveways graded to encroach on the road can disrupt the crown of the road. Such hazards cause



Severe rutting makes travel difficult and can require substantial repairs. Preventing this level of deterioration is important to gravel road maintenance.



Traffic and loose gravel combine to create washboarding. A good aggregate mix can help prevent a recurrence of this condition.

road users to drive in the center of the road. Over time, the wear pattern flattens the crown and reduces the road to two or three worn wheel tracks.

Another major problem is air-borne dust. Heiden discussed stabilizing the surface materials with dust suppressants like calcium chloride, magnesium chloride, and lignum sulfonates.

Keeping dust under control not only improves safety and air quality, it also helps maintain surface quality of the road and extends intervals between grading operations by preserving the fine materials in the gravel that bind the surface together.



Controlling dust and stabilizing the surface means needing to grade a gravel road less often. Stabilization also keeps gravel fines bound in the road's surface.

Necessary, useful ratings

Pavement ratings are due in December on all local roads in Wisconsin, including gravel roads. The PASER rating system gives local road officials a simple process for evaluating the condition of their gravel roads on a five-point scale.

Local agencies can use the system to visually evaluate condition details on their roads, a process that includes rating the height of the crown, observing how well ditches and culverts function and whether the thickness and quality of the gravel is adequate. The PASER Manual for gravel roads also guides raters as they document specific surface distresses or defects, including washboards, potholes and ruts.

Rating roads with PASER satisfies Wisconsin Department of Transportation requirements. It also gives local highway and public works managers useful information for planning and budgeting for maintenance operations and improvements of their gravel roads.

Practical ideas

Sound design and construction plus regular maintenance help reduce costs and keep gravel roads in good condition. Elected officials, engineers, superintendents, equipment operators and others responsible for local roads can use the resources listed here, including publications available in the TIC online library, to find practical ideas for cost-effective management of their gravel roads. ■

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PASER/WISLR Q&A

Answers to questions about making good use of the rating system and analysis tools. Wisconsin local governments must complete and submit pavement ratings to the Wisconsin Department of Transportation by December 15, 2013.

Q: What rating makes a road a good candidate for fog seals and rejuvenators?

A rating of 7 or 8 identifies pavements just starting to exhibit cracking or raveling. These spray-applied treatments can help slow the appearance of age-related distresses.

Q: How do I use PASER to rate drainage conditions along with the pavement?

Poor drainage is a key factor in pavement deterioration on all roads. For unimproved roads, PASER includes drainage in the rating. The system does not include drainage in condition descriptions for asphalt and concrete roads but drainage problems are a cause of some distresses that occur. Use the *Drainage Manual* available from TIC to evaluate drainage on asphalt and concrete roads.

Q: What if two parts of one road section have different surface conditions?

Depending on how different they are, divide the section in two and rate each separately or rate based on the condition exhibited by most of the roadway. Road agencies also can repair localized distresses and then rate the section based on overall condition after repairs are made.

Contacts

William Heiden, P.E., L.S.
970-227-9223
bill@MyDirtRoads.com

Resources

Link to download *Gravel Roads*, TIC Bulletin #5. Reviews effective design and maintenance of gravel roads.
<http://tic.engr.wisc.edu/Publications.lasso>

Gravel-PASER Manual, guide to system of evaluating condition of gravel roads.

http://epdfiles.engr.wisc.edu/pdf_web_files/tic/manuals/Gravel-PASER_02.pdf

Link to *Gravel Roads Maintenance and Design Manual* from the South Dakota Local Technical Assistance Program. Addresses maintenance and when to pave a gravel road.
<http://ntlsearch.bts.gov/repository/record/ntl/12188.html>

SAFER Manual, TIC, practical guide to evaluating roadway safety. Describes common roadway hazards, strategies for minimizing hazards, and how to prioritize safety improvements.