Kansas
LTAP Fact Sheet
A Service of The University of Kansas Transportation Center for Road & Bridge Agencies

Good Gravel Roads

By Jacob Bustad

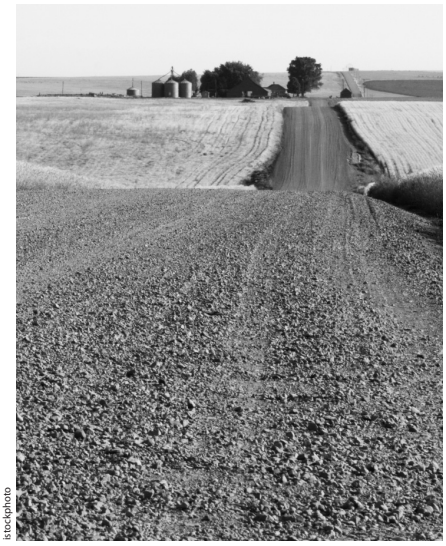
A good gravel road starts with good gravel. More than half of the problems that occur on gravel roads stem from using the wrong kind of gravel. Learn what makes "good" gravel and other tips about effective gravel road maintenance.

While interstate and other highway systems may see more traffic day to day, in reality the system of gravel roads throughout the United States provides a transportation resource for millions of Americans. In fact, more than half of the roadways in the U.S. are gravel surfaces. We depend on them to transport goods, access services, and for traveling to and from locations off of the highway system. This dependence makes the proper construction and maintenance of gravel roads critical to the nation's overall road system.

Gravel road maintenance requires continuous attention, often starting in the spring but occurring throughout the year. Read below for further information on gravel maintenance, including safety aspects and a general explanation of maintenance techniques.

Use the right kind of gravel

The importance of having good surface gravel cannot be understated. It is estimated that more than half of the problems that occur on gravel roadways stem from using ineffective gravel. Gravel roadways should avoid "base gravel," which is less fine and more drainable, but erodes much faster. Instead, crushed surface gravel should be used. Crushed gravel has different sizes of particles and sand, plus eight to 15 percent "fines," or gravel dust, that acts as the glue holding the bigger pieces together. This type of gravel allows the road to bond well, but also allows for proper drainage.



istockphoto

Maintain good drainage

Gravel road maintenance is aimed at making sure that the driving surface, as well as the shoulder, are both designed and maintained in a manner that allows for proper drainage.

If a roadway is allowed to have poor drainage, erosion of both the driving surface and the underlying structure of the road can occur. So, in additon to potholes and other damage to the driving surface, the integrity of the roadway can be compromised. In extreme cases, this can lead to no other option except completely rebuilding the road. This is an expensive option, and most agencies do not have the time or money to take on such a task. Instead, they should concentrate on proper maintenance.

To ensure good drainage, the gravel roadway should maintain a four percent slope on either side of the crown of the roadway. This equates to about a half inch drop per foot on a 24 ft-wide roadway. If the slope is flatter than four percent, rainwater will accumulate on the driving surface and cause potholes and erosion. If the slope is over four percent, water will drain from the roadway but will also wash away the fines that hold a gravel road together.

An easy way to spot whether or not a roadway's crown and slope are appropriately maintained is to check the wheel tracks from vehicles on the road. If wheel tracks are concentrated to the middle of the road, the crown may be too high and the slope more than 4 percent. Under these conditons, vehicles traveling in both directions may tend to drive in the center of the road, creating a safety hazard.

There are several instances when the roadway should not have a crown — specifically, when a roadway intersects another roadway or train track. When a gravel road meets a railroad crossing, bridge crossing, or intersection with another gravel road or paved road, the crown should be removed as to not cause drainage on to the intersecting element.

Curves on gravel roads also require a different tactic: Instead of a crown and four percent slope, the curve should be graded so that the collected sediment is distributed from the outside of the curve to the inside, meaning the curve will not be too steep for vehicle traffic.

Aside from maintenance of the driving surface and shoulders, other maintenance may be necessary to keep the roads in good condition. For instance, debris and sediment will need to be cleaned from ditches or culverts on a periodic basis to keep water flowing and prevent it from backing up onto the road.

Fix high shoulders

A "high shoulder" refers to the tendency for sediment and loose gravel to collect near the edges of gravel roads. Loose gravel can cause vehicles to lose traction. Loose, flying gravel, kicked up by passing vehicles, can also break windshields.

A high shoulder also interferes with the proper drainage of the road.

High shoulders are caused by water draining off the road (even on roads that have the appropriate four percent slope), by passing vehicle traffic, by snowplows during winter maintenance, and inadvertently by road graders while maintaining the roadway.

To address high shoulders, road grader operators should set the grader blade correctly to eliminate the high shoulder, or can use a "shouldering disc"—similar to the disc attachment used in farming to break up the soil.

Set the blade properly

The mowboard should be set to an appropriate angle and appropriate tilt for whichever maintenance task you are undertaking. This will be different, for instance, if you are working to maintain a four percent slope or are breaking up a high shoulder. When working on a four percent slope, keep an eye on the slope gauge to make sure you really are at or around four percent. For more information on setting a blade, see the resources at the bottom of this page.

Go slow!

Most importantly, GO SLOW. The maximum speed for correct grading is 3-5 miles per hour; anything faster than this will risk "washboarding," where the mowboard only contacts the road intermittently. This creates a situation where the road is extremely bumpy, and can compromise the drainage of the roadway as well.

Consider safety aspects

At the work site, think about both your safety and that of vehicles using the roadway. Use your flashing warning lights, have a "slow moving" or "keep back" sign on the back of the grader, attach red flags to the front of the grader, and wear a safety vest for when you will be outside the grader on or near the roadway.

Take care of your grader

Before leaving for the work site, give the grader a thorough inspection, including tire pressure and an inspection of the mowboard underneath the grader. The mowboard will naturally wear down, so be sure that it is in good condition, otherwise proper road maintenance will be much more difficult.

More information

For more information and resources about gravel road maintenance, check out the 2009 Kansas LTAP Resource Catalog. You can search the catalog online at http://www.ksltap.org. Click on "Lending Library."

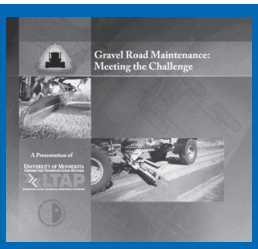
Source

• Minnesota LTAP, Gravel Roads Maintenance: Meeting the Challenge. 2006.
• US EPA, http://www.epa.gov/owow/nps/gravelroads/sec2.pdf

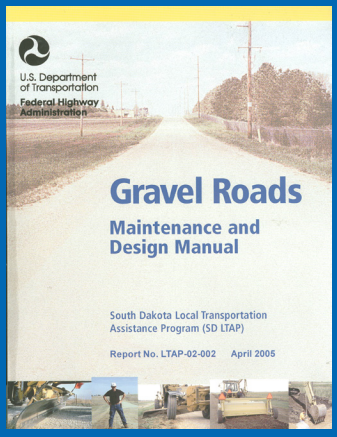
Reprinted from the Spring 2009 issue of the *Kansas LTAP Newsletter*, a publication of the Kansas Local Technical Assistance Program (LTAP) at Kansas Universit Transportation Center.

Two Great Resources on Gravel Roads Maintenance

The above article touches on some of the basics of making good gravel roads. For more detailed information, be sure to consult the following resources:



• **Gravel Road Maintenance: Meeting the Challenge DVD.** This DVD can either be used as a stand-alone tutorial or as a trainer's tool to introduce the topics of gravel road maintenance. Each chapter of the DVD discusses a specific maintenance topic. After playing a chapter, the trainer can pause the DVD and use other teaching materials, if desired.
http: www.ksltap.org



• **Gravel Roads Maintenance and Design Manual.** This manual, produced by FHWA and South Dakota LTAP, is a very comprehensive guide on the design and maintenance of gravel roads. It contains a wealth of illustrations and photographs to help readers understand proper blading techniques.
http: www.ksltap.org