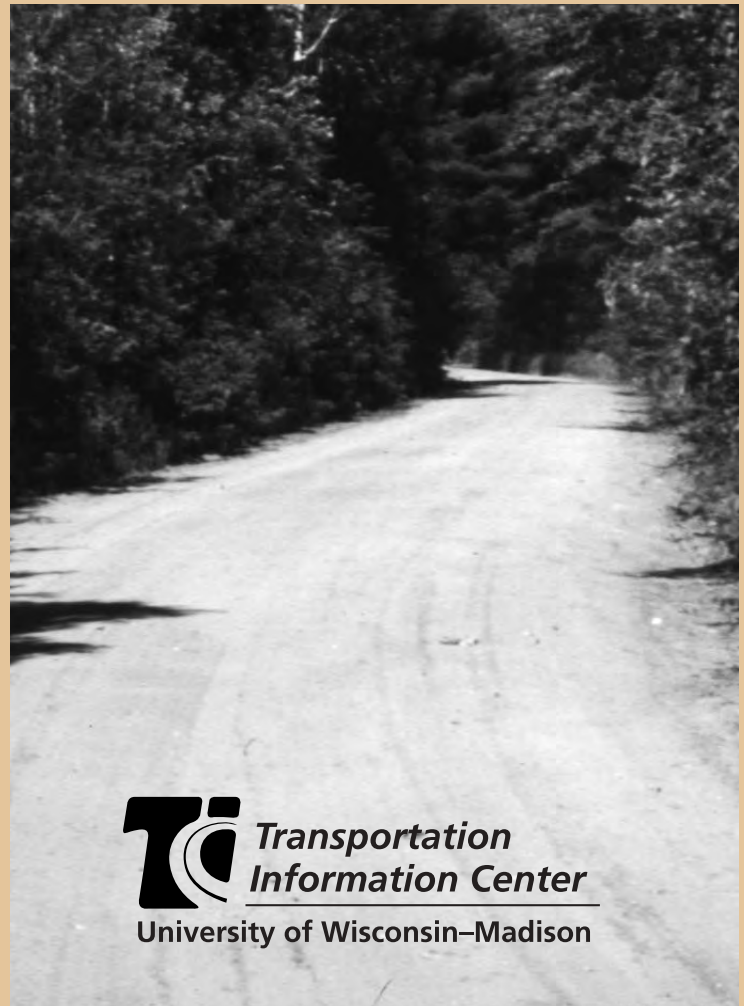


Pavement Surface Evaluation and Rating

PASER Unimproved Roads Manual



Contents

Introduction	2
Typical characteristics of unimproved roads	3
Conditions	3
Distress	5
Rating the condition of unimproved roads	7
Very Good – 4	8
Good – 3	9
Fair – 2	10
Poor – 1	11
Practical advice on rating roads	12
Inventory and field inspection	12
Averaging and comparing sections	12
Separating road function from conditions	12
Planning maintenance and repair	12
Summary	12

This manual is designed to provide background information to local officials on roads with earthen or unimproved surfaces. It describes conditions and distress common for these types of roads. The manual also provides a simple procedure to rate road surface conditions. The rating procedure can be used as condition data for the Wisconsin DOT local road inventory. It may also be helpful in establishing priorities for future road improvements

Produced by the T.I.C. with support from the Federal Highway Administration, the Wisconsin Department of Transportation, and the University of Wisconsin-Extension. The T.I.C., part of the nationwide Local Technical Assistance Program (LTAP), is a Center in the College of Engineering, Department of Engineering Professional Development, University of Wisconsin-Madison.

Special thanks to the Wisconsin Towns Association for their financial assistance and support for developing this manual and for training users of the PASER Pavement Surface Evaluation and Rating system.

Copyright © September 2001
Wisconsin Transportation Information Center
432 North Lake Street
Madison, WI 53706
phone 800/442-4615
fax 608/263-3160
e-mail tic@epd.engr.wisc.edu
URL <http://epd.engr.wisc.edu/centers/tic/>



Printed on recycled paper.

Pavement Surface Evaluation and Rating

PASER Manual

Unimproved Roads

Donald Walker, T.I.C. Director, *author*
Lynn Entine, Entine & Associates, *editor*
Susan Kummer, Artifax, *designer*

Pavement Surface Evaluation and Rating

Unimproved Roads PASER Manual

On some local roads vehicles travel on the natural soil. These roads have no paved or gravel surface and typically carry very low traffic volumes. They may serve as a driveway or as access to agricultural, forest or recreational lands. Some may resemble trails and provide access for ATVs, snowmobiles, biking, or skiers. Typical widths range from 8 to 20 feet. The Wisconsin Department of Transportation Local Road Inventory (WISLR) calls these roads either "unimproved road-trail (code 0002) or "graded and drained earth road" (code 0010).

The existing natural soil is the driving surface on earthen and unimproved roads. In some areas these soils are sand and/or gravel which typically have good drainage and may be more stable under wet conditions. Other soils are clays, silts and organic materials. These soils are very unstable in wet conditions and tend to develop ruts under heavy traffic.

Where traffic volumes are very light, turf grasses or other vegetation may cover the road surface. Slightly more traffic may produce wheel paths with vegetation between and outside the wheel paths. Gravel or another stabilized material may have been added at some spots, generally in unstable areas or where water or flooding conditions are frequent. Since this occurs only in isolated locations the overall road segment is considered earthen or unimproved.

It may be difficult to distinguish between a poorly maintained gravel road and an unimproved road. The local road agency must first decide if they plan to maintain the road with a gravel surface or as an unimproved road. A minimum of 1½ to 2 inches of gravel surfacing is necessary for low volume gravel roads. More gravel is desirable for roads with heavier traffic. The WISLR road inventory should reflect the desired surface code.

This manual provides information to allow local officials to evaluate and rate these earthen and unimproved roads. It is a companion document to other PASER manuals produced by the Wisconsin Transportation Information Center (T.I.C.).

This manual may be used to develop PASER ratings for the Wisconsin DOT Local Road Inventory. The rating and evaluation may also be helpful in establishing priorities for future road improvements.

Typical characteristics of unimproved roads

This section of the unimproved roads manual describes conditions commonly found on earthen and unimproved roads as well as the distress or deterioration of these roads which is commonly introduced by wet weather and traffic.

The conditions and distress described here are used in the PASER rating system on page 7. Conditions include profile and ride, drainage, crown, access and surface material. Distress types include ruts, potholes, rocks and roots, and washboarding.

Conditions

▼ **PROFILE AND RIDE** Some earthen roads have been graded to improve the ride. Cut and fill areas will be apparent. The ride condition may allow comfortable speeds over 25 mph, but when poor surface conditions exist, speeds may be limited.

▼ **DRAINAGE** Although earthen roads are often simple excavations with the road surface below the surrounding land, some ditches may be provided. Culverts also may be used for water flow under the road.



4 Typical characteristics of unimproved roads

▼ **SURFACE MATERIAL** An earthen road surface is usually natural soil with little or no gravel or permanent surfacing. Sandy soil will drain quicker while clay, silt, and organic soils turn to mud when wet. In some areas with very low traffic, turf may cover all or part of the road.



▼ **CROWN** The road may be graded with a crown to drain the road bed. It is desirable to have the center 4-6 inches higher than the road edge.



▼ **ACCESS** All-weather road access may be possible on some unimproved roads. Poor conditions can limit access during wet weather.



Distress

▼ **RUTS** May develop in the wheel paths. They range from minor—less than three inches—to severe, over nine inches. Regrading helps improve drainage and ride.

Slight ruts in wheel path.



Moderate rutting in low area where water crosses an ungraded road.



Moderate ruts in soft dry soil surface. Periodic maintenance grading helps improve ride and access.



Severe rutting makes travel difficult.



6 Typical characteristics of unimproved roads

▼ **POTHOLES** Standing water and traffic action create potholes. They may range from isolated to widespread. Regrading is desirable to remove trapped water and improve ride.

Minor potholes.



No grading, crown or ditching leads to severe potholes.

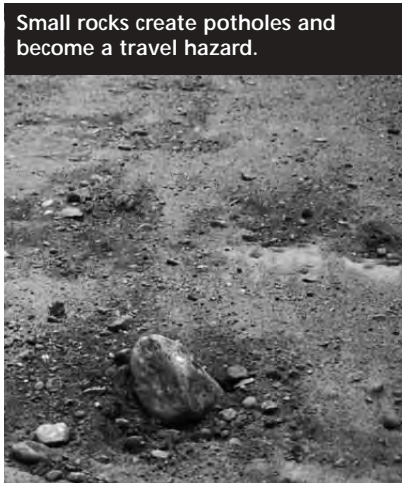


▼ **ROCKS AND ROOTS** Larger rocks and tree roots may be difficult to remove with the minor grading often performed on unimproved roads. When left in the surface they create a rough ride and low travel speed.

Large, flat boulder exposed by light maintenance grading.



Small rocks create potholes and become a travel hazard.



Tree roots leave a very rough surface and require slow travel.



► **WASHBOARDING**

Corrugating, washboarding, or general rough surface conditions may develop under traffic action. Maintenance regrading is required.

Washboard surface caused by traffic on earthen road.



Rating the condition of unimproved roads

This section of the manual presents a simplified rating system to help you manage earthen roads and supply information for your local road inventory. It uses a scale of 1 to 4, with 4 being very good and 1 being poor.

Ratings of the earthen road's overall condition are based on the general condition and the extent and severity of distress. Recommended maintenance or treatment is also a part of the rating process. Inspecting roads every year or two helps track the condition and lets local officials plan for maintenance and improvement.

First evaluate the general road conditions. If the road has been graded to create a smooth profile (cuts and fills) and has drainage ditches and a crown, then it could be

rated 4 if there is little or no distress (potholes, etc.). If it has been graded, but has some distress, then it will be rated 3 or lower.

If the road has not been graded, that is it follows the natural profile of the terrain, but has little distress, it could be rated 3. Roads with grass surfaces, potholes, ruts, unstable surface soil, and limited access would typically be rated 2 or 1.

Study the general conditions and distresses common for each rating category. Next, proceed to the photographic examples that illustrate typical conditions for each PASER rating. The table below is a summary of the ratings and their characteristic conditions.

Surface rating	General condition, distress, and recommended improvement
4 Very Good	Graded with cut and fill areas. Crown present. Ditches and culverts may be present. Comfortable ride over 25 mph possible. No significant ruts or potholes. Sandy or stable surface material. Access normally available in all weather. No improvement needed.
3 Good	May have some limited grading, crown or drainage. Slight rutting, less than 3 inches deep. Very few potholes, little washboarding. Comfortable ride at 15-20 mph. Good access and stable surface except in severe weather or unusual conditions. Routine maintenance or spot grading helpful.
2 Fair	Road follows natural terrain. Road not graded with cuts or fill areas. Little or no crown. Limited or no ditches or culverts. Ruts may be very common, some over 6 inches deep. Occasional potholes and uneven surface conditions. Ride usually requires speeds lower than 15 mph. Access may be limited during and after rain. Significant grading required to improve drainage, repair ruts and potholes, and improve road to good condition.
1 Poor	Very poor surface and driving conditions. Recreational trail, limited use. Severe rutting and/or extensive potholes. Surface condition often limits speed to less than 10 mph. Access for cars and trucks may be restricted for extensive periods of time. Reconstruction needed to provide improved access, repair severe distress, and improve road to good condition..

4 – VERY GOOD

Graded with cut and fill areas.

Crown present.

Ditches and culverts may be present.

Comfortable ride over 25 mph possible.

No significant ruts or potholes.

Sandy or stable surface material.

Access normally available in all weather.

No improvement needed.

EXAMPLES

- A Graded road with crown allows good ride and speeds of 25 mph. Sandy surface soil.

- B Surface mixture of soil and gravel. Graded with cuts and fill areas.

- C Excellent drainage provided by ditch and crown. Stable surface soils.



3 – GOOD

May have some limited grading, crown or drainage.

Slight rutting, less than 3 inches deep.

Very few potholes, little washboarding.

Comfortable ride at 15-20 mph.

Good access and stable surface except in severe weather or unusual conditions.

Routine maintenance or spot grading helpful.



EXAMPLES

- A Graded surface profile. Minor rutting. Good ride.
- B Grading creates good profile and ride. Dust from loose, dry soil surface
- C No graded profile or ditch. Crown helps drainage. Slight rutting and good ride. Provides good access.
- D No graded profile. Slight crown. Stable surface provides all-weather access. Comfortable ride at 15-20 mph.



2 – FAIR

Road follows terrain. No ditches. Loose surface soil. Moderate ruts. Comfortable ride at 10 mph.

Road not graded with cuts or fill areas.

Little or no crown.

Limited or no ditches or culverts.

Ruts may be very common, some over 6 inches deep.

Occasional potholes and uneven surface conditions.

Ride usually requires speeds under 15 mph.

Access may be limited during and after rain.

Significant grading required to improve drainage, repair ruts and potholes, and improve road to good condition.



EXAMPLES

- A Road follows terrain. No ditches. Stable surface. Ride comfortable at 10-15 mph.
- B Water crossing creates ruts and may limit access in wet weather.
- C Loose dry soil creates moderate ruts in several locations.
- D Low volume forest access. Stable surface. Comfortable ride at 10 mph.



 **1 – POOR**

Very poor surface and driving conditions.

Recreational trail, limited use.

Severe rutting and/or extensive potholes.

Surface condition often limits speed to less than 10 mph.

Access for cars and trucks may be restricted for extensive periods of time.

Reconstruction needed to provide improved access, repair severe distress, and improve road to good condition.

EXAMPLES

- A Wheel tracks are only evidence of road.
- B Severe ruts and mud limit access throughout the year.
- C Rocks and holes limit speed and produce rough ride.
- D Loose dry soil creates severe ruts.



Practical advice on rating roads

Inventory and field inspection

Most agencies routinely observe roadway conditions as a part of their normal work and travel. However, an actual inspection means looking at the entire roadway system and preparing a written summary of conditions. This inspection has many benefits over casual observations. It can be helpful to compare segments, and rating decisions are likely to be more consistent because the entire roadway system is considered at the same time.

An inspection also encourages a review of specific conditions important in roadway maintenance, such as drainage and adequate strength.

A simple written inventory is useful in making decisions where others are involved. You do not have to trust your memory, and you can usually answer questions in more detail. Having a written record also improves your credibility with the public.

Finally, a written inventory is very useful in documenting changing roadway conditions. Without records spanning several years, it is hard to know if road conditions are improving, holding their own, or declining.

Annual budgets and long range planning are best done when based on actual needs as documented with a written inventory.

The Wisconsin DOT local road inventory (WISLR) is a valuable resource for managing your local roads. Adding PASER road condition ratings is an important improvement.

Averaging and comparing sections

Rating a roadway segment may involve evaluating conditions over a considerable length (a mile or more in rural areas, or many blocks in urban areas). Obviously, no roadway segment has entirely consistent conditions. Also, surfaces in one section will not have all of the types of distress listed for any particular rating. They may have only one or two types. Therefore, some

averaging is necessary. The objective is to rate the condition that represents the majority of the roadway. Small or isolated conditions should not influence the rating. It is useful to note these special conditions on the inventory form so this information can be used in planning specific maintenance projects. For example, some spot repairs may be necessary.

Occasionally surface conditions vary significantly within a segment. For example, short sections of good condition may be followed by sections of poor surface conditions. In these cases, it is best to rate the segment according to the worst conditions and note the variation on the form.

The overall purpose of condition rating is to be able to compare each segment relative to all the other segments in your roadway system. On completion you should be able to look at any two pavement segments and find that the better surface has a higher rating.

Within a given rating, say 3, not all pavements will be exactly the same. However, they should all clearly be in better condition than those rated 2 or 1. When rating a difficult segment, it can be helpful to compare it to other segments that you have already rated. For example, if it is better than those you rated 2, and worse than a typical 4, then a rating of 3 is appropriate. Having all pavement segments rated in the proper relative order is most important and useful.

Separating road function from conditions

Unimproved roads often are found where traffic volumes are very low. This can be confusing. People rating roads are sometimes more willing to accept poor condition on a road if it is little used. In higher traffic situations, they expect a road in better condition.

Therefore, there may be a tendency to evaluate the condition more harshly in higher traffic volume situations and

to be more lenient in evaluating little used roads. This tendency should be avoided. The evaluation must be an objective description of the actual roadway condition.

The road's function or importance is also a factor in making improvement decisions, but it must be considered separately from the condition rating process. Roads can be categorized by their use or function. In choosing which projects to include in a specific budget, it is helpful to consider both the surface condition and the road's importance.

Planning maintenance and repair

We have found that relating a normal maintenance or rehabilitation procedure to the surface rating scheme helps local officials use the rating system. However, an individual surface rating should not automatically dictate the final maintenance or rehabilitation technique. You should consider future traffic projections, land use, and original construction. It may be appropriate to limit improvements on low volume, unimproved roads.

Summary

Using local road funds most efficiently requires good planning and accurate identification of appropriate rehabilitation projects. Assessing roadway conditions is an essential first step in this process. The PASER pavement surface evaluation and rating procedure has been effective in improving decision making and using highway funds more efficiently. Local officials and staff can use it directly; they can also combine it with additional testing and data collection in a more comprehensive pavement management system. For additional training or information, contact the Wisconsin Transportation Information Center.

**Transportation
Information
Center
Publications**

Asphalt PASER Manual

Pavement Surface Evaluation and Rating, 1987, 39 pp.

Gravel PASER Manual

Pavement Surface Evaluation and Rating, 1989, 32 pp.

Concrete PASER Manual

Pavement Surface Evaluation and Rating, 1989, 48 pp.

Sealcoat PASER Manual

Pavement Surface Evaluation and Rating, 2000, 16 pp.

Drainage Manual

Local Road Assessment and Improvement, 2000, 16 pp.

SAFER Manual

Safety Evaluation for Roadways, 1996, 40 pp.

Flagger's Handbook (pocket-sized guide), 1998, 22 pp.

Work Zone Safety, Guidelines for Construction, Maintenance, and Utility Operations, (pocket-sized guide), 1999, 55 pp.

Wisconsin Transportation Bulletins

- #1 Understanding and Using Asphalt
- #2 How Vehicle Loads Affect Pavement Performance
- #3 LCC—Life Cycle Cost Analysis
- #4 Road Drainage
- #5 Gravel Roads
- #6 Using Salt and Sand for Winter Road Maintenance
- #7 Signing for Local Roads
- #8 Using Weight Limits to Protect Local Roads
- #9 Pavement Markings
- #10 Seal Coating and Other Asphalt Surface Treatments
- #11 Compaction Improves Pavement Performance
- #12 Roadway Safety and Guardrail
- #13 Dust Control on Unpaved Roads
- #14 Mailbox Safety
- #15 Culverts-Proper Use and Installation
- #16 Geotextiles in Road Construction/Maintenance and Erosion Control
- #17 Managing Utility Cuts
- #18 Roadway Management and Tort Liability in Wisconsin
- #19 The Basics of a Good Road
- #20 Using Recovered Materials in Highway Construction
- #21 Setting Speed Limits on Local Roads



**Transportation
Information Center**

University of Wisconsin—Madison

432 North Lake Street
Madison, WI 53706

phone 800/442-4615

fax 608/263-3160

e-mail tic@epd.engr.wisc.edu

URL <http://epd.engr.wisc.edu/centers/tic/>

PASER



*Transportation
Information Center*

University of Wisconsin–Madison

Unimproved Roads