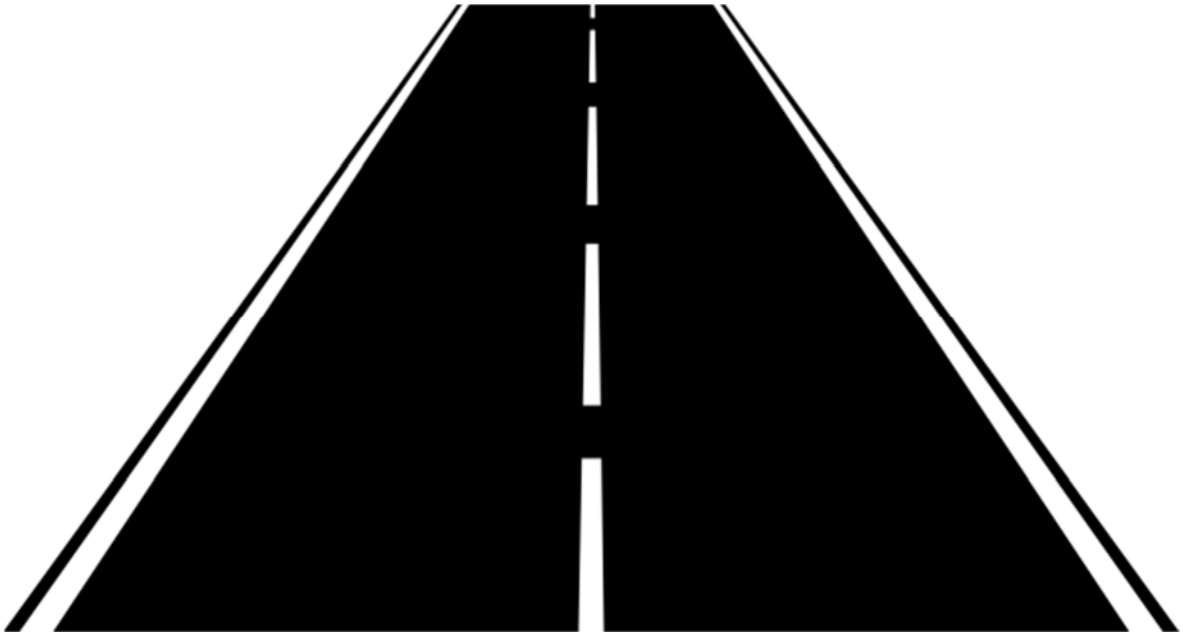
TOWN OF BRECKENRIDGE
PUBLIC WORKS

Streets Evaluation Manual



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Introduction

This manual follows closely the PASER (Pavement Surface Evaluation and Rating) Manual and roadway management system developed by Phil Scherer, transportation planner, Northwest Wisconsin Regional Planning Commission.

The following definitions of road conditions and evaluations and related repairs were taken from the PASER Manual. Included are photos from Town of Breckenridge roadways and streets to accompany each evaluation rating.

Asphalt pavement distress

The Town of Breckenridge uses visual inspection to evaluate pavement conditions. The key to a useful evaluation is identifying different types of pavement distress and linking them to a cause. Understanding the cause for current conditions is important in selecting an appropriate maintenance or rehabilitation technique. There are three especially useful steps in managing our local roads:

1. Inventory all local roads and streets.
2. Periodically evaluate the condition of all pavements.
3. Use the condition evaluations to set priorities for projects and select alternative treatments.

There are four major categories of common asphalt surface distress:

- Surface defects
  Raveling, flushing, polishing

- Surface deformation
  Rutting, distortion—rippling and shoving, settling, frost heave

- Cracks
  Transverse, reflection, slippage, longitudinal, and alligator cracks

- Patches and potholes

Deterioration has two general causes: environmental due to weathering and aging and structural caused by repeated traffic loading.

The rate at which pavement deteriorates depends on its environment, traffic loading conditions, original construction quality, and interim maintenance procedures. Poor quality materials or poor construction procedures can significantly reduce the life of a pavement.

Timely and effective maintenance can extend a pavement's life. Crack sealing and seal coating can reduce the effect of moisture in aging of asphalt pavement.

Recognizing defects and understanding their causes help us rate pavement condition and select cost-effective repairs. The pavement defects shown on the following pages provide a background for this process.

Evaluation

SURFACE DEFECTS

Raveling

Raveling is progressive loss of pavement material from the surface downward, caused by stripping of the bituminous film from the aggregate, asphalt hardening due to aging, poor compaction especially in cold weather construction, or insufficient asphalt content. Slight to moderate raveling has loss of fines. Severe raveling has loss of coarse aggregate. Raveling in the wheel paths can be accelerated by traffic. Protect pavement surfaces from the environment with sealcoat or a thin overlay if additional strength is required.

Raveling

French Gulch Rd, below Union Mill Rd

Extreme Raveling

Airport Rd, just South of Coyne Valley Rd

Flushing

Flushing is excess asphalt on the surface caused by a poor initial asphalt mix design or by paving or seal coating over a flushed surface. Repair by blotting with sand or by overlaying with properly designed asphalt mix.

Flushing

Too much AMZ oil in spray patch

Polishing

Polishing is a smooth slippery surface caused by traffic wearing off sharp edges of aggregates. Repair with sealcoat or thin bituminous overlay using skid-resistant aggregate.

Polishing

CR 450, In front of Kenington bus stop

SURFACE DEFORMATION

Rutting

Rutting is displacement of material, creating channels in wheel paths. It is caused by traffic compaction or displacement of unstable material. Severe rutting (over 2") may be caused by base or subgrade consolidation. Repair minor rutting with overlays. Severe rutting requires milling the old surface or reconstruction the roadbed before resurfacing.

Rutting French Gulch Rd

Distortion

Shoving or rippling is surfacing material displaced crossways to the direction of traffic. It can develop into wash boarding when the asphalt mixture is unstable because of poor quality aggregate or improper mix design. Repair by milling smooth and overlaying with stable asphalt mix. Other pavement distortions may be caused by settling, frost heave, etc. Patching may provide temporary repair. Permanent correction usually involves removal of unsuitable sub grade material and reconstruction.

Distortion at Lomax Dr. cul-de-sac

CRACKS

Transverse Cracks

A crack at approximately right angles to the center line is a transverse crack. They are often regularly spaced. The cause is movement due to temperature changes and hardening of the asphalt with aging. Transverse cracks will initially be widely spaced (over 50'). Additional cracking will occur with aging until they are closely spaced (within several feet). These usually begin as hairline or very narrow cracks; with aging they widen. If not properly sealed and maintained, secondary or multiple cracks develop
parallel to the initial crack. The crack edges can further deteriorate by raveling and eroding the adjacent pavement. Prevent water intrusion and damage by sealing cracks which are more than ¼" wide.

Transverse cracks at Reiling Rd at Rachel Lane

Reflection Cracks Cracks in overlays reflect the crack pattern in the pavement underneath. They are difficult to prevent and correct. Thick overlays or reconstruction is usually required.

Reflection Cracks Asphalt overlay over concrete

Slippage Cracks

Crescent or rounded cracks in the direction of traffic are caused by slippage between an overlay and an underlying pavement. Slippage is most likely to occur at intersections where traffic is stopping and starting. Repair by removing the top surface and resurfacing using a tack coat.

Slippage Cracks

Longitudinal Cracks

Cracks running in the direction of traffic are longitudinal cracks. Center line or lane cracks are caused by inadequate bonding during construction or reflect cracks in underlying pavement. Longitudinal cracks in the wheel path indicate fatigue failure from heavy vehicle loads. Cracks within one foot of the edge are caused by insufficient shoulder support, poor drainage, or frost action. Cracks usually start as hairline or vary narrow and widen and erode with age. Without crack filling, they can ravel, develop multiple cracks, and become wide enough to require patching. Filling and sealing cracks will reduce moisture penetration and prevent further sub grade weakening. Multiple longitudinal cracks in the wheel path or pavement edge indicate a need for strengthening with an overlay or reconstruction.

Longitudinal Cracks on Peerless Drive

Block Cracks

Block cracking is interconnected cracks forming large blocks. Cracks usually intersect at nearly right angles. Blocks may range from one foot to approximately 10' or more across. The closer spacing indicates more advanced aging caused by shrinking and hardening of the asphalt over time. Repair with seal coating during early stages to reduce weathering of the asphalt. Overlay or reconstruction required in the advanced stages.

Block Cracking

Alligator Cracks

Interconnected cracks forming small pieces ranging in size from about 1" to 6" are alligator cracks. This is caused by the failure of the surfacing due to traffic loading (fatigue) and very often also due to inadequate base or subgrade support. Repair by excavating localized areas and replacing base and surface. Large areas require reconstruction. Improvements in drainage may often be required.

Alligator Cracks

PATCHES AND POTHOLES

Patches

Original surface repaired with new asphalt patch material. This indicates a pavement defect or utility excavation which has been repaired. Patches with cracking, settlement or distortions indicate underlying causes still remain. Recycling or re-construction is required when extensive patching shows distress.

Patch Jefferson Ave at S. Ridge St

Potholes

Potholes are loss of pavement material caused by traffic loading, fatigue, and inadequate strength. Often combined with poor drainage. Repair by excavating or rebuilding localized potholes. Reconstruction required for extensive defects.

Pothole on Hwy 9

Rating Pavement Surface Conditions

You can evaluate and rate asphalt pavement surfaces with a rating scale from **10 - excellent** condition to **1 - failed**. Once significant deterioration begins, it is common to see pavement decline rapidly. This is usually due to a combination of loading and the effects of moisture. As

a pavement ages and additional cracking develops, more moisture can enter the pavement and accelerate the rate of deterioration.

Look at the photographs in this section to become familiar with the descriptions of the individual rating categories. To evaluate an individual pavement segment, first determine its general condition. Is it relatively new, toward the top end of the scale? In very poor condition and at the bottom of the scale? Or somewhere in between? Next, think generally about the appropriate maintenance method. Use the rating categories outlined below.

Finally, review the individual pavement distress and select the appropriate surface rating. Individual pavements will ***not*** have all of the types of distress listed for any particular rating. They may have only one or two types.

RATINGS ARE RELATED TO NEEDED MAINTENANCE OR REPAIR

Rating 9 & 10	No maintenance required
Rating 8	Little or no maintenance
Rating 7	Routine maintenance, crack sealing and minor patching
Rating 5 & 6	Preservative treatments (seal coating)
Rating 3 & 4	Structural improvement and leveling (overlay or recycling)
Rating 1 & 2	Reconstruction

In addition to indicating the surface of a road, a given rating also includes a recommendation for needed repair. This feature of the rating system facilitates its use and enhances its value as a tool in ongoing road maintenance.

Rating System

Surface Rating	*Visible Distress*	*General Condition/ Treatment Measures*
10 Excellent	None.	New construction.
9 Excellent	None.	Recent overlay. Like New.
8 Very Good	No longitudinal cracks except reflection of paving joints. Occasional transverse cracks, widely spaced (40' or greater). All cracks sealed or tight (open less than ¼").	Recent sealcoat or new cold mix. Little or no maintenance required.
7 Good	Very slight or no raveling, surface shows some traffic wear. Longitudinal cracks (open ¼") due to reflection or paving joints. Transverse cracks (open ¼") spaced 10 feet or more apart. No patching or very few patches in excellent condition.	First signs of aging. Maintain with routine crack filling.
6 Good	Slight raveling (loss of lines) and traffic wear. Longitudinal cracks (open ¼" – ½") due to reflection or paving joints. Transverse cracking (open ¼" – ½") some spaced less than 10 feet. Slight to moderate flushing or polishing. Occasional patching in good	Shows signs of aging, sound structural condition. Could extend life with sealcoat.

	condition.	
5 Fair	Moderate to severe raveling (loss of lines and course aggregate). Longitudinal cracks (open ½") show some slight raveling and secondary cracks. First signs of longitudinal cracks near wheel path or edge. Transverse cracking and first signs of block cracking. Slight crack raveling (open ½"). Extensive to severe flushing or polishing. Some patching or edge wedging in good condition.	Surface aging. Sound structural condition. Needs sealcoat or thin non-structural overlay (less than 2")
4 Fair	Severe surface raveling. Multiple longitudinal and transverse cracking with slight raveling. Block cracking (over 25 – 50% of surface). Patching in fair condition. Slight rutting or distortions (1" deep or less).	Significant aging and first signs of need for strengthening. Would benefit from recycling or overlay.
3 Poor	Closely spaced longitudinal and transverse cracks often showing raveling and crack erosion. Block cracking over 50% of surface. Some alligator cracking (less than 25% of surface). Patches in fair to poor condition. Moderate rutting or distortion (1" or 2" deep). Occasional potholes.	Need patching and major overlay or complete recycling.
2 Very Poor	Alligator cracking (over 25% of surface). Severe distortions (over 2" deep). Extensive patching in poor condition. Potholes.	Severe deterioration. Need reconstruction with extensive base repair.
1 Failed	Severe distress with extensive loss of surface integrity.	Failed. Needs total reconstruction.

RATING 10 & 9

EXCELLENT

No maintenance required. Newly constructed or recently overlaid roads are in excellent condition and requires no maintenance.

RATING 10 New Construction

RATING 9 Recent overlay

RATING 8

VERY GOOD-

Little or no maintenance required. This category includes roads which have been recently seal coated or overlaid with new cold mix. It also includes recently constructed or overlaid roads which may show longitudinal or transverse cracks. All cracks are tight or sealed.

RATING 8

Widely spaced, sealed cracks

RATING 8

Recent chip seal

RATING 7

GOOD-

Roads show first signs of aging, and they may have very slight raveling. Any longitudinal cracks are along the paving joint. Transverse cracks may be approximately 10' or more apart. All cracks are ¼" or less, with little or no crack erosion. Few if any patches, all in very good condition. Maintain a crack sealing program.

RATING 7

Tight and sealed transverse and longitudinal cracks

RATING 7

Routine sealing recommended

RATING 6

GOOD-

Roads are in sound structural condition but show definite signs of aging. Seal coating could extend their useful life. There may be slight surface raveling. Transverse cracks can be frequent, less than 10' apart. Cracks may be ¼" - ½" and sealed or open. Pavement is generally sound adjacent to cracks. First signs of block cracking may be evident. May have slight or moderate bleeding or polishing. Patches are in good condition.

RATING 6

Transverse cracking less than 10' apart; cracks well sealed

RATING 6

Large blocks, early signs of raveling and block cracking

RATING 5

FAIR-

Roads are still in good structural condition but clearly need seal coating or overlay. They might have moderate to severe surface raveling with significant loss of aggregate. First signs of longitudinal cracks near the edge. First signs of raveling along cracks. Block cracking up to 50% of surface. Extensive to severe flushing or polishing. Any patches or edge wedges are in good condition.

RATING 5

Block cracking with open cracks

RATING 5

Longitudinal cracks near the edge

RATING 4

FAIR-

Roads show first signs of needing strengthening by overlay. They have very severe surface raveling which should no longer be sealed. First longitudinal cracking in wheel path. Many transverse cracks and some may be raveling slightly. Over 50% of the surface may have block cracking. Patches are in fair condition. They may have rutting less than ½" deep or slight distortion.

RATING 4

Wheel rutting

RATING 4

Block Cracking over 50%

RATING 3

POOR-

Roads must be strengthened with a structural overlay (2” or more). Will benefit from milling and very likely require pavement patching and repair beforehand. Cracking will likely be extensive. Raveling and erosion in cracks may be common. Surface may have severe block cracking and show signs of alligator cracking. Patches are in fair to poor condition. There is moderate distortion or rutting (1 - 2”) and occasional potholes.

RATING 3

RATING 3

RATING 2

POOR-

Roads are severely deteriorated and need reconstruction. Surface pulverization and additional base may be cost-effective. These roads have more than 25% alligator cracking, severe distortion or rutting, as well as potholes or extensive patches in poor condition.

RATING 2

Alligator cracking and edge needs repair

RATING 2

RATING 1

FAIL-

Reconstruction required. Roads have failed, showing severe distress and extensive loss of surface integrity.

RATING 1

RATING 1