Adapted and Expanded on from:
PASER Training Manual
The Center for Technology & Training (CTT)
Michigan Technological University

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Introduction

The Pavement Surface Evaluation and Rating (PASER) system is a visual method, based on engineering principles, for evaluating the condition of pavement surfaces in an easy-to-learn, time efficient and consistent way. The method has been formally developed by the University of Wisconsin Transportation Information Center (the Wisconsin LTAP) specifically for local road agencies. The system is based in part on a roadway management system originally developed by Phil Scherer, now retired executive director of the Transportation Development Association of Wisconsin and former transportation planner at the Northwest Wisconsin Regional Planning Commission.

Michigan’s Transportation Asset Management Council (TAMC) has adopted the system for its state-wide assessment of pavement conditions. All local agencies in Wisconsin use it for their required condition reporting. And many other agencies nationwide have found it to be a good solution for their pavement condition assessment needs.

PASER data serves as the foundation for understanding the current state of pavement condition, predicting future pavement condition and building cost-effective pavement maintenance strategies. Additionally, PASER ratings also provide an understandable way for an agency to communicate pavement condition to elected officials and the public.

Rating Roads Effectively

Omission in the Asphalt PASER Manual

Asphalt PASER manuals published prior to 2013 cited “less than ½” of rutting” for PASER 4. But then PASER 3 indicates 1” to 2” of rutting. What happens to the rutting greater than ½” but less than 1”? Good question. To remedy this discrepancy, modify the distress criteria for PASER 4 to “less than 1” of rutting”. This modification has worked out well.

Go to your Asphalt PASER Manual. On pages 15 and 21, change the ½” to 1”.

Rating Speed

Rating roads at highway speeds can lead to inaccuracy. Reviews conducted by Michigan Tech PASER trainers have shown that teams which observe pavement at slower speeds are much more likely to rate them accurately. Attempting to rate pavement at highway speed can lead to distresses being missed and thereby result in higher than the actual condition rating. These inaccurate ratings distort needs assessment, which leads to a picture of the pavement network that doesn’t represent reality.

Accountability—this data is the foundation for decision-making

The objective of the data collection process is to collect ACCURATE data. That data is the foundation for agency-wide analysis that leads to maintenance strategies and an understanding of the resources needed to maintain or improve the road network. Inaccurate data casts doubt on the entire pavement management process, your department and your decisions.

You will collect data as part of your job. Treat it that way. Conversely, agencies need to hold their rating teams accountable for the data they collect.
A Pavement Is Only Rated a PASER 10 Once

According to the PASER methodology, a pavement is rated a 10 when it has been rehabilitated or reconstructed, and it only remains a 10 for one year. The following year it becomes a 9, which is very good condition with no distress. From there, it can remain a 9, or other PASER rating, for multiple years. The 10 is the anchor for the pavement’s deterioration curve. The 9 sets the curve in motion. Repeat the rule: A pavement is only rated a PASER 10 once.

Clarification on Asphalt Block Cracking

The PASER manual description for rating block cracking is based on the distress covering a percentage of the surface. Many raters have had difficulty with that concept. Another way of looking at it is to consider the propagation of the cracks that make up the blocks. This approach coincides with the intent of the PASER method.

PASER 6 First Signs of Block Cracking
Created by the first longitudinal crack (not the paving joint) that joins two transverse cracks, yielding two longitudinal blocks.

PASER 5 Moderate Block Cracking
Created by short transverse cracks that join the longitudinal crack in PASER 6 to either the pavement edge, the centerline joint.

PASER 4 Extensive Block Cracking
Created by the subdivision of the blocks in PASER 5, usually yielding blocks with sides measuring less than 3 ft.

Rate Distress—Not Ride Quality

Just because a road rides well doesn’t mean the pavement surface doesn’t have distress. This is especially true on a road with rutting and cracking in the wheel path, which indicate structural deterioration, but don’t affect ride quality in the early stages – except after rainfall.

Conversely, in the summer, an asphalt surface in relatively good condition, with sealed transverse cracks, often causes a “thump, thump, thump” as tires pass over the expanded crack seal. More noise does not always mean more distress.

Don’t let ride quality distort your ratings—either to the good or to the bad.
**Rate the Worst Lane**

Variation of distress by lane is not uncommon. It can often be found on the inbound lane to a new subdivision, where fully loaded cement trucks have been making regular trips. Or on multi-lane streets, the right lane may incur more distress if used as the transit bus route. Severe distresses are the ones that impact road condition the most. And since the required treatments also cost the most, those distresses impact the budget analysis the most. Rating the best lane would hide the condition of the distressed lane, thereby masking its treatment and budget need. The best approach is to rate the lane in the worst condition. If there is a significant disparity, make note of it during your data collection.

**Do Not Let Ownership or NFC Influence the Rating**

The PASER method assesses pavement distress. Agency ownership or its National Functional Class designation is irrelevant. Distress is distress—period. Surely, ownership and NFC designation will be a factor in project selection, but not at the condition rating stage. Rate the distress objectively, don’t let ownership, NFC or any other aspects influence your rating.

**Rate the Travel Lane, Not the Paved Shoulder**

Although important, paved shoulders are secondary when rating pavement. Distress in a paved shoulder isn’t going to warrant rehabilitation or reconstruction of the entire road surface. Ignore paved shoulder distress when doing PASER evaluation. If the shoulders have unusual distress, that condition can be noted during your data collection.

**Measure Rutting to Get an Understanding of What It Really Looks Like**

Do you know what a ½” of rutting looks like while traveling at 55 mph? It’s almost indiscernible on a dry, sunny day. The best way to learn what it looks like is to measure it. With a 6-foot piece of aluminum angle stock (get this at Lowe’s or Home Depot) and a tape measure, you can measure the extent of rutting in a matter of seconds and learn what the varying degrees of rutting look like. You’ll be surprised. This is especially important during the first days of rating, when you are trying to get your eyes and your brain working together in the PASER mode.

If you enter the roadway to check rutting, be sure to wear all the required safety garments and station one person as a traffic spotter.

**Time of the Day & Lighting Conditions**

Changes in lighting conditions at various times of day can influence how some distresses are perceived. Bright sunlight directly overhead can make surface texture defects or fine cracking on weathered, light colored pavements especially hard to discern. Rating early in the morning or late in the afternoon, while driving into the sun, complicates visibility. If lighting conditions are poor, slow down or pull over to make sure that you are not overlooking any distress cues.

**Rain or Wet Pavements**

PASER is a visual assessment system. Rating pavement in the rain is ineffective. Road surfaces look different when they are wet—sometimes cracks are hidden, sometimes cracks are more pronounced. A good rule: Don’t rate wet pavement.
**High Contrast between the Pavement and Crack Sealing**

Cracks and joints with dark crack seal really stand out when the surrounding pavement is faded from oxidation. Don’t let those dark areas fool you. In addition to the sealed cracks that are very obvious, there may be additional, unsealed cracks that have developed since the crack sealing had been done. Slow down and take a closer look.

**Shade Lines from Nearby Trees**

Depending on the angle of the sun and the direction of the road you are rating, tree shade can really mask distress, especially when multiple trees cause intermittent sun, shade, sun, shade, and so on. Your eyes simply can’t adjust fast enough. Slow down and take a closer look.

**Oxidized Pavement (light colored)**

Over time, sunlight causes asphalt surfaces to oxidize. This oxidation changes the color of the pavement from jet black to grey, sometimes approaching white. At that stage, sunlight reflection makes it hard to see cracking and especially easy to miss the first stages of cracking in the wheel path when driving at highway speeds. Here again, slow down and take a closer look.

**What to Do When Construction Is Taking Place**

No doubt you will come upon some segments that are under construction when doing PASER rating. They may be passable or they may be closed to traffic altogether. If construction has begun, under the assumption that the work will be completed this season, rate that pavement a 10. However, orange barrels stored on the shoulder by a contractor in anticipation of a future project don’t constitute construction. DO NOT rate that pavement a 10. Instead, rate what it currently is. You never know what might happen. The project could be delayed or postponed.

**Group Dynamics in the Rating Vehicle**

If done with multiple people, condition rating is supposed to be a group decision making process—a process that conforms to the PASER methodology. Teams should read the PASER descriptions closely and use the data collection field guide; don’t just look at the pictures in the manual (you’ll probably never find a pavement that looks exactly like that anyway). Talk through the distress levels and work your way to consensus. If a particular rater is being a “bulldog” and insisting on misinterpretation of the PASER method, take a time out and review the methodology as described in the PASER manuals.

**Safety Concerns**

**The Driver Should Focus on Driving**

During data collection, you will be merging in and out of traffic, slowing down, pulling off to the shoulder for team discussions, etc. Always take safety precautions. Driving the team vehicle is not something to be taken lightly. The driver is responsible for keeping everyone alive.

**Seating within the Vehicle**

The best configuration for a 3-person team is a rater in the front seat and a second rater in the driver side of the back seat (provides a great view of the opposite lane of pavement). The rater in
the back seat can handle the data entry. If the data entry person sits in the front seat with a laptop, an airbag discharge could plant the laptop screen into their face. Think about it.

**Warning Lights on the Vehicle & Safety Garments on the Rater**

Any vehicle used for data collection must be equipped with a warning light bar. Any rater that gets out of the vehicle to get a better view of distress or to measure rutting must be wearing safety garments as required by their employer.

**Computer Hardware—Be Careful**

Data collection can become a tedious activity—your hardware is at risk. Consider this: You are on your fifth day out; its midafternoon and about 97 degrees. You pull up at the Quick Stop for cold drinks. The data entry person sitting in the rear seat goes to jump out of the van and doesn’t realize that the laptop power cord has become wrapped around their leg. What happens next? Have you ever heard the sound when asphalt meets a laptop computer? You don’t want to. Equipment damage will stop data collection dead in its tracks. And lost data and lost equipment.

**Emergency Plan**

Discuss ahead of time what you plan to do in case of an emergency—have an actual conversation! Have a cell phone in each car and a number to call in addition to 911 in case there is a problem.

**Splitting Segments**

Typically, a GIS basemap segments all streets and roads on an intersection-to-intersection basis (node to node) and political boundaries (township/city/county). Although that format works well in the GIS world, pavement surface types and road geometry don’t always conform to the “intersection-to-intersection” format in the real world. So pavement management practitioners have found the need to split segments.

If you are working within your agency’s GIS system, you will need to create a separate layer to handle segment splits.

There are a variety of reasons why your agency should respect the basemap segment as well as an equal number of reasons to justify splitting segments, especially as situations in the field change over time.

**Guiding Principle for Splitting Segments**

If the area in question would receive rehabilitation or reconstruction exclusive of the basemap segment from which it came, now and in the future, then the area in question should be split into its own designated rating segment.

In practice, avoid splitting segments into lengths of less than ¼ mile.

**Good Reasons for Splitting Segments**

**Change in Surface Type** The road surface changes from concrete to asphalt, asphalt to gravel, asphalt to chip seal road, chip seal road to gravel, etc. Splitting a segment to reflect a change in
surface type is the only way to insure that the inventory collected reflects the correct mileage of the surfaces that are really there.

**Number of Lanes** Commercial or residential development activity may often necessitate the addition of through lanes or continuous left-turn lanes within a given basemap segment. That change in the number of through lanes creates a distinct use for that portion of the segment and a construction project resulting in distinct future costs. Splitting a segment to reflect the change in number of lanes is the only way to insure that the lane mile inventory reflects what’s really out there.

**Intersection as a Unique Facility** Many intersections on the local road system are simply extensions of the segments— design, surface type, service life, and number of lanes are the same. However, there are cases where a major intersection becomes a facility in and of itself—a two lane asphalt highway that expands into one left turn lane, one right turn lane, and one through lanes— all concrete. This significant change in geometry, number of lanes and surface type creates a construction project resulting in distinct future costs. This type of intersection is a good candidate to be designated as its own segment.

Unique Environmental Factors In the continuing battle with Mother Nature, there are often cases where the sub grade is muck, where flooding regularly washes out the roadway, or where exceptional frost heave occurs over a distance. This type of deterioration is far from normal and may require its own rehabilitation or reconstruction. These unique areas, provided they are of significant length (at least a ¼ mile, not just 20 feet over a culvert crossing), warrant being split and being designated as its own segment. Refer to the **Guiding Principle for Splitting Segments** above.

**Bad Reasons for Splitting Segments—Don’t Do It!**

**Change in PASER Rating Over a Short Stretch** Isolated pavement distress, distress that will only receive routine maintenance, isn’t substantial enough to impact the overall network—it’s a maintenance issue. Note it as such.

**Short Turning Bay** Short turning bays are not substantial enough to impact the overall network length.

**School Zone** Not just because it’s a school zone. However, if parking lanes were added to accommodate school bus capacity over a significant stretch, then it may meet the criteria for splitting.

**Traffic Count Segments** Traffic counts do not determine the PASER rating. Traffic counts are supplemental information used to prioritize candidate selection during the pavement management process.
**Segment Splitting In Actual Practice?**

Condition data can be viewed as a model for money—what will it cost to maintain and reconstruct a roadway? At the end of the day, this is the question that the elected officials and the public wants answered.

Consider the following example of how a valid segment split clarifies the answer to the above question and improves the quality of the data.

*a. A one-mile basemap segment, asphalt, with a .35 mile bad spot crossing a swamp.*

Cost Assumptions:

Seal coat, approximate cost: $20,000 / lane mile.

Reconstruction, approximate cost: $175,000 / lane mile

If the segment is not split according to the Guiding Principle above, the cost to do a seal coat on both lanes of this one-mile segment with a PASER rating of 6 is $40,000. However, in the real world, the section that runs through the swamp needs reconstruction, not seal coating. This has historically been the case and we expect it to continue being the case. What costs get overlooked? The cost to reconstruct both lanes of that .35 mile is $122,000—over 300% of the cost to seal coat the entire mile!

**Rating Sealcoat Roads**

When road professionals hear "sealcoat" or “chip seal” those words may mean different things to different people, sometimes even within the same road agency.

The confusion stems from how the sealcoat or chip seal is being used—whether as a surfacing option for a gravel road (the PASER definition), or as a preventative maintenance treatment for a hot mix asphalt (HMA) pavement. The process of application is basically the same. But the eventual outcomes and the implication to pavement condition rating are different.

**Sealcoat as a Pavement Type**

Sealcoats are frequently applied to a gravel road to reduce dust, maintain ride and seal out water. The sealcoat is applied directly onto the top course of aggregate that was formerly the road's surface; in effect creating a sealcoat pavement. This type of application is generally considered to have a service life of five years; however, some low volume roads may exceed this life if
properly maintained. At the end of its service life another sealcoat layer is typically applied. Reapplication can be directly on top of the existing surface if the cross slope of the road is acceptable and rutting is minimal, otherwise the existing sealcoat surface must be scarified, graded and re-compacted prior to the application.

**Sealcoat as a Preventative Maintenance for HMA**

Sealcoats are also frequently applied to a HMA pavement to maintain and restore serviceability. The process restores surface friction, seals minor cracking and can eliminate minor ruts. It is intended to extend the life and quality of an existing HMA pavement. Use the Asphalt PASER for these pavements.

**The Rating System**

The PASER rating system (per the original Seal Coat manual) rates a sealcoat road (sealcoat over a gravel base) on a scale of 1 to 5; however, the local agencies in Michigan felt that the 1 to 5 scale would create confusion when all the other PASER scales were 1 to 10. They also found the description methodology difficult to follow.

A group of agency engineers got together developed a description method using the relative percent of distress observed on the pavement and applied those conditions to the 1 to 10 scale. A sheet describing this approach is included on a page at the end of this guide.

**Rating Sealcoat Pavement Using the Michigan “Percentage” Approach**

The first thing you need to do is determine that you are looking at a sealcoat road and not a sealcoat maintenance treatment on HMA pavement. If HMA, use the Asphalt PASER.

The Michigan sealcoat PASER ratings are based on the percentage of distress over a cross section of the pavement. The distresses are: edge distress, lane distress (including rutting) and raveling.

These percentages are **not** cumulative—you don’t add them up. Each distress stands on its own.

If neither of the surface distress percentages outlined in the Sealcoat distress table exceed the upper limit, then that rating is your selection.

For example, the PASER 5 description allows up to 20 percent raveling, 20 percent edge distress or 20 percent lane distress. If your assessment yields 10 percent raveling, 5 percent edge distress and 20 percent lane distress, the PASER rating is 5 because neither of the distresses exceeds 20 percent. It is not a PASER rating of 6 because lane distress exceeds the 10 percent criteria, and it is not a PASER rating of 3 regardless that the cumulative total distress equals 35.

**Data Collection Time Log**

It is a good practice to track the time spent on doing PASER data collection, along with miles rated, miles driven, etc. This information will allow your agency to assess personnel effort in this process and justify the benefits gained for such a relatively small investment. Complete a Time Log every day. A sample log is provided in the following pages.
# PASER Rating Data Collection

## Time Log

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<th>Crew</th>
<th>Date &amp; Hours</th>
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<td>Name: ______________________</td>
<td>Date: ____________</td>
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<tr>
<td>Name: ______________________</td>
<td>Shift Hours: ____________</td>
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<td>Name: ______________________</td>
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<td>Name: ______________________</td>
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<table>
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<tr>
<th>Geographic Area Covered</th>
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<table>
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<th>Vehicle Log</th>
<th>Comments</th>
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<td>Vehicle Used: _______</td>
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<td>Begin Mileage: _______</td>
<td>_____________________</td>
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<tr>
<td>End Mileage: _______</td>
<td>_____________________</td>
</tr>
<tr>
<td>Total Miles: _______</td>
<td>_____________________</td>
</tr>
<tr>
<td>Miles Rated: _______</td>
<td>_____________________</td>
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</table>

(accessToken this from the LDC)

Person Completing the Time Log: ____________
### Michigan PASER Sealcoat Rating Guide Table

<table>
<thead>
<tr>
<th>PASER Rating</th>
<th>Description</th>
<th>Condition / Defects</th>
<th>Remedy / Action</th>
<th>Typical Age in years *</th>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>Excellent</td>
<td>New construction</td>
<td>None</td>
<td>&lt; 1 year</td>
</tr>
<tr>
<td>9</td>
<td>Excellent</td>
<td>Like new</td>
<td>None</td>
<td>1 to 3</td>
</tr>
<tr>
<td>8</td>
<td>Very Good</td>
<td>First signs of distress</td>
<td>Routine maintenance.</td>
<td>3 to 5</td>
</tr>
<tr>
<td>7</td>
<td>Good</td>
<td>First signs of distress, Limited edge distress</td>
<td>Minor edge seal</td>
<td>4 to 6</td>
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<tr>
<td>6</td>
<td>Good</td>
<td>Minor distress, Edge distress with limited lane distress &lt;5%</td>
<td>Minor asphalt or spray-injection patching</td>
<td>5 to 7</td>
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<tr>
<td>5</td>
<td>Fair</td>
<td>Moderate distress</td>
<td>Moderate asphalt or spray-injection patching</td>
<td>6 to 8</td>
</tr>
<tr>
<td>4</td>
<td>Fair</td>
<td>Distressed, Edge distress up to 20%, Lane distress up to 20%, Raveling up to 20%</td>
<td>Single application sealcoat</td>
<td>7 to 9</td>
</tr>
<tr>
<td>3</td>
<td>Poor</td>
<td>Distress up to 30%, Lane distress up to 30%, Rutting of ½” to 1”</td>
<td>Asphalt or spray-injection patching and Double application sealcoat</td>
<td>8 to 10</td>
</tr>
<tr>
<td>2</td>
<td>Very poor</td>
<td>Edge distress &gt; 50%, Lane distress &gt; 50%, Rutting greater than 2”</td>
<td>Wedge and/or asphalt or spray-injection patching and Double or Triple application sealcoat. May be necessary to crush and reshape prior to new sealcoat surface</td>
<td>&gt; 9</td>
</tr>
<tr>
<td>1</td>
<td>Failed</td>
<td>Extensive distress &gt; 50% of surface area</td>
<td>Reconstruct by crush and shape prior to new sealcoat surface, possible return to gravel</td>
<td>&gt;10</td>
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<tr>
<td>0</td>
<td>Not Rated</td>
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