

Technical Note
About the PCI Calculations with
the
2015 MTC Distress
Identification Manual
Revised 2018/02/19

- **Introduction**

The American Society for Testing and Materials ASTM, published in 1999 the Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys. This standard covers a methodology to quantify pavement condition after performing visual inspections and registering type, severity level and extension of 19 distresses for both flexible and rigid pavements. In 2009, the standard was updated for flexible pavements with 20 distresses since weathering and raveling were separated with their own deduct curves affecting the PCI calculations.

In 2015, the MTC Distress Identification Manual was updated in 2015 for use in the MTC StreetSaver software defines 8 distress types for asphalt (AC) surfaced pavements with Weathering separated from Raveling. This technical note is prepared to explain the expected differences in the PCI calculations using the updated MTC Distress Identification Manual previous version that defines 7 distress types for asphalt (AC) surfaced pavements with Weathering and Raveling defined as one single distress.

- **Expected differences in the PCI calculations**

PCI distress data was collected following the updated 2015 MTC Distress Identification Manual (8 distress types for asphalt) and the PCI with distress definitions from the previous version (7 distress types for asphalt). The expected differences between PCI calculated based on 7 distresses (PCI_7) are PCI calculated based on 8 distresses (PCI_8), are:

PCI₈ Network Average

- In general terms, the PCI network average for PCI_8 is expected to be +1 to +4 PCI points.

If PCI_7 network average ranges from:

- 85-95 : the PCI_8 network average increases about 4 points.
- 70-85 : the PCI_8 network average increases about 3 points.
- 35-70 : the PCI_8 network average increases about 2 points.
- 10-35 : the PCI_8 network average increases about 1 point.

PCI₈ for Individual Pavement Sections

- PCI₈ should be:
 - Higher than PCI₇ in about 80% of the cases.
 - Same as PCI₇ in about 10% of the cases.
 - Lower than PCI₇ in about 10% of the cases.

- For pavements in very good condition, PCI₇ above 70, it is expected that:
 - Low Weathering will result in higher PCI₈ values than Low W&R
 - Medium Weathering will result in higher PCI₈ values to Low W&R
 - High Weathering will result in higher PCI₈ values to Medium W&R
 - PCI₈ will be ± 5 PCI₇ points in about 75% of the cases.

- For pavements in very poor condition, PCI₇ below 25, it is expected that:
 - Medium Raveling will result in slightly higher PCI₈ values than Medium W&R
 - High Raveling will give the same PCI₈ values as High W&R
 - PCI₈ will be ± 1 PCI₇ points in about 75% of the cases.

- **Recommendations for PCI Inspections with the Updated MTC Distress Manual**

The updated version of the MTC Distress Manual allows the inspector to rate weathering separated from raveling reporting distress in more detail. Weathering is primary the deterioration of the fine asphalt matrix, and raveling the loss of coarse aggregate. In the updated version, with weathering separated from raveling, the low weathering distress definition allows for the change in the asphalt color and the loss of 'fines'. The medium weathering looks at whether the coarse aggregate is starting to show signs of wear.

Table 1 shows differences in the description, severity levels definitions, and how to measure the weathering and raveling distresses between the updated MTC Distress Manual, with weathering separated from raveling for asphalt pavements, and the previous manual version with weathering and raveling combined.

Table 1. Comparison of Weathering and Raveling distresses in MTC Distress Manuals.

MTC Distress Manual 3 rd version (2002)	Updated MTC Distress Manual 4 th version (2015)	
Description		
<p>Weathering and Raveling are the wearing away of the pavement surface caused by the loss of asphalt or tar binder and dislodged aggregate particles. This distress indicates that either the asphalt binder has hardened appreciably or that a poor quality mixture is present. In addition, raveling may be caused by certain types of traffic (e.g., tracked vehicles). Softening of the surface and dislodging of the aggregates due to oil or fuel spillage is also included under raveling.</p>	<p>Weathering is the wearing away of the asphalt binder and fine aggregate matrix. As used herein, coarse aggregate refers to predominant coarse aggregate size of the asphalt mix. Loss or dislodging of coarse aggregate is covered under Raveling. Surface wear is normally caused by oxidation, inadequate compaction, insufficient asphalt content, excessive natural sand, surface water erosion, and traffic. Weathering occurs faster in areas with high solar radiation.</p>	<p>Raveling is the dislodging of coarse aggregate particles. Raveling may be caused by insufficient asphalt binder, poor mixture quality, insufficient compaction, segregation, or stripping. As used herein, coarse aggregate refers to predominant coarse aggregate size of the asphalt mix, and aggregate clusters refers to when more than one adjoining coarse aggregate piece is missing.</p>
Severity Levels		

<p>Weathering and Raveling</p> <p>L Aggregate or binder of the pavement. In some areas, the surface is starting to pit. In the case of oil spillage, the oil stain can be seen, but the surface is hard and cannot be penetrated with a coin.</p> <p>M Aggregate and/or binder has worn away. The surface texture is moderately rough and pitted. The surface texture is soft and can be penetrated with a coin.</p> <p>H Aggregate and/or binder has been considerably worn away. The surface texture is very rough and severely pitted. The edge of the pavement has broken up to the extent that pieces are missing within 1 to 2 ft (.3 to .6m) of the edge. In the case of oil spillage, the asphalt binder has lost its binding effect and the aggregate has become loose.</p>	<p>Weathering</p> <p>L Asphalt surface beginning to show signs of aging which may be accelerated by climatic conditions. Loss of the fine aggregate matrix is noticeable and may be accompanied by fading of the asphalt color. Edges of the coarse aggregates are beginning to be exposed (less than 0.05 inches or 1 mm. Pavement may be relatively new (as new as 6 months old).</p> <p>M Loss of fine aggregate matrix is noticeable and edges of coarse aggregate have been exposed up to ¼ width (of the longest side) of the coarse aggregate due to the loss of fine aggregate matrix.</p> <p>H Edges of coarse aggregate have been exposed greater than ¼ width (of the longest side) of the coarse aggregate. There is considerable loss of fine aggregate matrix leading to potential or some loss of coarse aggregate.</p>	<p>Raveling</p> <p>M Considerable loss of coarse aggregate, greater than 20 per square yard (square meter), and/or clusters of missing coarse aggregate are present.</p> <p>H Surface is very rough and pitted, may be completely removed in places.</p> <p>Note: If in doubt about a severity level, three representative areas of one square yard each (square meters) should be examined and the number of missing aggregate particles/clusters is counted.</p>
<p>How to Measure</p>		
<p>Weathering and Raveling are measured in square feet of surface area.</p>	<p>Weathering: Surface wear is measured in square feet (square meter). Surface wear is not recorded where medium and/or high severity raveling is recorded.</p>	<p>Raveling is measured in square feet (square meters) of surface area. Mechanical damage caused by such things as hook drags, tire rims, or snowplows is counted as raveling. If raveling is present weathering (surface wear) is not recorded.</p>