

PUBLIC ROADWAY ASSESSMENT



TOWN OF ROLLINSFORD, NH
PUBLIC WORKS DEPARTMENT

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Introduction

The public roadways found within this document were subject to a visual inspection of pavement distress & ride performance. There is a general agreement that the ability of a flexible pavement to sustain traffic loads in a safe and smooth manner is adversely affected by the occurrence of observable distress. The rating method used provides a procedure for uniformly identifying and describing, in terms of severity and extent of pavement distress.

The mathematical expression for pavement condition rating (PCR) provides an index reflecting the composite effects of varying distress types, severity, and extent upon the overall condition of the pavement.

Lastly core samples were drawn providing a cross section of the depth and viability of asphalt beneath the surface. This inspection below grade is crucial when determining the approach to roadway reconstruction or preservation. This process determines the depth of existing asphalt, pin points any failure of asphalt below grade and directs when roadways are best suited to receive Full Depth Reclamation (FDR) verses Cold-Planing / Milling of surface and or overlay.

Asphalt cement is a mixture of bitumen and aggregates; stone, sand and gravel. Bitumen, a naturally occurring material is the thick black pliable material that acts as the glue that makes up Asphalt Cement. Asphalt Cement offers flexible properties which make it the preferred medium for road construction in North America because of its tolerance for freeze and thaw.

There are thirteen types of pavement distresses considered when inspecting and rating the condition of flexible pavement that is applied in our New England region. Each distress is given a weight or multiplier that is factored into deductible points when found to be present along a roadway.

DISTRESS TYPE	DISTRESS WEIGHT
Raveling	10
Bleeding	5
Patching	5
Potholes/Debonding	10
Crack Sealing Deficiency	5
Rutting	10
Settlement	10
Corrugations	5
Wheel Track Cracking	15
Block and Transverse Cracking	10
Longitudinal Joint Cracking	5
Edge Cracking	5
Thermal Cracking	5

Distress Type: **Raveling**

Description

Disintegration of the pavement from the surface downward due to the loss of aggregate particles. Raveling may occur as a result of asphalt binder aging, poor mixture quality, segregation, or insufficient compaction.

Severity Level

- Low – Very little coarse aggregate has worn away. Loss of fine aggregate. Coarse aggregate exposed.
- Medium – Surface has an open texture and is moderately rough with considerable loss of fine aggregate and some coarse aggregate removed.
- High – Most of the surface aggregate has worn away or become dislodged. Surface is severely rough and pitted and may be completely removed in places.

Extent Level

- Occasional – Less than 20 percent of the surface area is raveling.
- Frequent – Between 20 and 50 percent of the surface area is raveling.
- Extensive – More than 50 percent of the surface area is raveling.



Distress Type: **Bleeding**

Description

Bleeding or flushing is the presence of free asphalt binder on the pavement surface. Bleeding is caused by an excess amount of bituminous binder in the mixture and/or low air void content.

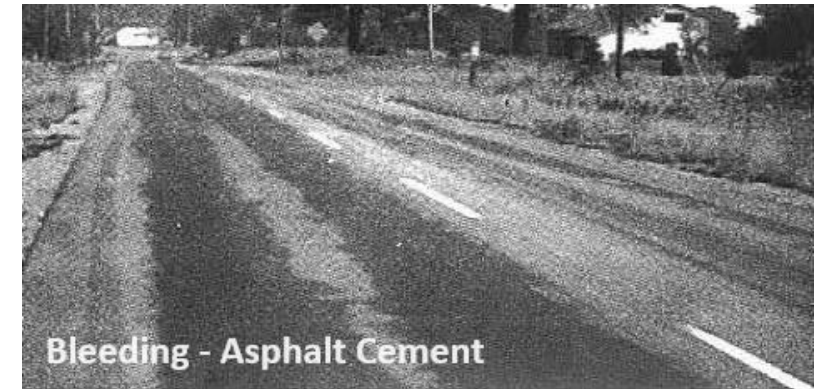
Severity Level

Only two severity levels are defined:

- Medium – both coarse aggregate and free bitumen are noticeable at the pavement surface.
- High – surface appears black with very little aggregate noticeable.

Extent Level

- Occasional – less than 10 percent of the length exhibits bleeding.
- Frequent – between 10 and 30 percent of the length is bleeding.
- Extensive – bleeding occurs in more than 30 percent of the length.



Distress Type: **Patching**

Description

Patching is either the placing of asphalt cement on the surface of the existing pavement or the replacement of the existing pavement in small isolated areas.

Deductions shall be made for all patches present in the pavement which are the result of deterioration and/or maintenance since the last construction project.

Large patched areas greater than 15 sq. yd., such as spot overlays or wedge courses, shall be rated for condition as a part of the existing pavement rather than as patches.

If more than one patch size is present, rate the severity of the size that exists in the largest quantity, and rate the extent of the total number of patches present.

Severity Level

- Low – patch size < 1 sq. ft.
- Medium – patch size < 1 sq. yd.
- High – patch size > 1 sq. yd.

Extent Level

- Occasional – <10 patches / mile.
- Frequent – 10 – 20 patches / mile.
- Extensive – >20 patches / mile.



Distress Type: **Debonding**

Description

Loss of surface by debonding is the removal of the asphaltic surface layer from the underlying layer. The problem is most common with thin asphalt surface layers, less than 2 inches and is caused by freeze and thaw action or poor bonding of the two layers during construction.

Severity Level

Use the following table to determine the severity levels:

Depth of Debonded Area	Debonded Area < 1 sq. yd.	Debonded Area > 1 sq. yd.
< 1"	Low	Medium
> 1"	Medium	High

Extent Level

- **Occasional** – < 5 debonding areas / mile.
- **Frequent** – 5 – 10 debonded areas / mile.
- **Extensive** – > 10 debonded areas / mile.



Distress Type: **Crack Sealing Deficiency**

Description

Crack sealing deficiency is crack sealing which is no longer effective in preventing intrusion of water or cracks which have never been sealed. Unsealed cracks with an average width less than 1/4" may not be considered..

Severity Level

Severity levels are not considered.

Extent Level

- **Occasional** – Less than 50% of existing cracks are not effectively sealed.
- **Frequent** – More than 50% of existing cracks are not effectively sealed.
- **Extensive** – None of the existing cracks have been sealed, there is no sealant on the roadway.



Distress Type: **Rutting**

Description

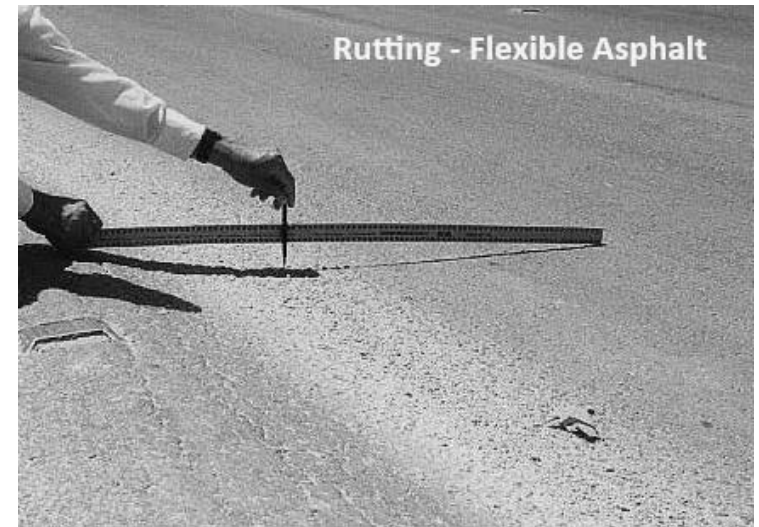
Ruts are vertical deformations in the pavement surface along the wheel tracks. In severe cases pavement uplift may occur along the sides of the rut, but in most instances only a depression is noticeable. Rutting is caused by consolidation or lateral movement of any or all pavement layers, including subgrade, under traffic.

Severity Level

- Low – Barely noticeable, depth between 1/8 inch and 3/8 inch.
- Medium – Readily noticeable, depth more than 3/8 inch, less than 3/4 inch.

Extent Level

- Occasional – Less than 20 percent of the section length is rutted.
- Frequent – Between 20 and 50 percent of the section length is rutted.
- Extensive – More than 50 percent of the section length is rutted.



Distress Type: **Settlement**

Description

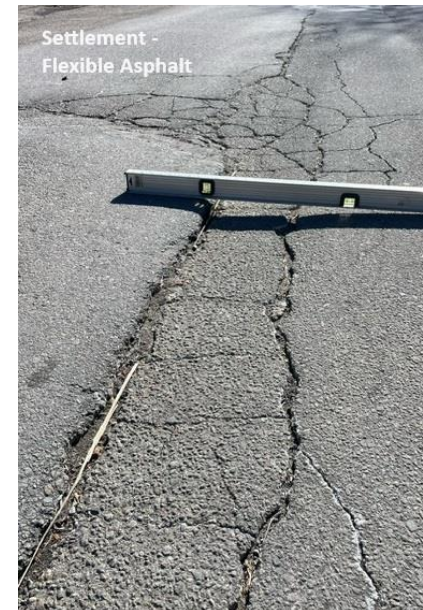
Settlement is a dip in the longitudinal profile of the pavement surface. Settlement shall be considered a distress when it causes a noticeable effect upon riding quality. Settlement should not be confused with corrugation, which is another type of surface profile deficiency.

Severity Level

- Low – noticeable effect upon ride, driver able to maintain vehicle control easily.
- Medium – some discomfort to passengers, driver able to maintain control with slight corrective action.
- High – definite effect upon ride quality, noticeable profile dip generally greater than 6 inches. Poor ride, corrective action needed.

Extent Level

- **Occasional** – Less than 2 settlements / mile of roadway.
- **Frequent** – 2 to 4 settlements / mile of roadway.
- **Extensive** – More than 4 settlements / mile of roadway.



Distress Type: **Potholes**

Description

Potholes are bowl – shaped voids or depressions in the pavement surface. Potholes are localized failure areas which are usually caused by weak base or subgrade layers.

Severity Level

Use the following table to determine the severity levels:

Depth of Pothole	Pothole < 1 sq. yd.	Pothole > 1 sq. yd.
< 1"	Low	Medium
> 1"	Medium	High

Regardless of depth, potholes less than 6 inches in diameter shall be considered to be of low severity.

Extent Level

- **Occasional** – < 5 potholes / mile.
- **Frequent** – 5 – 10 potholes / mile.
- **Extensive** – >10 potholes / mile.



Distress Type: **Wheel Track Cracking**

Description

Cracks located within or near the wheel tracks are wheel track cracks. For evaluation purposes each wheel track shall be considered 3 feet in width. Wheel track cracking usually starts as intermittent, single longitudinal cracks progressing to multiple longitudinal cracking, and eventually interconnected or alligator cracking. Wheel track cracking usually results from fatigue failure of the asphaltic layer.

Wheel track cracking may exist on the outer edge of the pavement. If this is the case, both wheel track cracking and edge cracking should be rated and the appropriate deductions made.

Severity Level

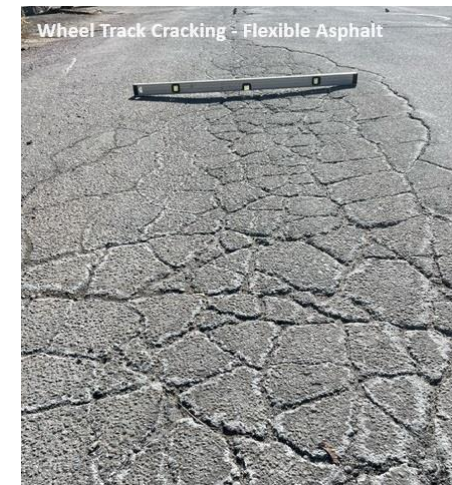
Severity is based upon both crack width and multiplicity of the cracking. Both criteria must be satisfied when assigning severity level.

- Low – Single or intermittent multiple cracking with average crack width less than ¼ inch.
- Medium – Single or multiple cracking, intermittent alligator cracking included with average crack width greater than ¼ inch with little spalling or loose pieces.
- High – Multiple cracking with extensive alligator cracking and rutting with a depth greater than 1/8 inch. Spalling is fairly common, with average crack width greater than ¼ inch, and some alligator blocks are easily removed.

Extent Level

Extent is based upon percentage of the wheel track length within the section which exhibits cracking.

- Occasional – Less than 20% of section affected.
- Frequent – Between 20 and 50% of section affected.
- Extensive – More than 50% of section affected.



Distress Type: **Block & Transverse Cracking**

Description

Block cracks are interconnected cracks which divide the pavement into large rectangular pieces or blocks. Block size may range from 3 ft. by 3 ft. upwards to 10 ft. by 10 ft. Transverse cracking is cracks at approximately right angles to the pavement centerline. The occurrence of both block and / or transverse cracking is usually related to thermal shrinkage of the asphalt binder. Binder age hardening is also related to formation of these crack types.

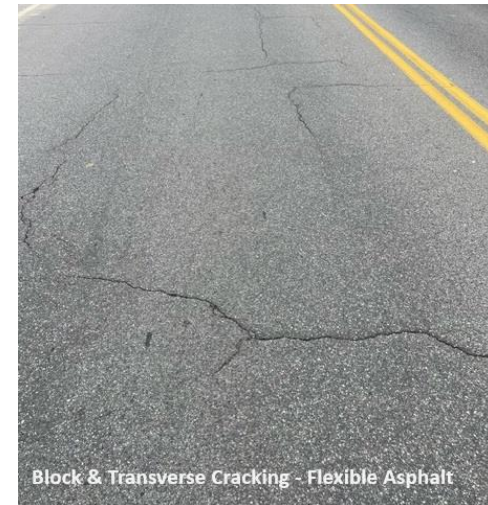
Transverse cracks that are not classified as thermal cracks and are not interconnected into a block pattern will be rated as low severity block cracking. Longitudinal cracks that are intermittent and infrequent, and thus do not meet the criteria of frequent or extensive longitudinal cracking, will be rated as low severity block cracking.

Severity Level

- Low – Average size of block formed is greater than or equal to 6' x 6' or an occasional transverse crack that is not a thermal crack.
- Medium – Average size of block formed is greater than 3' x 3' but less than 6' x 6'.
- High – Average size of block formed is less than 3' x 3'.

Extent Level

- **Occasional** – Less than 20 percent of the section length is affected by this distress.
- **Frequent** – Between 20 and 50 percent of this section length is affected by this distress.
- **Extensive** – Greater than 50 percent of the section length is affected by this distress.



Distress Type: **Longitudinal Cracking**

Description

Longitudinal cracks are those cracks formed parallel to the centerline of the roadway, and are the result of paving joints, widening joints which have reflected up through the layers of overlay, or the result of gear box segregation. Longitudinal cracking found in the wheel path should not be rated as longitudinal cracking, but instead as wheel track cracking.

Note: Crack width is defined as the sum of all cracks if more than one is present at the location of measurement.

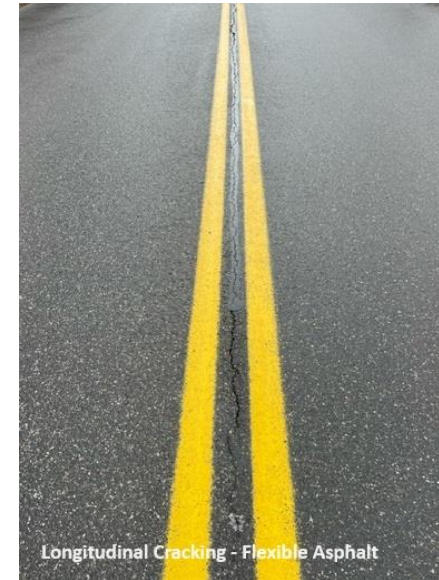
Severity Level

- Low – Single longitudinal crack with width less than ¼” and no spalling.
- Medium – Single or multiple cracking ¼” – 1” with some spalling.
- High – Multiple cracking > 1” wide with much spalling.

Extent Level

Based upon the average linear feet of longitudinal cracking per station of 100 feet length.

- Occasional – Less than 50 feet per station.
- Frequent – Between 50 and 150 feet per station.
- Extensive – More than 150 feet per station. Complete reflective longitudinal cracking along the pavement centerline and edge (200 linear feet per station) is termed extensive.



Distress Type: **Edge Cracking**

Description

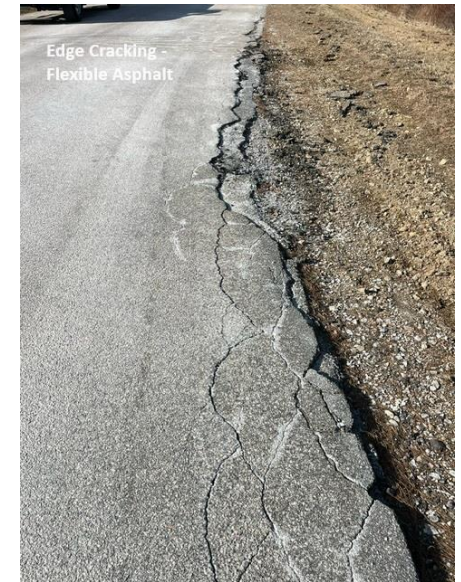
Edge cracks are longitudinal or crescent shaped cracks found within 1 foot of the pavement edge line. Edge cracking does not exist if the pavement is bordered by a curb. For evaluation purposes, edge cracking will only be evaluated within 1 ft. to the left and right of the fog line for roadway lanes larger than 10 ft. If the roadway lanes are 10 ft. wide, then edge cracking will be evaluated from the fog line to the edge of the pavement. If wheel track cracking is present in a 10 foot lane, and it occurs within 1 foot of the fog line, then both the wheel track cracking and the edge cracking should be rated.

Severity Level

- Low – Tight cracks, width less than ¼ inch with no break up or spalling.
- Medium – Crack width greater than ¼ inch with some spalling.
- High – Multiple cracking with moderate spalling and average crack width greater than ¼ inch.

Extent Level

- Occasional – Cracking occurs along less than 20 percent of the pavement edge within the section.
- Frequent – Cracking occurs along 20 to 50 percent of the pavement edge within the section.
- Extensive – Cracking occurs along more than 50 percent of the pavement edge within the section.



Distress Type: **Thermal Cracking**

Description

Thermal cracking is characterized as a series of evenly spaced cracks that are oriented perpendicular to the centerline of the roadway. Thermal cracks should be present from edge of pavement to edge of pavement. Thermal cracking is caused from repeated temperature cycling and aging of the pavement. As asphalt pavements are exposed to cold temperatures during the winter months, thermal stresses are produced since the asphalt binder contracts more than the aggregates. When temperature drops below the point where asphalt binder can remain elastic, thermal cracking is initiated.

Severity Level

- Low – Average crack width less than ¼ inch., no spalling.
- Medium – Average crack opened or spalled to a width between ¼ to 1 inch along at least half of its length.
- High – Average crack opened or spalled to a width greater than 1 inch along at least half of its length.

Extent Level

- Occasional – Average crack spacing (CS) is greater than 200 ft.
- Frequent – Average crack spacing (CS) is between 75 ft. and 200 ft.
- Extensive – Average crack spacing (CS) is less than 75 ft.



Severity Weight

Severity Weight is expressed low, medium to high and specific multipliers are given based on each distresses criteria.

Extent Weight

Extent Weight is the amount of area impacted by specific distresses measured from occasional, frequent to extensive.

- Each of the three distress ratings are multiplied equaling individual deduct points.
- The sum of all deduct points is added together equaling total deduct value.
- The number of observable distresses is recorded and added to total deduct points.
- The sum of observable distresses and total deduct points are subtracted from a total value of 100 to equal the assessed Pavement Condition Rating (PCR).

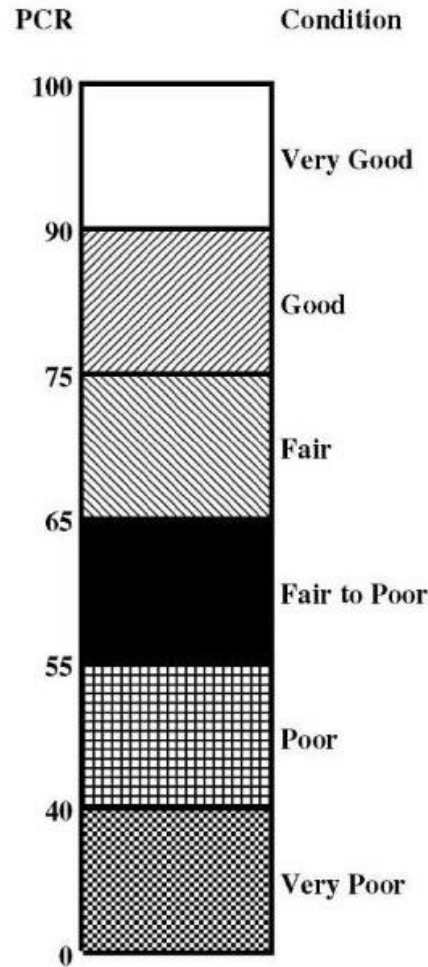
$(\text{Weight for Distress}) \times (\text{Weight for Severity}) \times (\text{Weight for Extent}) = \text{Deduct Points}$

$N = \text{Number of Observable Distresses}$

$\text{Deduct Points} + N = \text{Total Deduct}$

$100 - \text{Total Deduct} = \text{Pavement Condition Rating (PCR)}$

Example of Pavement Condition Rating Form Used For Field Data Collection



TOWN OF ROLLINSFORD PUBLIC WORKS
 STREET: **FRONT STREET**
 DATE: **2/13/2024** RATED BY: **NATE MEARS**

FLEXIBLE PAVEMENT CONDITION RATING FORM

DISTRESS	DISTRESS WEIGHT	SEVERITY WEIGHT *			EXTENT WEIGHT **			DEDUCT POINTS ***
		L	M	H	O	F	E	
RAVELING	10	0.3	0.6	1	0.5	0.8	1	0.00
BLEEDING	5	0.8	0.8	1	0.6	0.9	1	0.00
PATCHING	5	0.3	0.6	1	0.6	0.8	1	5.00
POTHOLES/DEBONDING	10	0.4	0.7	1	0.5	0.8	1	7.50
CRACK SEALING DEFICIENCY	5	RATING NOT CONSIDERED			0.5	0.8	1	5.00
RUTTING	10	0.3	0.7	1	0.6	0.8	1	0.00
SETTLEMENT	10	0.5	0.7	1	0.5	0.8	1	2.50
CORRUGATIONS	5	0.4	0.8	1	0.5	0.8	1	0.00
WHEEL TRACK CRACKING	15	0.4	0.7	1	0.5	0.7	1	4.20
BLOCK AND TRANSVERSE CRACKING	10	0.4	0.7	1	0.5	0.7	1	3.50
LONGITUDINAL JOINT CRACKING	5	0.4	0.7	1	0.5	0.7	1	2.45
EDGE CRACKING	5	0.4	0.7	1	0.5	0.7	1	1.00
THERMAL CRACKING	5	0.4	0.7	1	0.5	0.7	1	1.75
							SUM OF DEDUCT POINTS =	32.90
							NUMBER OF OBSERVABLE DISTRESSES (N) =	17.00
							100 - TOTAL DEDUCT = PCR =	50.10

*L = LOW **O = OCCASIONAL
 M = MEDIUM F = FREQUENT
 H = HIGH E = EXTENSIVE

*** DEDUCT POINTS = DISTRESS WEIGHT x SEVERITY WT. x EXTENT WT.
 (PCR) = PAVEMENT CONDITION RATING

NOTES/IMAGES:

On February 9, 2024 the Front Street asphalt was cored in two locations; an intact core was removed from the travel lane near the intersection of Front Street and Lower Mill Road. Nearly 2" of binder is present and two separate lifts of top coats equaling another 2" of depth totaling an average depth of 4" of asphalt.

The 2" binder course appears to be intact making the upper top wearing courses candidates for a 2" mill and resurface. This approach will retain the existing 2" binder course, tact coat of liquid emulsion shall be applied between existing binder and new wearing course providing adhesion between the two. After paving of wearing course a 6" reveal of the curb line elevation will be maintained. Drainage shall be improved in advance of top coat. Districts sewer manhole elevation shall not require raising or lowering.



Roadway Preservation

The American Association of State Highway and Transportation Officials (AASHTO) reports that for every dollar invested in extending roadway life through pavement preservation, \$6 to \$14 is saved in future roadway rehabilitation and construction costs.

- Bituminous Overlay
 - Average cost per square yard is \$7.00
- Chip Seal
 - Average cost per square yard is \$1.25
- Cape Seal
 - Average cost per square yard is \$1.40
- Fog Seal
 - Average cost per square yard is \$0.80
- Hot Crack Fill
 - Average cost per square yard is \$1.10

