NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PAVEMENT CONDITION SURVEY MANUAL FOR RATERS 2024

1. Introduction to the PCS

1.1 Pavement Condition Survey Goals

The main goal of the PCS is to assist in establishing a uniform level-of-service for maintenance across the state and to help maximize the benefit of all dollars spent on roads in the state.

Other goals of the PCS include:

- A ranking system to prioritize maintenance needs.
- A summary of the overall condition of the pavements in any area of the state.
- A uniform rating system for each Division.
- A means to monitor the condition of any section of pavement.
- A historical record of pavement performance and maintenance practices.

1.2 Purpose of the PCS Manual

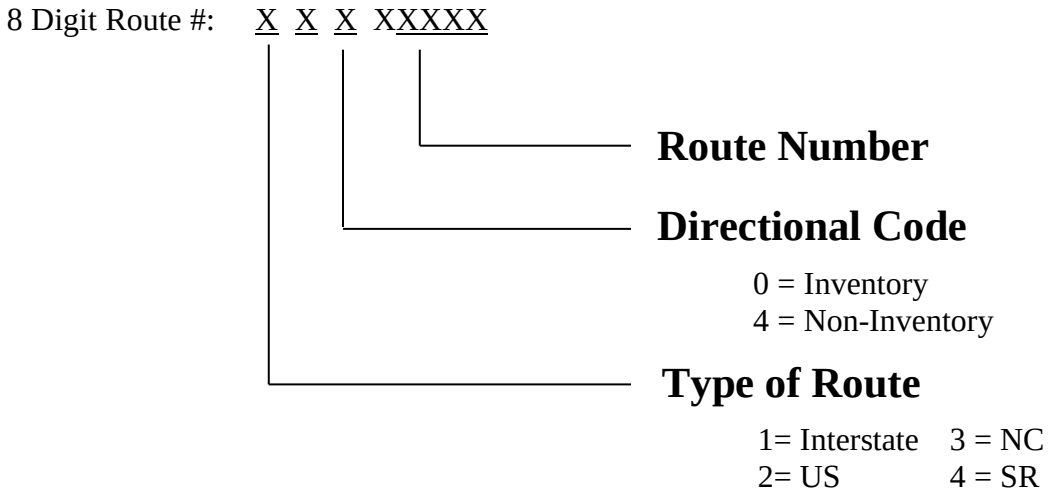
The ***Pavement Condition Survey Manual for Raters*** has been developed to assist personnel in conducting a Pavement Condition Survey. It will teach you how to understand route codes, mileposts, inventory the general characteristics of your routes, and mark and rate their various distress conditions.

2. Terminology

2.1 Route Inventory Fields

Route inventory fields capture the general characteristics of the route section you are currently surveying.

- ***Route Number:*** An 8-Digit code that describes the route.



- ***Beginning Milepost:*** Indicates the milepost of the beginning point of the route section, measured to the nearest 0.001 mile.
- ***Ending Milepost:*** Indicates the milepost of the ending point of the route section, measured to the nearest 0.001 mile.
- ***Length Miles:*** Length of the route section to be rated. Distances should correspond to the DMI unit.
- ***Begin and End Description:*** Brief description of the beginning point of a route section. This should be at an intersection of a state road, bridge, city street, county line whenever possible. When using a county line as a descriptor, always use the county where the route is coming from or going to, not the county in which the route section is located. When none of these are possible, such as in the case of a change in ***Pavement Type***, then use one of these descriptors:
  - NEW PVMT – New resurfacing of the same ***Pavement Type***.
  - PVMT CHG – Change in ***Pavement Type***.
  - WDTH CHG – Change in ***Pavement Width***.
  - BGN PVMT – Route transition from unpaved to paved.
  - END PVMT – Route transition from paved to unpaved.

- DEAD END – End of the road.
- CUL-DE-SAC – Route ends in a cul-de-sac.
- BGN MAINT – State maintenance begins.
- END MAINT – State maintenance ends.

- ***Pavement Type***: Indicates one of four surface pavement types:
  - **Plant Mix** – Asphalt concrete surfaces or overlays over existing asphalt.
  - **BST** – Bituminous Surface Treatment, including chip seals, etc.
  - **Slurry** – Slurry seal and micro-surface pavements.
  - **Composite** – Asphalt concrete surfaces or overlays over existing PCC.
- ***Pavement Width:*** Indicates the surface width of the entire section to the nearest whole foot from the edge of pavement to the edge of the pavement, including any paved shoulders. Short turning lanes or parking lanes that are less than 0.3 miles in length should not be included.
- ***Number of Lanes:*** Indicates the number of through lanes and continuous center left-turn lanes. Do not include street parking.
- ***Curb and Gutter:*** Indicates whether a route section has a curb & gutter (C&G).
  - **Yes**: If C&G is present on both sides for at least 0.3 miles
  - **No**: If C&G is not present or on one side only.
- ***Shoulder Type:*** Indicates whether the shoulder is **Paved** or **Unpaved**.
  - **Paved**: Paved shoulder continuous on each side.
  - **Unpaved**: Paved shoulder not continuous on each side or unpaved.
- ***Subdivision or Rural:*** Indicates a route as either **Rural**, known as a "through road," or Subdivision, built for access to or within a housing development.

2.2 Distress Rating Fields

Distress Rating fields capture the pavement distress ratings you generate for the route sections you are currently surveying.

- ***Alligator Cracking:*** Cracking in the wheel path creates a pattern resembling the scales of an alligator.

  Rated by the percentage of the route section, which exhibits each of four severity levels: **None**, **Light**, **Moderate**, and **Severe**. Each severity level will be rated on a scale of 0-10,

where 1 = 10% and 10 = 100%, and the sum of all severities combined must equal 10 or 100%.

- ***Transverse Cracking:*** Transverse/Reflective Cracking, caused by asphalt shrinkage, daily temperature cycling, or concrete slab movement beneath resurfacing.

  Rated as **None**, **Light**, **Moderate**, or **Severe**.

- ***Rutting:*** A surface depression in the wheel path(s) or at the edge of the pavement, caused by hot weather or inadequate compaction during construction.

  Rated as **None**, **Light**, **Moderate**, or **Severe**.

- ***Raveling:*** The wearing away of pavement surface, caused by dislodging aggregate particles or asphalt binder loss. BST & Slurry Seal pavements only.

  Rated as **None**, **Light**, **Moderate**, or **Severe**.

- ***Oxidation/Weathering:*** The aging and hardening of asphalt binder, exposing the coarse aggregate. Plant Mix/Composite pavements only.

  Rated as **None** or **Severe**.

- ***Bleeding:*** Shiny, reflective film on the pavement surface, caused by excess asphalt cement and low air void content.

  Rated as **None**, **Light**, **Moderate**, or **Severe**.

- ***Ride Quality:*** How rough the pavement feels when driven at safe operating speed.

  Rated as **Light**, **Moderate**, or **Severe**.

- ***Patching:*** Density of patching that covers a pavement surface.

  Rated as **None**, **Light**, **Moderate**, or **Severe**.

3. Conducting the Survey – General Guidelines

- **Work as a Team**

  The Driver should be surveying the left-hand lane and the iPad operator should survey the right-hand lane, at the end of the section the team should come to a consensus on their rating.

- **Review the Routes Before Surveying**

  Raters should thoroughly familiarize themselves with their areas.

- **Be Always Safety Conscious**

  Use car warning (hazard) lights and a yellow flashing light on your car roof. Always be aware of other traffic with your slower speed.

- **Begin Survey at the Beginning or End of a Route**

  ***IMPORTANT*:** Do **NOT** survey any route by starting in the middle.

- **Travel at 15-20 mph**

  Greater speeds will reduce survey accuracy. Slower speeds will result in harsher ratings.

- **Ride Towards the Sun While Surveying When Possible**

  Cracking and distresses are more visible due to shadowing.

- **Do Not Rate Roads When They Are Wet/Damp**

  Wet roads can cause distress conditions to appear worse than they are.

- **Carefully Inventory and Measure All Flexible Paved Roads**

  Check that all section information and mileage are correct.

- **Rate to the Linework.**

  Raters will encounter gaps in the linework and routes that continue past the linework. Keep to the linework. Do not try to fill in gaps or rate past where the linework ends.

- **Inspect Closer When Unsure**

  If unsure of distress or its severity, pull off the pavement to inspect the condition.

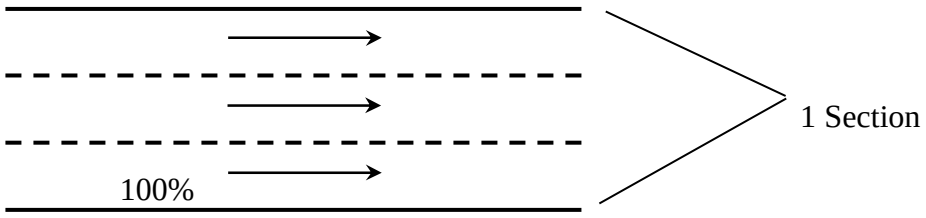
- **Measure Rutting on Foot at Least Once a Day**

Raters should get out of the car and measure rutting *at least once* in the morning before rating begins. Use a straight edge and ruler. This will give the rater a better feel for the severity of rutting.

Rating Instructions for One, Two, & Multi-Lane Routes

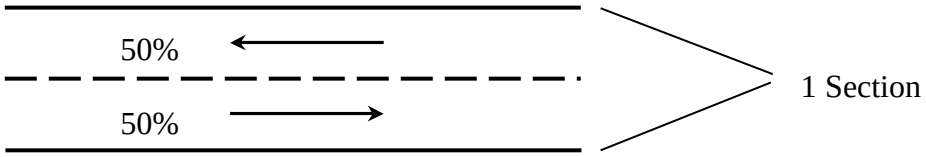
3.1 One-Way Streets

The rater will evaluate only the most distressed lane (usually the right-most lane). This lane will constitute 100% of the entire section's rating.



3.2 Two-Lane Routes

For two-lane routes, the rater will evaluate both lanes. Each lane will constitute 50% of the entire section's rating.

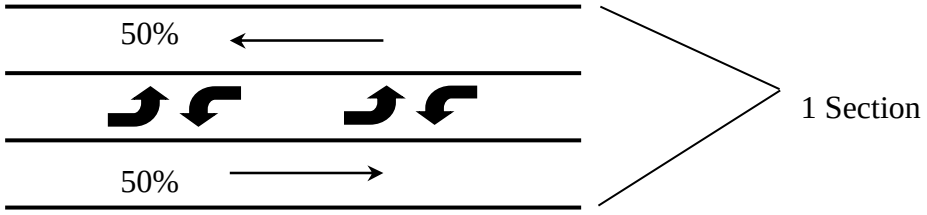


3.3 Multi-Lane Undivided Routes

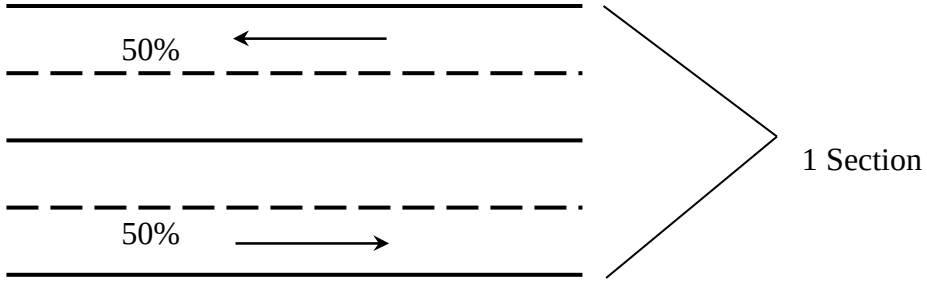
For multi-lane undivided routes (3 or more lanes), the rater will evaluate only the most distressed lane (usually the outside lane) in each direction. This lane will represent all lanes for the direction of travel. Each direction of travel will constitute 50 % of the entire section's rating.

Do not rate turn lanes.

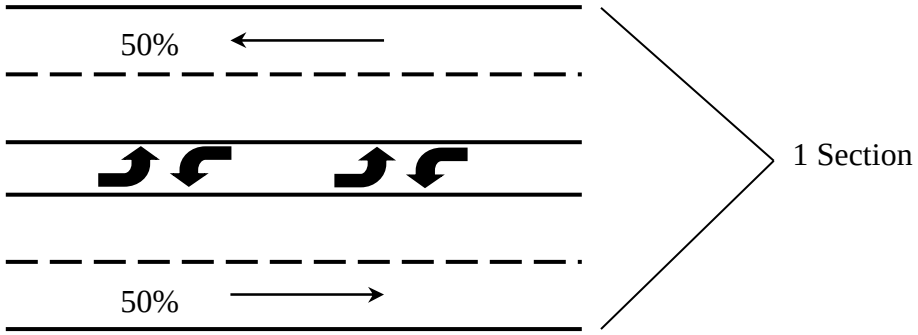
3 Lanes with Middle Turn Lane



4 Lane Undivided Route



5-lane Undivided Route with Middle Turning Lane

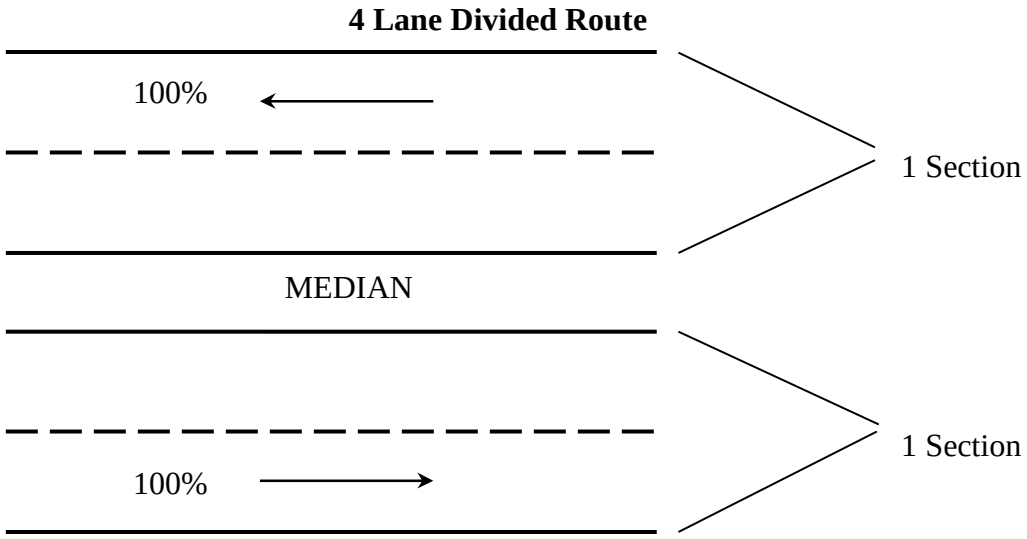


3.4 Divided Routes

For divided routes, the Inventory and Non-Inventory directions will each have their own set of sections to be evaluated.

The rater will evaluate only the most distressed lane in the Inventory direction. Therefore, this lane will constitute 100% of the Inventory section rating.

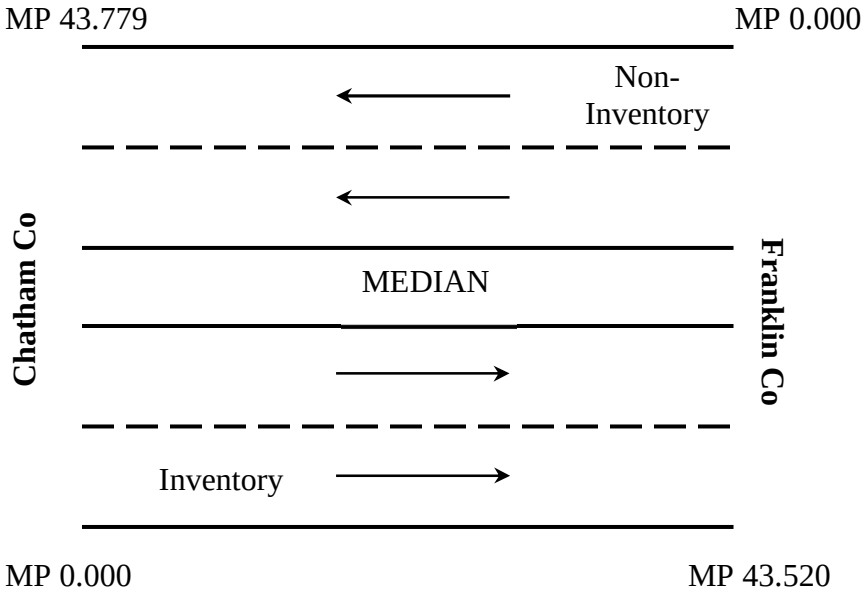
The rater will then evaluate only the most distressed lane in the Non-Inventory direction. This lane will constitute 100% of the Non-Inventory section rating.



Mile-posting for Divided Routes

When surveying a divided route, the mile-posting for the Non-Inventory direction is reversed from the inventory direction. This means that both the southbound and westbound directions of a divided route count up from zero, beginning at their respective starting points.

Divided Secondary Mile-posting Example – SR 1234 Wake County



The starting point of the Inventory direction for this route begins at the Chatham County line. The mile-posting counts up from MP 0.000 to MP 43.520, ending at the Franklin County line.

In contrast, the starting point of the Non-Inventory direction of the route begins at the Franklin County line. The mile-posting counts up from MP 0.000 to MP 43.779, ending at the Chatham County line.

Note also that there may be minor discrepancies between directions in the total length of a divided route. This is common due to variations in roadway elevation and curvature.

4. Mile Point Adjustment

Ideally, each route section in the PCS should have the same general characteristics throughout the entirety of its length. However, as time passes and route characteristics change, raters may encounter route sections where this is no longer the case. When this happens, raters may need to adjust mile points to reflect the current year's survey changes.

Keep in mind: Any section adjustment must stay within the linework shown in the PCS application. Under no circumstances should raters extend or create sections past the linework. This also applies to gaps in the linework.

> ***EXAMPLE***: If SR 1234 is shown in the app to extend from MP 0.000 – 1.000 and then from MP 1.250 – 1.500, raters may adjust/create sections within these ranges but should never go outside them. Do not fill in the gap. For example, do not extend a section past MP 1.500 even if the route continues.

4.1 Criteria for Adjustment

- **Pavement Width:** A new section should be created by splitting if the width of the pavement changes. A short change, such as a turn lane at an intersection, should be ignored.

- **Number of Lanes:** A new section should be created by splitting if the number of lanes changes due to pavement widening and is greater than 0.3 miles. If pavement width does not change, a new section should not be created. Short turn lanes at intersections should be ignored.

- **Section Lengths:** Lengths will vary depending on how often the rater must break the route into multiple sections because of changes in characteristics.

  Evaluate route sections that exceed 2.0 miles to determine if they can be split to avoid excessively long section lengths.

- **Paved Shoulders:** Continuous paved shoulders on both sides must be at least 0.3 miles long to justify forming a new survey section by splitting.

- **Curb and Gutter:** If curb and gutter have been installed on a portion of a rating section, create a new section if and only if the curb and gutter are continuous on both sides for at least 0.3 miles.

- **Pavement Type:** If a route section's pavement type changes and remains changed for 0.3 miles or more, create a new section for the new pavement type.

- **Significant Pavement Condition Differences (resurfacing):**

4.2 Examples

Splitting Route Sections

When raters encounter an existing route section that is excessively long or that has a new treatment, new pavement width, etc., they may need to break the route section into multiple route sections to reflect the latest state of the route. This is called "splitting" a route section.

Shifting Route Sections

When raters encounter a route section that is longer or shorter than is reflected in the PCS survey, they made need to adjust the mileposts of the section and the surrounding sections to reflect the route more accurately. This is called "shifting" route sections.

5. PCS Distress Definitions

5.1 ALLIGATOR CRACKING

Severity Levels

None: Insufficient amount of distress to meet **Light** severity.

Light: Longitudinal disconnected hairline cracks about 1/8-inch-wide running parallel to each other; may only be a single crack in the wheel path of pavement but could also look like an alligator pattern.

Moderate: Longitudinal cracks in wheel path(s) of pavement forming an alligator pattern; cracks may be lightly spalled and are about 1/4 inch wide.

Severe: Cracking has progressed so that pieces appear loose with severely spalled edges; cracks are about 3/8 to 1/2-inch-wide or greater; potholes may be present.

Description

Alligator Cracking is a load-associated structural failure, either in the surface, base, or subbase. Permanent deformation (rutting) does not have to be present for alligator cracking to exist.

Alligator cracking first begins in the wheel path, usually as longitudinal cracking. Further stress creates an alligator scale-like pattern. If the surface is very flexible, the longitudinal crack will widen, and the alligator pattern may not develop until severe distress sets in.

Rating Instructions

- Alligator cracking is rated by evaluating the total percentage of the route section, which exhibits four severity levels: **None**, **Light**, **Moderate**, and **Severe**.
- Each severity level will be rated on a scale of 0-10, where 1 = 10% and 10 = 100%
- The sum of all severities combined must equal 10 or 100%.

  For example, if 10% of a route section has no cracking, 50% has moderate cracking, 40% has severe cracking, but no light cracking is visible, then the section would be rated:

  None = 1, **Light** = 0, **Moderate** = 5, **Severe** = 4

  The total of all four severities (1 + 0 + 5 + 4) equals 10 or 100%.
- Only the most distressed lane (usually the outside lane) in each direction will be evaluated for multi-lane undivided routes. This lane will represent all the lanes for that direction, and each direction will account for 50% of the section rating.

- For sections where alligator or longitudinal cracking has been well-sealed, and the sealant is in good condition, the rater will rate the severity of the crack as **Light**. Conversely, if the crack has been sealed and the sealant has deteriorated, the rater will rate the severity of the crack as if no sealant were in place. This ensures that a deteriorating seal does not mask the possibility of the route section having moderate or severe cracking.

- For route sections that have 5 to10 potholes per mile, the rater will add 10% under **Moderate**. Then, add 10% under **Moderate** for every additional 5 potholes per mile after that.

ALLIGATOR CRACKING – LIGHT

Longitudinal disconnected hairline cracks about 1/8-inch-wide running parallel to each other; initially may only be a single crack in the wheel path of pavement but could also look like an alligator pattern.

ALLIGATOR CRACKING – MODERATE

Longitudinal cracks in pavement wheel path(s) form an alligator pattern; cracks may be lightly spalled and are about 1/4 inch wide.

ALLIGATOR CRACKING - SEVERE

Cracking has progressed so that pieces appear loose with severely spalled edges; cracks are about 3/8 to 1/2-inch-wide or greater; potholes may be present.

5.2 SINGLE VALUE RATINGS – TRANSVERSE CRACKING, RUTTING, AND RAVELING

Unlike alligator cracking, these distress conditions are given a single value to represent the overall condition of a route section: **None, Light, Moderate,** or **Severe.** More than half the section should exhibit distress to have any distress level, then the final severity level is determined based on the most observed severity level.

Distress Severity Level Criteria

None	Less than **1/2** of the section shows distress.
Light	**1/2** or more of the section shows distress, where the most common distress severity level is **Light**.
Moderate	**1/2** or more of the section shows distress, where the most common distress severity level is **Moderate**.
Severe	**1/2** or more of the section shows distress, where the most common distress severity level is **Severe**.

5.3 TRANSVERSE CRACKING

Severity Levels

None: Insufficient amount of distress to meet **Light** severity.

Light: Cracks are less than 1/4-inch-wide; cracks are usually 10 to 20 feet apart; cracks have little or no spalling and are sealed; joints are not generally bulging, so bumps are rarely present.

Moderate: Cracks are 1/4 inch to less than 1/2-inch-wide; cracks are usually 5 to 10 feet apart; cracks may have spalling; joints may be bulging, causing bumps 1/2 to 1 inch high.

Severe: Cracks are greater than 1/2-inch-wide; cracks are usually 1 to 5 feet apart through portions of the surface; cracks are severely spalled and may have bumps higher than 1/2 inch; joints may be bulging, causing bumps higher than 1 inch.

Description

Transverse cracks are cracks that run across the road perpendicular to the direction of travel. Transverse cracks are often called "thermal cracks" because they may be caused by pavement movement due to cold temperatures and temperature cycling.

Reflective cracking is a form of distress that occurs on asphalt pavement overlays that have been laid over jointed rigid pavements or severely cracked flexible pavements. This distress is caused by movement at the joints and cracks of the underlying pavements due to thermal and moisture changes. Typically, reflective joints have bulged above the riding surface such that the vehicle is riding over small bumps.

Rating Instructions

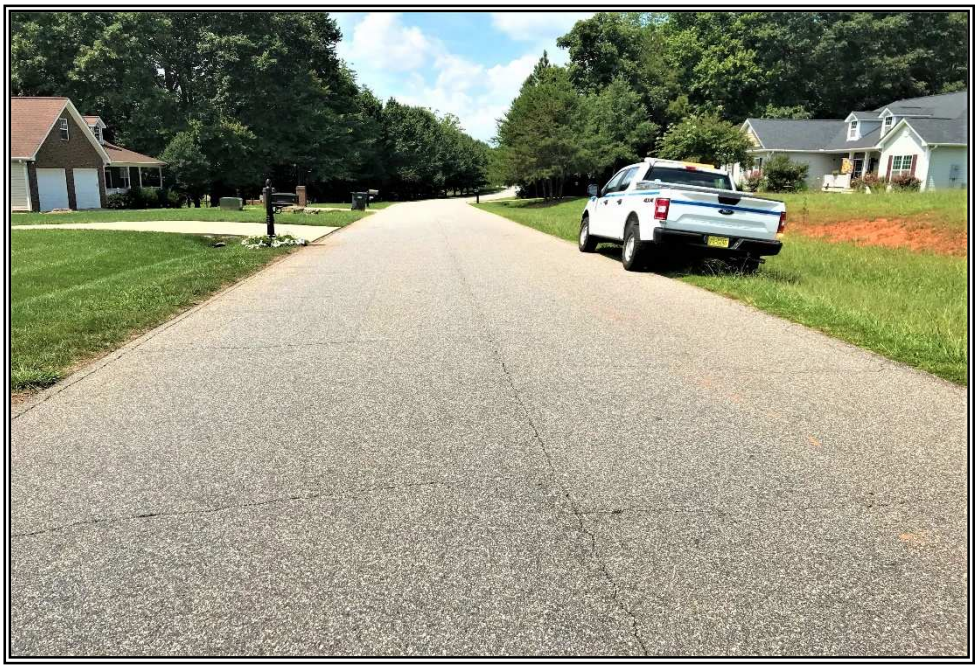
- ~~Only cracks spanning across the entire lane are considered for rating,~~ **~~cracks that do not span the entire lane width should be included in Alligator Cracking quantities~~**~~.~~

- Each route section is given a single rating to represent its overall condition in Transverse Cracking: **None, Light, Moderate,** or **Severe.** This holds even when various amounts of all severity levels are present.

- For sections where cracking has been **well-sealed**, and the sealant is in good condition, the rater will rate the severity of the crack as **Light**. Conversely, if the crack has been sealed and the sealant has **deteriorated**, the rater will **rate the severity of the crack as if no sealant were in place**. This ensures that a deteriorating seal does not mask the possibility of the route section having moderate or severe cracking.

TRANSVERSE CRACKING - LIGHT

Cracks are less than 1/4-inch-wide; cracks are usually 10 to 20 feet apart; cracks have little or no spalling or have been sealed and in good condition; joints are not generally bulging, so bumps are rarely present.



TRANSVERSE CRACKING - MODERATE

Cracks are 1/4 inch to less than 1/2-inch-wide; cracks are usually 5 to 10 feet apart; cracks may have spalling; joints may be bulging, causing bumps 1/2 to 1 inch high.

TRANSVERSE CRACKING - SEVERE

Cracks are greater than 1/2-inch-wide; cracks are usually 1 to 5 feet apart through portions of the surface; cracks are severely spalled and may have bumps higher than 1/2 inch; joints may be bulging, causing bumps higher than 1 inch.

5.4 RUTTING

Severity Levels

None: Rutting less than 1/4 inch deep.

Light: Rutting 1/4 to less than 1/2 inch deep.

Moderate: Rutting 1/2 to less than 1 inch deep.

Severe: Rutting 1 inch deep or greater.

Description

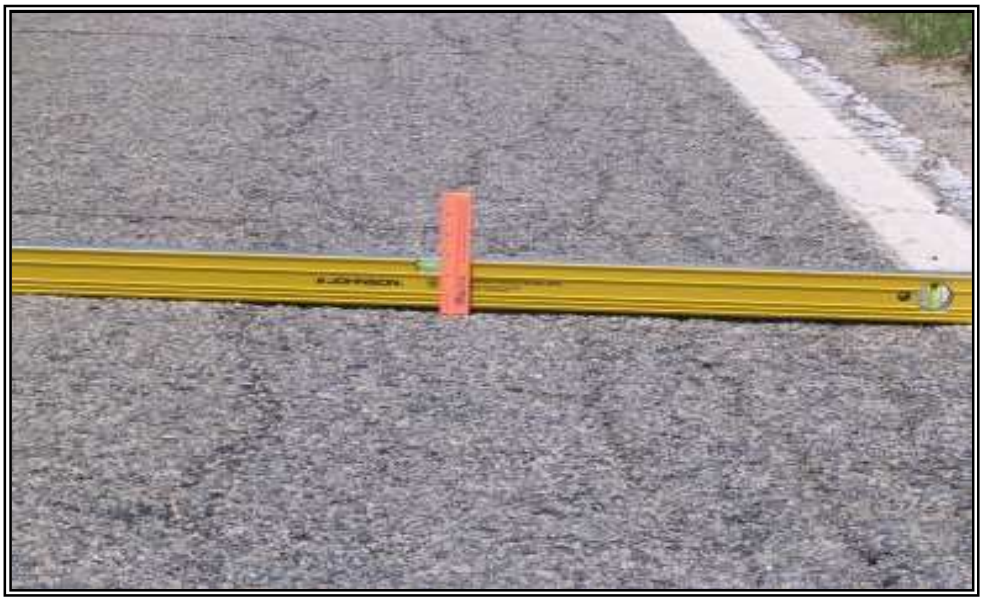
Rutting is a surface depression in the wheel path of the pavement due to deformation in the asphalt layers and subgrade due to traffic load. In addition, rutting is often caused by inadequate compaction during construction or lateral movement in the mix during hot weather.

Rating Instructions

- Each route section is given a single rating to represent its overall condition in Rutting: **None, Light, Moderate,** or **Severe.** This holds even when various amounts of all severity levels are present.
- For 2-lane routes, both lanes should be evaluated. For multi-lane routes, only the most distressed lane should be surveyed.
- Raters should get out of the car and measure rutting *at least once in the morning* before rating begins. Use a straight edge and ruler. This will give the rater a better feel for the severity of rutting.
- Any other surface deformation not in the wheel path is not rutting
- Rutting, especially Light Rutting is difficult to see while driving. It is important that both team members are looking for rutting, if there is a question of whether rutting should be called, re-ride the section, get out and measure the location in question with a straight edge and ruler or tape.
- Rutting is more commonly observed on BST routes.

RUTTING - LIGHT

Rutting 1/4 inch to less than 1/2 inch deep.



RUTTING - MODERATE

Rutting 1/2 inch to less than 1 inch deep.

RUTTING - SEVERE

Rutting 1 inch or greater.

5.5 RAVELING (BST & SLURRY ONLY)

Severity Levels

None: Insufficient amount of distress to meet **Light** severity.

Light: Very little aggregate loss; small amounts of stripping may be evident; aggregate has started to wear away.

Moderate: Some stripping evident; random stripping with small areas (less than one square foot) of aggregate broken away.

Severe: Stripping very evident; aggregate accumulations may be a problem; large sections (greater than one square foot) of stripping with aggregate layer broken away.

Description

Raveling combines the loss of aggregate materials and the stripping of asphalt binder from the pavement's surface. Stripping is the loss of bond between the aggregate mix and the binder, usually caused by the poor application of the asphalt binder or the hardening of the binder due to age. This distress is only applicable on BST and Slurry surfaces.

Rating Instructions

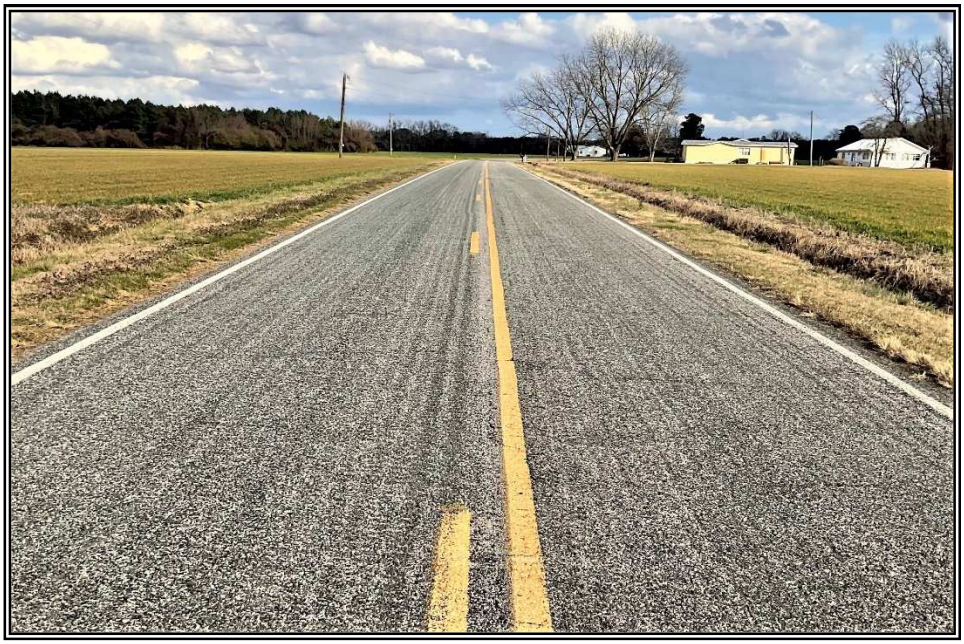
- Each route section is given a single rating to represent its overall condition in Raveling: **None, Light, Moderate,** or **Severe.** This holds even when various amounts of all severity levels are present.

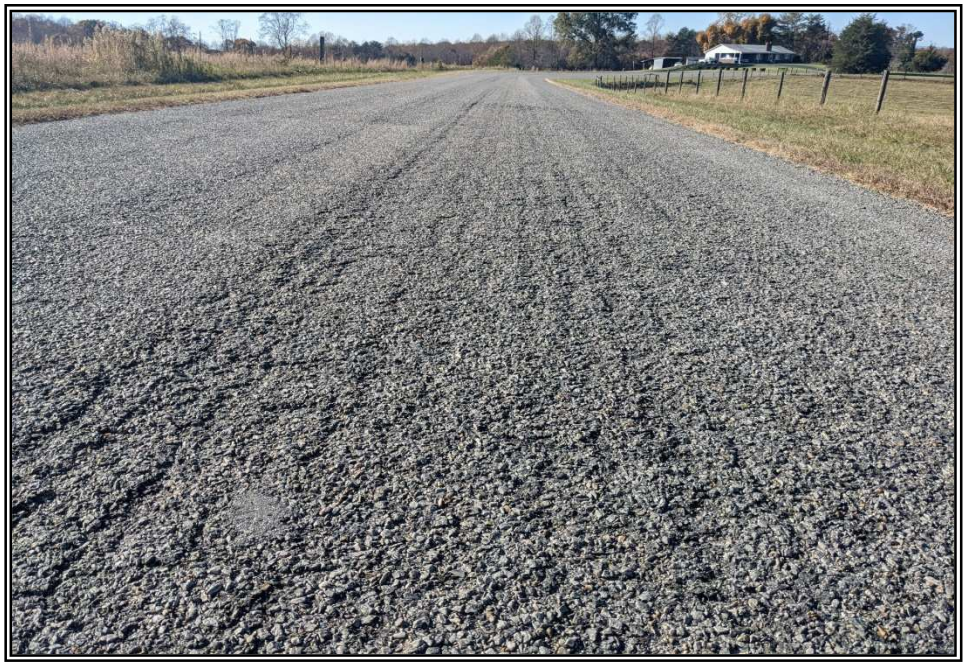
RAVELING - LIGHT

Aggregate loss within the pavement lanes is not significant; small amounts of stripping may be detected; aggregate has started to wear away.

RAVELING - MODERATE

Some stripping is evident; random stripping with small areas (less than one square foot) or strips of aggregate broken away.





RAVELING - SEVERE

Stripping is evident; aggregate accumulation may be a problem; large sections (greater than one square foot) of stripping with aggregate layer broken away.

5.6 OXIDATION (PLANT MIX & COMPOSITE ONLY)

Severity Levels

None: Oxidation is not present in the route section.

Severe: Oxidation is present in the route section.

Description:

Oxidation is the hardening and aging of the asphalt binder, which causes it to become brittle, less elastic, and more likely to crack or fail. The surface binder wears away over time, exposing coarse aggregate and eventually resulting in pitting and aggregate loss. This distress is only applicable for Plant Mix and Composite pavement types.

Rating Instructions

- Each route section is given a single rating to represent its overall condition in Oxidation: **None** or **Severe.** If Oxidation is present, the section should be rated **Severe**.
- Oxidation usually covers the entire surface, and pitting is very evident.
- Pavement color is not a determining factor for the presence of Oxidation.

5.7 BLEEDING

Severity Levels

None: Insufficient amount of distress to meet Light severity.

Light: Condition is present on 10 to 25% of the section.

Moderate: Condition is present on 26 to 50% of the section.

Severe: Condition is present on greater than 50% of the section.

Description

Bleeding is a process that creates a shiny, reflective film of bituminous material in the wheel paths of the pavement surface. It is caused by excess asphalt cement in the mix and low air voids. During hot weather, the asphalt fills the voids of the mixture and then expands out onto the surface of the pavement. Because cold weather does not reverse the bleeding process, asphalt binder on the surface accumulates over time.

Rating Instructions

- Raters should take into account the Quantity and Quality of bleeding for Each route section to give a single rating to represent its overall condition in Bleeding: **None, Light, Moderate,** or **Severe.**

BLEEDING - LIGHT

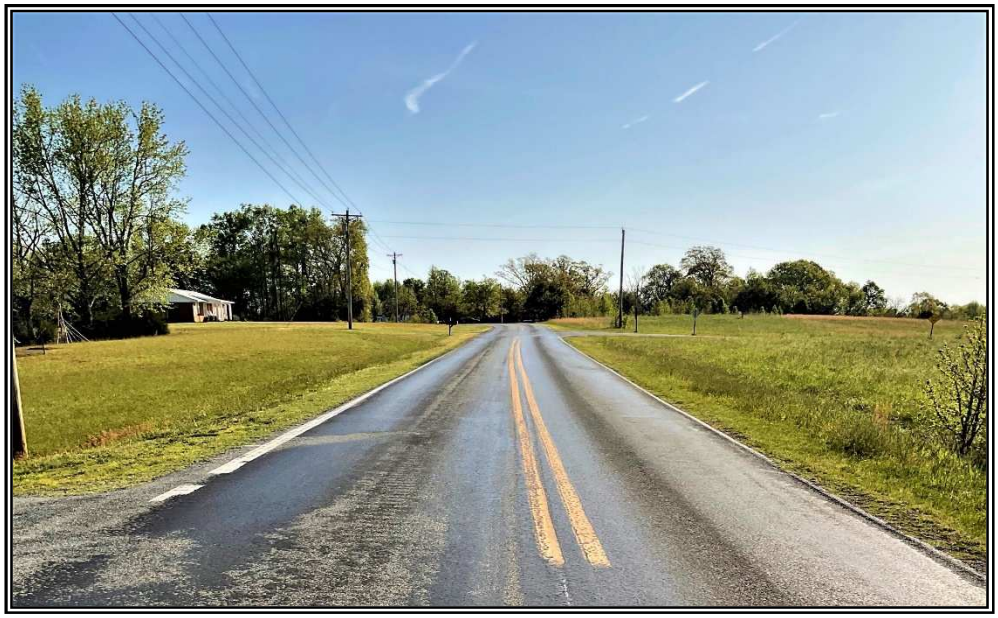
Bleeding areas are visible in small splotches with some darker color as the area gets larger. For roads that are considered to have Light bleeding, the condition is usually present on 10 to 25% of the section.

BLEEDING - MODERATE

Bleeding areas have filled in with sections consistently dark in color but minimal shiny areas are present. For roads that are considered to have Moderate bleeding, the condition is usually present on 26 to 50% of the section.

BLEEDING - SEVERE

Bleeding areas have filled in with sections consistently dark in color. Bleeding areas can appear shiny and greasy. There will be areas no aggregate is visible due to the amount of liquid AC present. For roads that are considered to have Severe bleeding, the condition is usually present on 50% of the section or greater.



5.8 RIDE QUALITY

Severity Levels

Light: Isolated cases of bumps and dips comprising up to 1/4 of route section; the posted speed limit can be safely maintained.

Moderate: Bumps, dips, rises, and ruts comprising 1/4 to 1/2 of route section; pavement may be broken, cracked, and uneven; slight difficulty maintaining the posted speed limit.

Severe: Bumps, dips, rises, and ruts comprise more than 1/2 of the route section; significant, frequent pavement failures and rough texture may be present; the rider is frequently jostled; the posted speed limit cannot be safely maintained.

Description

Ride Quality evaluates how smooth or rough a road feels when driven at the posted speed. Therefore, the distress rating should most closely reflect the general public's perception of how well a road holds up.

Rating Instructions

- Each route section is given a single rating to represent its overall Ride Quality: **Light, Moderate,** or **Severe.** The level of severity depends on how much of the route section is rough or uneven.

- Safe operating speed is the average speed at which most drivers travel a section of road under normal weather conditions.

- When evaluating Ride Quality, raters should not factor in rolling or mountainous terrain or curved alignment. These conditions exist regardless of the state of the pavement.

5.9 PATCHING

Severity Levels

None: Condition is present on less than 6% of the route section.

Light: Condition is present on 6 to 15% of the route section.

Moderate: Condition is present on 16 to 30% of the route section.

Severe: Condition is present on more than 30% of the route section.

Description

Patching is defined as any surface area of the existing pavement that indicates some maintenance repair has taken place. Patched areas can include Plant Mix or BST skin patches, edges, overlays, or full-depth patches. They may be in spot locations, along one or both edges, in the wheel paths, across the entire surface for short distances, or any combination.

Rating Instructions

- Each route section is given a single rating to represent the overall percentage of its surface area covered in Patching: **None, Light, Moderate,** or **Severe.**
- The entire pavement surface of the route section should be evaluated, not just the most distressed lane.
- The severity level is determined by calculating the total surface area of the entire section covered in full pavement-width patching.

  For example, a mile-long route section would be rated as follows:

  - 315 feet of full pavement-width patching = Less than 6% = **None**
  - 315 to 792 feet of full pavement-width patching = 6 to 15% = **Light**
  - 792 to 1585 feet of full pavement-width patching = 15 to 30% = **Moderate**
  - More than 1585 feet of full pavement-width patching = More than 30% = **Severe**
- Only the *amount* of patching should be evaluated. The quality and condition of the patching should have no bearing on how a route section is rated.
- Bridge approach tie-ins, intersection tie-ins, realignments, new signals or section widening, crack sealings and **full width** patches greater than 50’in length ***are not*** counted as Patching for this survey.

PATCHING - LIGHT

Condition is present on 6 to 15% of the route section.

PATCHING - MODERATE

Condition is present on 16 to 30% of the route section.

PATCHING - SEVERE

Condition is present on more than 30% of the route section.

Appendix F – Points to Remember

- **Rating Multi-lane Divided Routes:** Each direction of travel is rated as a separate section of pavement for all multi-lane divided routes. The rater should look at the most distressed lane (usually outside lane) in each direction when rating distresses.

- **Sealed Cracks:** rate sealed cracks as **Light**, if the crack has been sealed and the sealant has deteriorated, the rater will rate the severity of the crack as if no sealant were in place. This ensures that a deteriorating seal does not mask the possibility of the route section having moderate or severe cracking.

- **If linework error:** linework differs from actual road alignment, rate as much as linework aligns, then skip the rest. **Rate to the Line Work**.

- **The direction of Travel:** Sunlight, time of day, and dampness of road affect the rater's ability to see distress conditions. Therefore, it is recommended that the rater travel in a direction that makes the distresses more apparent. Two passes may be required for some sections.

- **Lane Conditions May Differ:** When conducting the PCS on undivided multi-lane routes, the condition of lanes in opposite directions of travel may be different from one another. For example, there may be transverse cracking in one direction and no cracking in the other direction. These differences should be reflected in your ratings.

- **Short Distance Interchange Widening:** While rating, you will encounter cases where a two-lane route splits at an interchange to become a four-lane divided route. Unless the divided section is at least 0.3 miles long, treat these cases like a two-lane route with only the outside lane rated in each direction and ignore any paved shoulder. If the divided section is equal to or longer than 0.3 miles, then create a new section.

- **Pavement Width & Number of Lanes:** If a route is divided (i.e., linework for each direction), record the **Pavement Width** and **Number of Lanes** for each direction individually. Do not combine them.

- **State Maintenance Signs:** Disregard signs "STATE MAINTENANCE BEGINS" or "STATE MAINTENANCE ENDS." These signs are often outdated and should be ignored whenever their placement differs from the survey linework.

Appendix G – Contact Information

For manual questions

opm-pcssupport@ncdot.gov

For survey distress questions

Name	Email	Cell Phone
Chip Speight	cspeight@amtengineering.com	704.322.8060
Bill Key	bkey@amtengineering.com	980.521.9412
Mike Walden	mwalden@amtengineering.com	704.320.4099
Steve Nance	snance@amtengineering.com	704.305.0389

For hardware/software questions

Your Company's technical support

Appendix H – PCS Abbreviations

Abbreviations				
Severity Level	**Pavement Type**	**Begin & End Descriptions**		**Shoulder Type**
N = None	P = Plant Mix	CO = County	MAINT = Maintenance	P = Paved
L= Light	S = Slurry	PVMT = Pavement	BGN = Begin	U = Unpaved
M = Moderate	B = BST	SR = Secondary Rd	MP = Milepost	
S = Severe	O = Composite	SL = State Line	END = End	
		WDTH = Width	CHG = Change	

Appendix I – County List with Number Codes

County	County Number	County	County Number	County	County Number
Alamance	1	Franklin	35	Orange	68
Alexander	2	Gaston	36	Pamlico	69
Alleghany	3	Gates	37	Pasquotank	70
Anson	4	Graham	38	Pender	71
Ashe	5	Granville	39	Perquimans	72
Avery	6	Greene	40	Person	73
Beaufort	7	Guilford	41	Pitt	74
Bertie	8	Halifax	42	Polk	75
Bladen	9	Harnett	43	Randolph	76
Brunswick	10	Haywood	44	Richmond	77
Buncombe	11	Henderson	45	Robeson	78
Burke	12	Hertford	46	Rockingham	79
Cabarrus	13	Hoke	47	Rowan	80
Caldwell	14	Hyde	48	Rutherford	81
Camden	15	Iredell	49	Sampson	82
Carteret	16	Jackson	50	Scotland	83
Caswell	17	Johnston	51	Stanly	84
Catawba	18	Jones	52	Stokes	85
Chatham	19	Lee	53	Surry	86
Cherokee	20	Lenoir	54	Swain	87
Chowan	21	Lincoln	55	Transylvania	88
Clay	22	Macon	56	Tyrrell	89
Cleveland	23	Madison	57	Union	90
Columbus	24	Martin	58	Vance	91
Craven	25	McDowell	59	Wake	92
Cumberland	26	Mecklenburg	60	Warren	93
Currituck	27	Mitchell	61	Washington	94
Dare	28	Montgomery	62	Watauga	95
Davidson	29	Moore	63	Wayne	96
Davie	30	Nash	64	Wilkes	97
Duplin	31	New Hanover	65	Wilson	98
Durham	32	Northampton	66	Yadkin	99
Edgecombe	33	Onslow	67	Yancey	100
Forsyth	34				

Appendix J – Pavement Distress Conditions at a Glance

ALLIGATOR CRACKING

NOTE: The entire lane in one direction of travel on a two-lane route represents 50% of the section. They are recorded in percent of each severity.	
Light (L)	Longitudinal disconnected hairline cracks about 1/8-inch-wide running parallel to each other; initially may only be a single crack in the wheel path or edge of pavement but could also look like an alligator pattern.
Moderate (M)	Longitudinal cracks in wheel path(s) or edge of pavement forming an alligator pattern; cracks may be lightly spalled and are about 1/4 inch wide.
Severe (S)	Cracking has progressed so that pieces appear loose with severely spalled edges; cracks are about 3/8 to 1/2-inch-wide or greater; potholes may be present.

RATING TRANSVERSE CRACKING, RUTTING, AND RAVELING

NOTE: For these types of distress, the rater should recognize that various amounts of LIGHT, MODERATE, and SEVERE distress might be present. Therefore, the rater shall use the following guidelines and the distress definitions in rating the condition of the section.	
None (N)	Less than 1/2 of the section shows **any distress**.
Light (L)	**1/2 or more** of the section shows distress where the most common distress severity level is **Light**
Moderate (M)	**1/2 or more** of the section shows distress where the most common distress severity level is **Moderate**
Severe (S)	**1/2 or more** of the section shows distress where the most common distress severity level is **Severe**

TRANSVERSE CRACKING

NOTE: The entire pavement surface represents 100% of the section	
Light (L)	Cracks are less than 1/4-inch-wide; cracks are usually 10 to 20 feet apart; cracks have little or no spalling and are sealed; joints are not generally bulging, so bumps are rarely present.
Moderate (M)	Cracks are 1/4 inch to less than 1/2-inch-wide; cracks are usually 5 to 10 feet apart; cracks may have spalling; joints may be bulging, causing bumps 1/2 to 1 inch high.
Severe (S)	Cracks are greater than 1/2-inch-wide; cracks are usually 1 to 5 feet apart through portions of the surface; cracks are severely spalled and may have bumps higher than 1/2 inch; joints may be bulging, causing bumps higher than 1 inch.

RUTTING

Light (L)	Rutting 1/4 to less than 1/2-inch-deep in wheel paths
Moderate (M)	Rutting 1/2 inch to less than one inch deep in wheel paths
Severe (S)	Rutting 1 inch deep or more in wheel paths

RAVELING (BST/Slurry Surfaces Only)

Light (L)	Very little aggregate loss; small amounts of stripping may be evident; aggregate has started to wear away.
Moderate (M)	Some stripping is evident; random stripping with small areas (less than one square foot) of aggregate broken away.
Severe (S)	Stripping is evident; aggregate accumulations may be a problem; large sections (greater than one square foot) of stripping with aggregate layer broken away.

OXIDATION (Plant Mix/Composite Surfaces Only)

None (N)	Oxidation is not present in the section
Severe (S)	Oxidation is present in the section

BLEEDING (Use % of surface area and Bleeding Quality to give a single value Rating)

Light (L)	Bleeding areas are visible in small splotches with some darker color as the area gets larger. Condition is usually present on 10 to 25% of the section.
Moderate (M)	Bleeding areas have filled in with sections consistently dark in color but minimal shiny areas are present. Condition is usually present on 26 to 50% of the section.
Severe (S)	Bleeding areas have filled in with sections consistently dark in color. Bleeding areas can appear shiny and greasy. There will be areas no aggregate is visible due to the amount of liquid AC present. Condition is usually present on greater than 50% of the section.

RIDE QUALITY

Light (L) - *Average*	Isolated cases of bumps and dips comprising up to 1/4 of the route section; the posted speed limit can be safely maintained.
Moderate (M) - *Slightly Rough*	Bumps, dips, rises, and ruts comprise 1/4 to 1/2 of the route section; pavement may be broken, cracked, and uneven; slight difficulty maintaining the posted speed limit.
Severe (S) – *Rough*	Bumps, dips, rises, and ruts comprise more than 1/2 of the route section; significant, frequent pavement failures and rough texture may be present; the rider is frequently jostled; the posted speed limit cannot be safely maintained.

PATCHING (Page 35)

Light (L)	The surface has 6 to 15% patching	***315 feet of full width patching per mile = 6%***
Moderate (M)	The surface has 15 to 30% patching	***792 feet of full width patching per mile = 15%***
Severe (S)	The surface has more than 30% patching	***1545 feet of full width patching per mile = 30%***

Full road width patching greater than 50’ in length will not be counted as patching for this project.