



***NORTH CAROLINA DEPARTMENT OF TRANSPORTATION***



***PAVEMENT CONDITION  
SURVEY MANUAL  
2012***

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## **Introduction**

This manual has been developed to assist North Carolina Division of Highways personnel in conducting a condition survey of the paved road network in North Carolina. All state-maintained roads on the Primary and Secondary Systems are included in the survey.

The goals of the condition survey are 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 the roads in the state. Other benefits of the condition survey include:

1. A ranking system to prioritize maintenance needs
2. A summary of the overall condition of the pavements in any area of the state
3. A uniform rating system for each Division
4. A means to monitor the condition of any section of pavement (particular special design, use of materials or construction projects)
5. An historical record of pavement performance and maintenance practices.

The previous surveys established descriptive and rating information for all flexible pavement sections of the state-maintained systems. A milepost scheme was also used to further pinpoint begin and end points for each section rated. All of this information has been stored in computer files and will be used in the 2012 survey.

Only those who have attended the Pavement Condition Survey training class and have been given certification as a rater will be allowed to rate the pavement sections. Certifications are only good for one survey cycle. Each rater must be recertified before each survey cycle by attending the training class.

*If non-certified raters are used the rating forms will be returned to the county for re-rating by a certified rater.*

A digital copy of the “2012 Pavement Condition Survey Manual”, “2012 Pavement Condition Survey Presentation”, and “Road Addition Sheet” for new road sections can be found on Pavement Management section of the NCDOT Portal. The PMU section of the NCDOT portal can be found at:

<https://intranet.dot.state.nc.us/portal/Home/Teams/DOH/Operations/PMU/tabid/90/Default.aspx>

### **A. Getting Started**

Each rater should thoroughly familiarize himself with the *Pavement Condition Survey Manual*. A copy of this manual will be available for each rater. This manual will form the basis for this year's survey. Special attention should be placed on understanding how to code routes, how to milepost, and how to rate and mark the distress conditions.

**B. Conducting the Survey – General Guidelines**

**1. Write Neatly & Legibly**

It is important that the form be filled out with a pencil, preferably a red pencil, as it is easier to read. Make a special effort when writing M's and N's, as they can often be confusing to read.

**2. Review the Printed PCS Survey Sheets Before Surveying**

The raters should thoroughly familiarize themselves with the computer printout for their areas. Some initial time should also be spent relating the computer listing of roadway sections to the county maps.

**3. Use the Most Current County Maps Available While Conducting the Survey**

This will result in less confusion with new roads, SR number changes, etc. The rater should mark sections of the maps as they are rated. This will allow the rater to better visualize what has not been surveyed.

**4. Survey All Newly Constructed or Formerly Unpaved Roads**

New roads and newly paved (formerly unpaved) roads should be surveyed even if they are not on the map or printout.

**5. Be Safety Conscious at All Times**

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

**6. Begin Survey at the Beginning or End of a Route**

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

**7. Measure Rutting on Foot at Least Once a Day**

Raters should get out of the car and measure rutting at least once a day preferably 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.

**8. Travel at 15-20 mph**

Greater Speeds Will Reduce Survey Accuracy

**9. Closer Inspection Will Sometimes Be Required**

If unsure of a distress or severity or unable to determine a type of distress, pull off the pavement to inspect the condition.

**10. Ride Towards the Sun When Surveying**

Cracking and distresses are more visible due to shadowing.

**11. Do Not Rate Roads When They Are Wet/Damp**

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

## 12. Travel in the Direction of Mileposting Whenever Possible

The printout is simpler to read when traveling a road in the same direction that it is mileposted. If it is necessary to travel a section in the opposite direction, care should be taken that the distress information is filled in on the proper line.

### C. The Form

1. A printout form with previous survey data and blanks for new data will be used for the 2012 pavement condition survey. Existing sections of road are set up with mileposts and descriptions from previous surveys.
2. Brief review of the form.
  - a. **County Section:** County subdivided into work sections.
  - b. **Route:** The sections are listed with the US routes first, followed by NC routes and then Secondary routes. They are listed numerically from lowest to highest. The routes are 8 digits and coded as explained on page 8.
  - c. **Direction:** Indicates the direction of travel for a **divided highway only**. This code is necessary because each direction of travel for a divided section is rated separately. Put the letter that represents the direction of travel for that lane - (N) north, (S) south, (E) east or (W) west. The opposite lane will naturally have the opposite direction of travel indicated. Leave this space blank for all undivided sections.
  - d. **Begin Milepost:** Indicates the milepost (entered to the nearest 0.001 mile) of the beginning point of the section. The Geometrics Report can be used to help find the milepost of the road being surveyed. Refer to page 8 under Section 2 for a link to the report.
  - e. **Begin Description:** Brief description of the beginning point of the section (limited to 10 characters in length). This should be at an intersection of a state road, county line or city street (in urban areas) if at all possible. In some cases there may not be a landmark to use because of pavement type or width changes. In these cases, write new pavement (NEW PVMT), end pavement (END PVMT), pavement change (PVMT CHANGE), etc.
  - f. **End Milepost:** Indicates the milepost (entered to the nearest 0.001 mile) of the ending point of the section. The Geometrics Report can be used to help find the milepost of the road being surveyed. Refer to page 9 under Section 2 for a link to the report.
  - g. **End Description:** Brief description of the end point of the section (Limited to 10 characters in length). This description will be in the same format as explained under item e, **Begin Description**.

2012 NCDOT Pavement Condition Survey

- h. **Section Length:** Length of the section should be entered to the nearest 0.001 mile. The distances should correspond to the Geometrics Report. A maximum of 2 miles is recommended for a section.
- i. **Pavement Type:** Indicates whether pavement surface is Plant Mix (**P**), BST (**B**) or Slurry (**S**)
- j. **Pavement Width:** Indicates the surface width to the nearest whole foot from edgeline to edgeline, excluding any paved shoulders.
- k. **Number of Lanes:** Indicates the number of through lanes (excluding parking), including continuous center left turn lanes
- l. **Curb and Gutter:**
  - a. Y = Yes, must be continuous on both sides
  - b. N = None, including one side only
    - i. 0.50 mile or greater – Rural
    - ii. 0.30 mile or greater – Urban

Obviously, if the entire section has curb and gutter on both sides but is shorter than either of the above distances, the rater will mark ‘Y’.

- m. **Shoulder Type:** Indicates whether the shoulder is Paved (**P**) or Unpaved (**U**). A paved shoulder shall be defined as continuous on both sides of the pavement and at least two feet wide. “Shoulders” outside the edgeline that are less than two feet wide shall be considered as part of the pavement width. Continuous paved shoulders must be at least 0.5 miles long to justify forming a new survey section. Only the outside (right-hand) shoulder is to be described for divided sections.
- n. **Shoulder Width:** Indicates the average width of the shoulder to the nearest whole foot.
- o. **Paved Shoulder Condition:** Rate as follows:
  - L: Overall good condition, edge intact with no cracking
  - M: Acceptable condition; some cracking up to ½” wide, less than 1/2” rutting. Edge may be breaking away in spots.
  - S: Unacceptable condition; cracking more than 1/4 “, rutting more than ½”, edge breaking away over large part of section.
- p. **Paved Shoulder Repair Percentage:** Indicates the percentage of the paved shoulder that needs to be repaired.
- q. **Year Resurfaced:** Indicates year of the latest resurfacing.
- r. **Resurface Thickness:** Indicates thickness of the latest resurfacing.

- s. **Subdivision/Rural**: Indicate **S** for subdivision road, or **R** for rural road.

This information is important for performing analysis of the road network. It is meant to distinguish roads that are classified as secondary roads (route number begins with '4') as either rural (typically through roads) or subdivision (generally built for access to, or movement within a housing development).

- t. **ADT**: Indicates the latest estimated Average Daily Traffic for the survey section.

The rater should check this information and make corrections as needed. Changes should be made by marking through incorrect data with a single line and writing the correct data above the marked out data.

Distresses (see **Section L** for definitions and photos):

- 1) **Alligator Cracking** = Percentage of the section exhibiting each of four severity levels:  
N = None, L = Light, M = Moderate, and S = Severe  
Rate the percentages as 01 (10%), 02 (20%), ... 10(100%)  
The sum of the numbers **must** equal 10.
- 2) **Transverse** = Block/Transverse/Reflective Cracking, rated with one letter of either  
N = None, L = Light, M = Moderate, or S = Severe
- 3) **Rutting** = Rated with one of the four letters, (N,L,M,S)
- 4) **Raveling** = Rated with one of the four letters, (N,L,M,S)
- 5) **Oxidation/Weathering** = Rated with one of the two letters, (N,S)
- 6) **Bleeding** = Rated with one of the four letters, (N,L,M,S)
- 7) **Ride Quality** = Rated with one of the three letters as follows:  
L = Light (Average), M = Moderate (Slightly Rough),  
S = Severe (Rough)
- 8) **Patching** = Rated with one of the four letters, (N,L,M,S)
- 9) **Comments** = Information helpful to the County Maintenance Engineer

Pavement distresses should be evaluated independently of the 2010 distress information. It is possible that the pavement condition in 2010 is significantly different from the condition seen in 2012. Each rater will be given forms with sections shown from the 2010 survey. The forms will contain 2010 rating information, but this information should only be used if there is difficulty deciding on appropriate distress levels for 2012.

2012 NCDOT Pavement Condition Survey

Surveyed by:

( print legibly )

Survey Date:

( print legibly )

NCDOT PAVEMENT CONDITION SURVEY FILE

DIVISION 7 - (1) ALAMANCE

ROUTE	DIR	BEGIN MILE POST	BEGIN DESCRIPTION	END MILE POST	END DESCRIPTION	SCN LNTH	-PVNMT- SLDOR	C	YEAR	RESF	TH	R	S	ADT	LAST YEAR ALLIGATOR N L M S	T R V	R U T	R A V	O X D	B L E	R I D	P A T	
40001001		0	NC 62	1.36	BRIDGE	1.36	P 24 2 U 4 N	1993	1	1	1	1	R	3200	6 2 2 0	L	L	N	S	N	L	L	L
40001001		1.36	BRIDGE	2.35	SR 1581	0.99	P 24 2 U 4 N	1993	1	1	1	1	R	3200	7 2 1 0	N	L	N	S	L	L	L	L
40001001		2.35	SR 1581	3.81	SR 1754	1.46	P 20 2 U 4 N	1992	1	1	1	1	R	3200	3 5 2 0	L	L	N	N	N	L	N	N
40001001		3.81	SR 1754	4.93	SR 1002	1.12	P 20 2 U 4 N	1992	1	1	1	1	R	3000	2 8 0 0	L	L	N	N	N	L	N	N
40001001		4.93	SR 1002	6.61	SR 1763	1.68	P 20 2 U 4 N	2003	1	1	1	1	R	3000	6 3 1 0	L	N	N	N	N	L	N	N
40001001		6.61	SR 1763	8.24	CASWELL CO	1.63	P 20 2 U 4 N	2003	1	1	1	1	R	3000	5 4 1 0	L	N	N	N	N	L	N	N
40001002		0	NC 49	1.03	NC 62	1.03	P 20 2 U 4 N	1995	1	1	1	1	R	400	9 1 0 0	N	L	N	N	N	L	N	N
40001002		1.03	NC 62	2.81	SR 1758	1.78	P 20 2 U 4 N	2001	1	1	1	1	R	400	7 3 0 0	L	N	N	N	N	L	N	N
40001002		2.81	SR 1758	4.67	SR 1001	1.86	P 20 2 U 4 N	2001	1	1	1	1	R	1000	7 3 0 0	L	N	N	N	N	L	N	N
40001002		4.67	SR 1001	6.36	SR 1581	1.69	P 20 2 U 6 N	2001	1	1	1	1	R	1000	7 3 0 0	L	N	N	N	N	L	N	N
40001002		6.36	SR 1581	7.54	SR 1605	1.18	P 20 2 U 6 N	2001	1	1	1	1	R	1400	4 3 2 1	L	L	N	N	N	L	N	N
40001002		7.54	SR 1605	9.15	SR 1593	1.61	P 20 2 U 6 N	2001	1	1	1	1	R	1500	4 3 2 1	L	L	N	N	N	L	N	N
40001002		9.15	SR 1593	10.59	SR 1594	1.44	P 20 2 U 6 N	2001	1	1	1	1	R	1500	2 2 3 3	L	L	N	N	N	L	N	N
40001002		10.59	SR 1594	11.73	NC 87	1.14	P 20 2 U 4 N	1994	1	1	1	1	R	4600	3 3 3 1	L	L	N	N	N	L	L	L
40001003		0	CHATHAM CO	0.23	SR 2345	0.23	P 20 2 U 4 N	1989	1	1	1	1	R	540	9 1 0 0	N	N	N	N	N	L	N	N
40001003		0.23	SR 2345	2.07	SR 2346	1.84	P 20 2 U 4 N	1989	1	1	1	1	R	540	7 2 1 0	N	N	N	N	N	L	N	N
40001003		2.07	SR 2346	3.23	BRIDGE	1.16	P 20 2 U 4 N	1989	1	1	1	1	R	1200	8 1 1 0	L	N	N	N	N	L	N	N
40001003		3.23	BRIDGE	4.31	SR 1005	1.08	P 20 2 U 4 N	1989	1	1	1	1	R	1200	7 2 1 0	L	N	N	N	N	L	N	N
40001003		4.31	SR 1005	6.04	SR 2335	1.73	P 20 2 U 4 N	2007	1	1	1	1	R	1800	10 0 0 0	N	N	N	N	N	L	N	N
40001003		6.04	SR 2335	7.86	NC 87	1.82	P 20 2 U 4 N	1989	1	1	1	1	R	1800	5 2 3 0	N	L	N	N	N	L	L	L
40001004		0	CHATHAM CO	1.62	SR 2352	1.62	P 20 2 U 6 N	1997	1.5	1.5	1.5	1.5	R	2500	7 1 2 0	N	N	N	N	N	L	N	N
40001004		1.62	SR 2352	3.53	SR 1005	1.91	P 20 2 U 6 N	1997	1.5	1.5	1.5	1.5	R	2500	7 3 0 0	N	L	N	N	N	L	N	N
40001004		3.53	SR 1005	5.45	SR 2356	1.92	P 20 2 U 4 N	1997	1.5	1.5	1.5	1.5	R	2700	8 0 2 0	N	L	N	N	N	L	N	N
40001004		5.45	SR 2356	6.78	SR 2351	1.33	P 20 2 U 4 N	1997	1.5	1.5	1.5	1.5	R	2700	9 1 0 0	N	N	N	N	N	L	N	N
40001004		6.78	SR 2351	7.07	SR 2328	0.29	P 20 2 U 4 N	1998	1	1	1	1	R	2700	9 1 0 0	N	N	N	N	N	L	N	N

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ALAMANCE - 1

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**D. Notes on Mileposting**

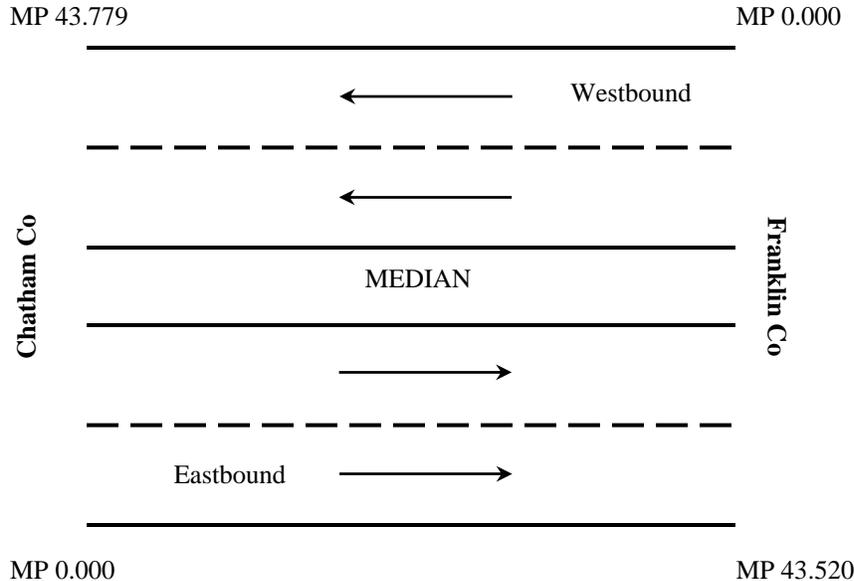
A substantial change was made to mileposting for the 2008 Pavement Condition Survey. To better match the mileposting system maintained by the NCDOT Geographic Information Systems Unit (NCDOT GIS), the mileposting methodology for divided highways has changed.

Divided highway mileposting is **reversed** in the non-primary direction. This effectively means that westbound and southbound routes count up from zero beginning at their entry point in the county or other starting point.

NCDOT GIS is in the process of increasing the precision of the mileposting by adding more decimal places. In the past mileposting precision was done to two decimal places (0.00). Now the mileposting precision will be done to three decimal places (0.000). **Note that the increase in precision has not been fully implemented, thus some mileposting precision will still be at two decimal places (0.00).**

An example would be US 64 in Wake County. The **eastbound** (primary) direction has a milepost value of 0.000 at the **Chatham** County line. The **westbound** (secondary) direction has a milepost value of 0.000 at the **Franklin** County line.

Note that there may be small discrepancies in the total length of a route. In the case of US 64, the eastbound portion has a total length of 43.520 while the westbound has a length of 43.779. This is normal and is due to variation in roadway elevation and curvature.



**Divided Highway Mileposting Example**

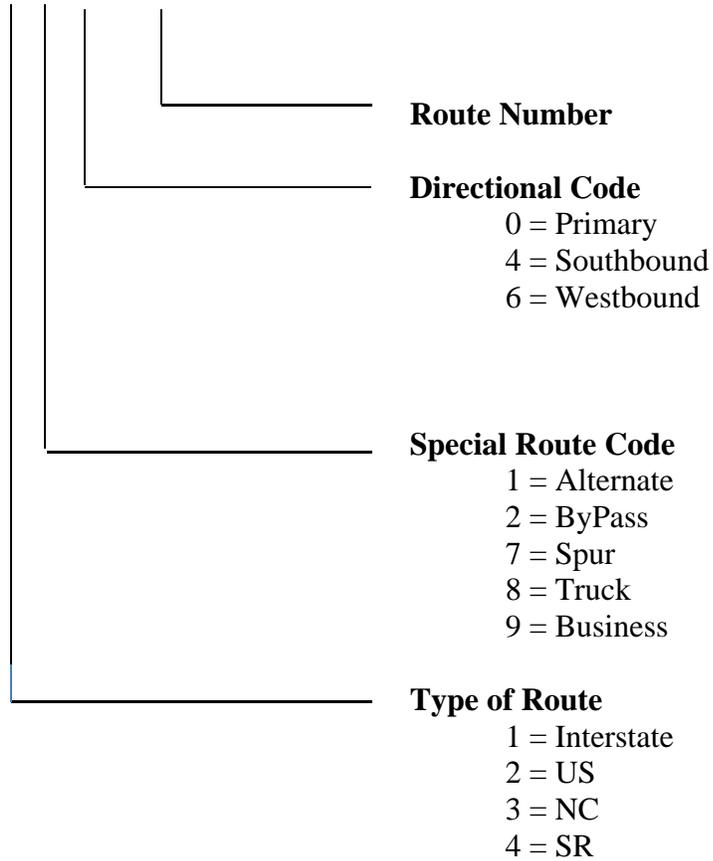
**Other mileposting notes:**

1. Where county lines are used in either description, abbreviate county with **CO**. The county used shall be the county that the route is coming from or going to, not the county that the section is located in.

2. Make use of the **Geometrics Report** available at the NCDOT web site:  
<https://apps.dot.state.nc.us/pmu/GeometricsReport.aspx>

This report contains the most up-to-date information available to the GIS and Pavement Management Units. When adding or splitting roads using “Road Addition Sheets” it is a good idea to verify mileposting and direction using this tool.

8 Digit Route #: X X X XXXXX



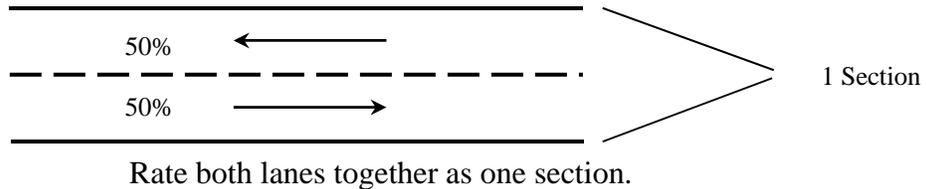
For divided **primary** highways, northbound or eastbound legs will have a value of 0 in the directional code slot (as they are the primary directions). The southbound and westbound directions will be coded with values of 4 and 6, respectively.

NCDOT GIS has changed the 8 digit coding for divided **secondary** roads. Divided secondary roads will have a 0 in the directional code slot in one direction and will always have a numeric value of 4 to indicate the opposing direction. This is due to secondary roads not having a default primary direction.

**E. Instructions for Multi-Lane Sections**

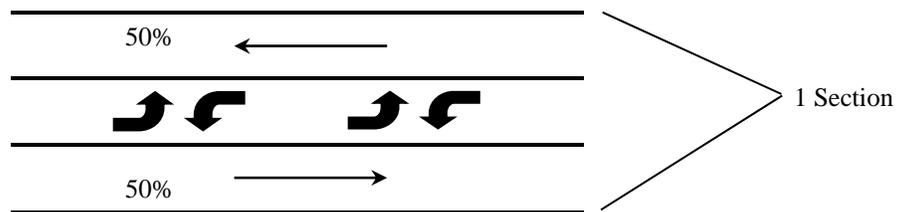
1. For two-lane roads, the rater will evaluate both lanes. Each lane is 50% of the total section.

**2 Lane Highway**



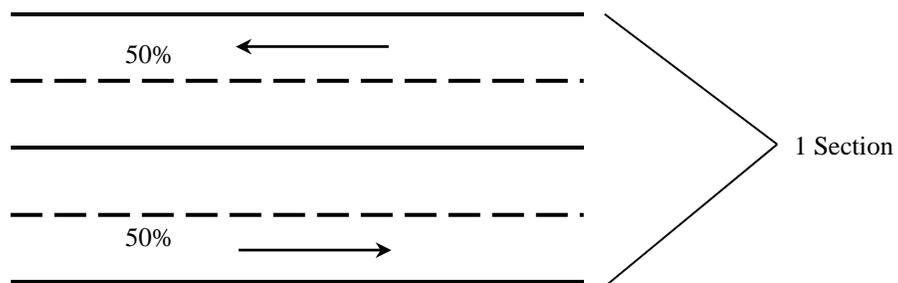
2. For multi-lane **undivided** highways (3 or more lanes), the rater shall evaluate the most distressed lane, generally the outside lane, in each direction. Each direction of travel (each lane) shall total 50 % of the section. **You will not rate all lanes, as in past surveys.**

**3 Lanes with Middle Turn Lane**



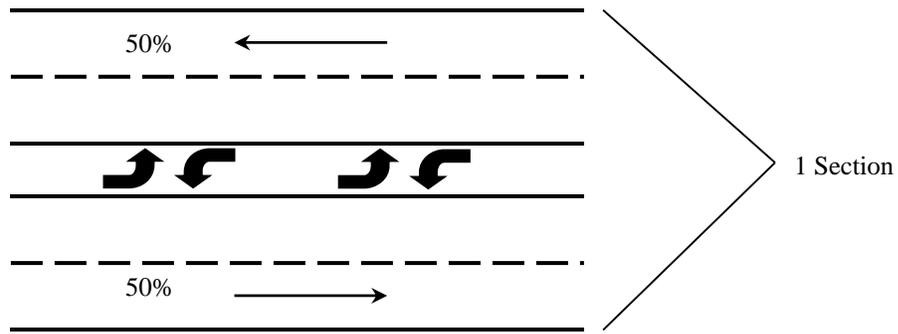
Rate through lanes together as one section. Do not rate turn lane.

**4 Lane Undivided Highway**



Rate both outside lanes in each direction together as one section.

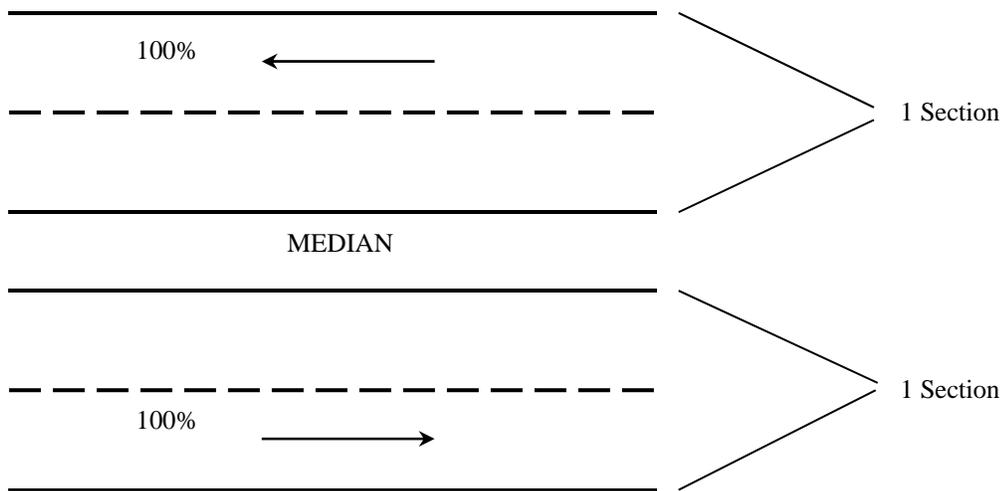
**Multi-lane Undivided Highway with Turning Lane**



Rate both outside lanes in each direction together as one section.

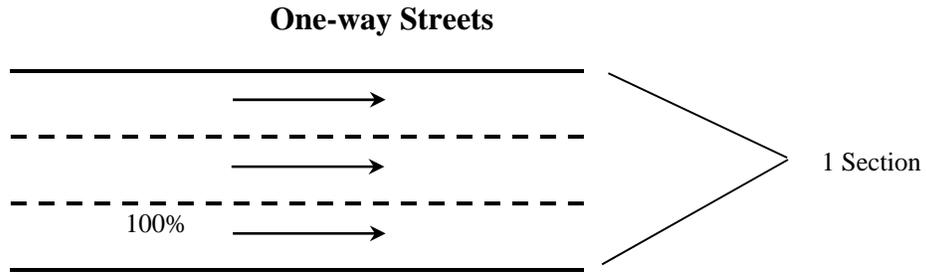
3. For **divided** highways, each direction of travel shall be rated as a separate section. The rater shall evaluate the most distressed lane, generally the outside lane, in each direction. Each direction of travel (each lane) shall total 100% of the section.

**4 Lane Divided Highway**



Rate outside lane in each direction as one section.

- The rater will rate the outside lane or the most distressed lane in urban areas.



- When conducting the Condition Survey on multilane highways, the condition of lanes in opposite directions of travel may not have the same rating. For example, there may be transverse cracking in one direction and no cracking at all in the other direction.
- For multi-lane highways, the ADT for each direction shall be the total (two-way) ADT for the highway.
- Short Distance Interchange Widening:** There are instances where a two-lane primary route will split and become a four-lane divided facility at an interchange. For these cases, unless the divided section is at least 0.50 miles long, it shall be treated like a two-lane highway with only the outside lane in each direction being rated. For this case only, any paved shoulder would be ignored. If it is equal to or longer than 0.50 miles, then a new section shall be written up.
- Interchange ramps are not to be rated.
- If paved shoulders are on the outside lane, then record the paved shoulder width only. Do not include any width for the unpaved shoulder, even though it is present.
- Mark the proper pavement width and number of lanes for each direction on a divided facility, not both.

## **F. Instructions for Urban Areas**

1. Curb and gutter must be present on both sides and present for at least 0.30 miles in order to form a new section specifically to account for curb and gutter. Curb and gutter on one side only shall be marked **N (None)**.
2. When rating urban one way streets, rate the most distressed lane. Generally this will be the outside lane.
3. Special turning lanes or parking lanes of less than 0.30 miles (approx. 1500 feet) should be ignored and not included in the overall pavement width.
4. Do not form a new section if the number of lanes changes but the pavement width stays the same.
5. Routes that cross city limits shall **NOT** be broken at the city limits.

## **G. Pavement Section Adjustment**

**Criteria for Pavement Section Adjustment:** It is desirable to have pavement sections that have the same general characteristics throughout. Significant criteria that, if changed, would require a new section include:

- 1) Number of lanes (where the width also changes)
  - 2) Section Length (excessively long or short)
  - 3) Paved shoulder
  - 4) Curb and gutter
  - 5) Recent resurfacing
  - 6) Pavement type
  - 7) Change in pavement conditions
1. **Pavement Width, Number of Lanes:** Generally speaking, it is necessary to create a new section if the number of lanes changes due to pavement widening. Note that short turn lanes at intersections **do not** result in the creation of a new section.
  2. **Section Lengths:** In general, section lengths should not be greater than 2 miles for Primary and Secondary roads in rural areas. In urban areas; lengths may vary from 0.1 to 2.0 miles, depending on how often the rater must break the route because of changes in characteristics.
  3. **Paved Shoulders:** A pavement is considered to have a paved shoulder when the width of the paved shoulder section is 2 feet or greater and the shoulder is paved on both sides of roadway.

4. **Curb and Gutter:** If curb and gutter has been installed on a portion of a rating section, it is necessary to split the section according to the following criteria: It must be continuous on both sides with lengths of 0.50 mile or greater in rural or 0.30 mile or greater in urban areas.
5. **Resurfacing:** Where it is obvious that part of a route has received an in-kind new plant mix resurfacing, asphalt surface treatment, or slurry seal, a new section will be formed for this new surface. However, the newly treated section must be at least 0.50 miles long for a new section to be formed. If the newly treated section is longer than 2 miles, then the rater should break this into two or more shorter sections of less than 2 miles in length. Even though the condition of the pavement will not show any change now, there may be distress conditions in the future that can be better monitored with the shorter survey sections.

**Note:** Patching versus Resurfacing: In many instances a plant mix road may have a short seal or a BST road may have a short plant mix overlay on a portion of the road. If this unlike treatment situation is greater than 0.50 miles long, a new section shall be created. Unlike treatments less than 0.50 miles long shall be considered patching.

6. **Surface Types:** Sections with asphalt concrete surfaces or overlays over either PCC or existing asphalt shall be considered as plant mix (P) sections. Bituminous Surface Treatment (B) sections shall include all the various seals (straight, split, and mat). Slurry (S) seals shall include slurry seal and micro-surface pavements.
7. **Significant Pavement Condition Differences:** If a section of road exhibits a large and clear-cut difference in pavement conditions, it is worthwhile to split the section, as this allows for more accurate tracking of performance over time and better reflects the true condition of the pavement. This should only occur with relatively long sections for instance: a 1.8-mile section might be conveniently split into 1.0 mile and 0.8-mile sections. If possible, split at an obvious physical location (intersection road, bridge etc).
8. **City Limits:** City limits are no longer being used for section breaks. When a section that has a city limit as a break point is encountered, either combine the section with one of the adjacent sections or replace the city limit description with the milepost of the city limit.

## **H. Updating Section Information**

1. There may be instances where basic information on the survey form is incorrect or a section needs to be deleted. **See page 16 for an example.**

### **To Correct Descriptive Data** (e.g. section length or pavement type)

Simply mark through the incorrect data with a single line and write the correct data directly above.

### **To Delete A Section** (e.g. extension of city limits with road becoming city responsibility)

Mark completely through the existing section with a single line on the computer form, and write DELETE directly above it.

2. There may be instances where an existing section needs to be broken into two (or more) sections because of a pavement width or type change or a new or partial section needs to be identified. **See page 21 for an example.**

### **To Break A Section into Two or More Sections**

The original section should be edited on the printout to reflect the change. Remaining sections should be entered on a "Road Addition Sheet" as new sections. Be sure the total of the lengths of all new sections is equal to the length of the original, unbroken section.

### **To Add A Newly Constructed Road or Section Not Previously Surveyed**

The "Road Addition Sheet" will need to be filled out and turned in with the existing survey forms.

2012 NCDOT Pavement Condition Survey

Surveyed by: Jerry Blackwelder  
(print legibly)

Survey Date: 10/15/2009  
(print legibly)

NCDOT PAVEMENT CONDITION SURVEY FILE

DIVISION 7 - (1) ALAMANCE

ROUTE	DIR	BEGIN MILE POST	BEGIN DESCRIPTION	END MILE POST	END DESCRIPTION	SCN LENGTH	-PVMNT- T	SLDR L T W I G	C /	YEAR	RESF	TH	S /	ADT	LAST YEAR ALLIGATOR N L M S	ALLIGATOR CRK N L M S	T R V	R U T	R A V	R O X D	B L E	R I D	P A T	
40001001		0	NC 62	1.36	BRIDGE	1.36	P	24 2 U 4 N	1993	1	R	3200	6 2 2 0	5 3 2 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001001		2.35	BRIDGE	2.35	SR 1581	0.99	P	24 2 U 4 N	1993	1	R	3200	7 2 1 0	7 2 1 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001001		3.81	SR 1754	3.81	SR 1754	1.46	P	20 2 U 4 N	1992	1	R	3200	3 5 2 0	2 5 3 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001001		4.93	SR 1754	4.93	SR 1002	1.12	P	20 2 U 4 N	1992	1	R	3000	2 8 0 0	2 8 0 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001001		6.61	SR 1002	6.61	SR 1763	1.68	P	20 2 U 4 N	2003	1	R	3000	6 3 1 0	6 3 0 1	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001001		6.61	SR 1763	8.24	CASWELL CO	1.63	P	20 2 U 4 N	2003	1	R	3000	5 4 1 0	5 4 1 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001002		0	NC 49	1.03	NC 62	1.03	P	20 2 U 4 N	1995	1	R	490	9 1 0 0	9 0 1 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001002		2.81	NC 62	2.81	SR 1758	1.78	P	20 2 U 4 N	2001		R	490	7 3 0 0	7 2 1 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001002		2.81	SR 1758	4.67	SR 1001	1.86	P	20 2 U 4 N	2001		R	1000	7 3 0 0	7 3 0 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001002		4.67	SR 1001	6.36	SR 1581	1.69	P	20 2 U 6 N	2001		R	1000	7 3 0 0	7 3 0 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001002		6.36	SR 1581	7.54	SR 1605	1.18	P	20 2 U 6 N	2008	1.5	R	1400	4 3 2 1	4 3 2 1	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001002		7.54	SR 1605	9.15	SR 1593	1.61	P	20 2 U 6 N	2001		R	1500	4 3 2 1	4 3 1 2	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001002		9.15	SR 1593	10.59	SR 1594	1.44	P	20 2 U 6 N			R	1500	2 2 3 3	2 2 3 3	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001002		10.59	SR 1594	11.73	NC 87	1.14	P	20 2 U 4 N	1994	1	R	4600	3 3 3 1	3 3 3 1	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001003		0	CHATHAM CO	0.23	SR 2345	0.23	P	20 2 U 4 N	1989	1	R	540	9 1 0 0		L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001003		0.23	SR 2345	2.07	SR 2346	1.84	P	20 2 U 4 N	1989	1	R	540	7 2 1 0	6 3 1 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001003		2.07	SR 2346	3.23	BRIDGE	1.16	P	20 2 U 4 N	1989	1	R	1200	8 1 1 0	8 0 2 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001003		3.23	BRIDGE	4.31	SR 1005	1.08	P	20 2 U 4 N	1989	1	R	1200	7 2 1 0	7 2 1 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001003		4.31	SR 1005	6.04	SR 2335	1.73	P	20 2 U 4 N	2007	1	R	1800	10 0 0 0	10 0 0 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001003		6.04	SR 2335	7.86	NC 87	1.82	P	20 2 U 4 N	1989	1	R	1800	5 2 3 0	5 2 2 1	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001004		0	CHATHAM CO	1.62	SR 2352	1.62	P	20 2 U 6 N	1997	1.5	R	2500	7 1 2 0	7 1 2 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001004		1.62	SR 2352	3.53	SR 1005	1.91	P	20 2 U 6 N	1997	1.5	R	2500	7 3 0 0	7 3 0 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001004		3.53	SR 1005	5.30	SR 2356	1.77	P	20 2 U 4 N	1997	1.5	R	2700	8 0 2 0	8 0 2 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001004		5.30	SR 2356	6.78	SR 2351	1.48	P	20 2 U 4 N	1997	1.5	R	2700	9 1 0 0	8 1 1 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N
40001004		6.78	SR 2351	7.07	SR 2328	0.29	P	20 2 U 4 N	1998		R	2700	9 1 0 0	8 2 0 0	L L	L L	N N	N N	N N	N N	N N	N N	N N	N N

**I. Points to Remember**

1. **Severity Levels:** When rating distresses, remember that **N = None, L = Light, M = Moderate, and S = Severe**. Take care that a written M does not look like an N or vice versa.
2. **Multi-lane Divided Rating:** Each direction of travel is rated as a separate section of pavement for all multi-lane divided highways. The rater should look at the most distressed lane (usually the outside lane) in each direction when rating distresses. For example, a section may have severe alligator cracking in the outer wheelpath of the outside lane for the total length of the section. Even if the inside lane had no alligator cracking, it would be rated as having 100% alligator cracking. Patching will also be rated based upon percentage of the outside lane.
3. **Alligator and Edge Cracking:** There has been some confusion in the past regarding alligator and edge cracking where this type of structural cracking is near the edge of the pavement. To eliminate this problem, we have decided to label cracking near the pavement edge as alligator cracking. However, when rating this type of cracking near the edge as alligator cracking, care must still be taken not to "double up" on alligator cracking in the same location.
4. **Severe Ride Quality:** Another problem that may occur is identifying Severe (Rough) Ride Quality. Remember that the key to a rough ride is that operating speed cannot be maintained safely. Rough ride quality should be extremely rare across the state. Before rating a road roughness as severe, be sure that it complies with the definition.
5. **Direction of Travel:** Sunlight, time of day, and wetness of road affect the rater's ability to see distress conditions. It is recommended that the rater travel in a direction that makes the distresses more apparent. It is possible that two passes will be required for some sections.
6. **Patch Evaluation:** Existing BST or plant mix patches are not specifically evaluated on their quality. However, some patches may affect ride quality and should be evaluated in this manner. Any cracking or rutting that is visible in a patch should be marked under the appropriate distress.
7. **Description Abbreviations:**

CL = City Limits  
CO = County  
CDS = Cul-de-Sac  
CG = Curb & Gutter  
DE = Dead End

EOM = End of Maintenance  
EOP = End of Pavement  
PVT/PVMT = Pavement  
SR = Secondary Road

**J. Filling Out a New Pavement Condition Survey Form (Road Addition Sheet)**

1. The forms used to add new pavement sections are identical to the field survey forms without the previous distress ratings.
2. The Pavement Condition Survey Form has been specifically designed to determine the amount and severity of several distresses for flexible pavements, including bituminous overlays over portland cement concrete. There is no need to use separate sheets for the Primary, Secondary, and Urban Systems. The route numbers will tell the computer the type of system that each section represents.
3. Each rater should pay special attention to all instructions so that the condition survey form can be correctly and completely filled out. Missing or improperly marked data will be rejected by the computer and will require much time and effort in rechecking that section.
4. A completed sample is shown on page 18. Twenty sections can be completed per sheet.
5. Be sure to include DIVISION, COUNTY, DATE(S) and RATER (your name). Print legibly.





**K. Transmittal of Survey Sheets and Progress Reports**

1. Each Friday, the Highway Maintenance Engineer should turn in all **completed** survey sheets to the District/County Office. This will allow data to be entered as the survey is being conducted rather than all at once at the end.

Field personnel will only enter distress information. Milepost and description changes, deletions, and additions will be handled by the Pavement Management Unit.

When a county is complete, the Highway Maintenance Engineer should turn in all original data sheets, including “Road Addition Sheets”, to the District/County Office to be entered. Once all the secondary road data has been entered for a county, the original survey book should be reassembled and sent to the Pavement Management Unit along with all the “Road Addition Sheets”. Once all the primary road data has been entered for a Division, the original survey book should be reassembled and sent to the Pavement Management Unit along with all the green forms. All the survey books should be sent to Jerry Blackwelder in the Pavement Management Unit in Raleigh.

**Remember to make a copy of all data for your records before sending it in.**

2. The Highway Maintenance Engineers and Primary Road rater should also turn in a weekly Progress Report (provided by Pavement Management Unit) to the Division Maintenance Engineer each Friday. This report should show the number of rating hours and the number of miles completed for that week. The Division Maintenance Engineer should review and then send one compiled report to the Pavement Management Unit, including a division wide progress total.
3. All surveys should be completed and data entered by **March 1, 2012**.
4. If there are any problems or questions, please call one of the trainers.
5. The trainers will make follow up visits while the survey is being conducted. This will assist the raters by clearing up questions and problems that may arise.

Jeff Chinlund	- Divisions 1,2,3 and 4	- (252) 917 - 2306 (Greenville)
Steve Hinnant	- Divisions 5,6,7and 8	- (919) 218 - 3990 (Raleigh)
Tom Thomas	- Divisions 9,10,11,12, 13 and 14	- (336) 703 - 6576 (Winston-Salem)
Jerry Blackwelder	- Statewide	- (919) 212 - 6050 (Raleigh)

**L. Pavement Condition Survey Distress Definitions – Flexible Pavements**

Pavement distress conditions are defined on the following pages. Photographs of the different severity conditions follow each distress description to help clarify what the distress definitions mean.

The rater shall very thoroughly study each written distress description with accompanying photographs so that he or she completely understands all severity conditions under each distress. This is critical to the survey if a uniform survey is to be successfully performed across the state.

One or more photographs are shown for each of the severity conditions for each distress. These photographs represent what might typically be seen in the field for a specific distress. The photographs do not show all conditions that might be found. They also are not meant to imply that a condition must look exactly like what is shown for it to be called light, moderate, or severe. The pictures are simply illustrations of what the rater may see under the various severity levels for each distress.

The definitions for each severity include one or more phrases that describe what the condition may look or feel like. Not all of the specific phrases must exist for a condition to be labeled as such. It may be that only one out of the four phrases is visible on a section. However, this is sufficient for the rater to mark down the condition as (L)ight, (M)oderate, or (S)evere.

## 1. ALLIGATOR CRACKING

**Note:** The entire lane in one direction of travel on a two-lane roadway represents 50% of the section.

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

**(M)oderate:** 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.

**(S)evere:** 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. The failure can be either in the surface, base or subbase. Permanent deformation (rutting) does not have to be present for there to be alligator cracking.

Cracking first begins in the wheel path, usually as longitudinal cracking. Further stress creates an alligator pattern. If the surface is very flexible the longitudinal crack will become wider and an alligator pattern may not develop until severe distress sets in. The proper solution for both alligator and longitudinal cracking is the same since a structural failure is taking place in both cases. ***Alligator cracking also includes cracking along the pavement edge.***

Each lane of a two-lane facility is to be evaluated as representing 50% of the section. For example, if there is continuous moderate alligator cracking in either one or both wheel paths of one lane only, or along the edge, the rater should mark 50% under moderate alligator cracking. If similar cracking had been present in the other lane, the rater would mark 100% under moderate.

For multi-lane undivided facilities only the outside lane (or most distressed lane) in each direction shall be rated. These lanes will be rated together as one direction.

***Construction joints are not rated unless the pavement in that area has begun to fail or show distress.***

For sections where the alligator or longitudinal cracking has been well-sealed and the sealant is in good condition, the rater should rate the severity of the crack as (L)ight. Conversely, if the crack has been sealed and the sealant has deteriorated, the rater should rate the severity of the crack as (M)oderate. This is necessary to pick up the fact that the section may have moderate or severe cracking and not be penalized for sealing the cracks.

Sections with scattered potholes are difficult to evaluate. Potholes represent spot locations of severe cracking. For sections that have about 5 to 10 potholes per mile, the rater should mark 10% (01) under moderate.

**\* Important Note About Alligator Cracking \***

Since 2002, the pavement condition survey has rated **all edge cracking** as alligator cracking.

Edge cracking is alligator cracking except it is usually located within 1 to 2 feet of the edge of the pavement. Edge cracking pinpoints an edge failure rather than a lane failure. The failure begins at the edge of the pavement and progresses in towards the center of the lane.

It is important to note edge cracking as it is an indicator that the edge may need strengthening either by PM patching, full-depth patching, and/or widening. Certainly, pooling of water at the pavement edge can contribute to and worsen an existing edge failure. By saturating the base, the strength at the edge is further reduced, which increases the rate of deterioration of the pavement.

## 1. ALLIGATOR CRACKING

**(L)ight:** Longitudinal disconnected hairline cracks about 1/8 inch wide running parallel to each other; initially may be only a single crack in the wheelpath or edge of pavement but could also look like an alligator pattern.



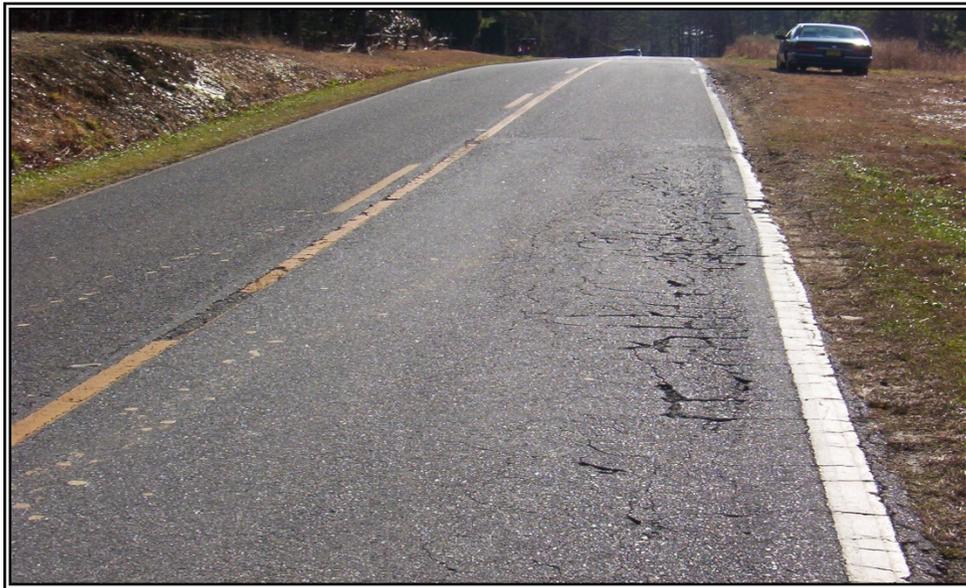
## 1. ALLIGATOR CRACKING

**(M)oderate:** Longitudinal cracks in wheelpath(s) or edge of pavement forming an alligator pattern; cracks may be slightly spalled and are 1/4 inch wide.



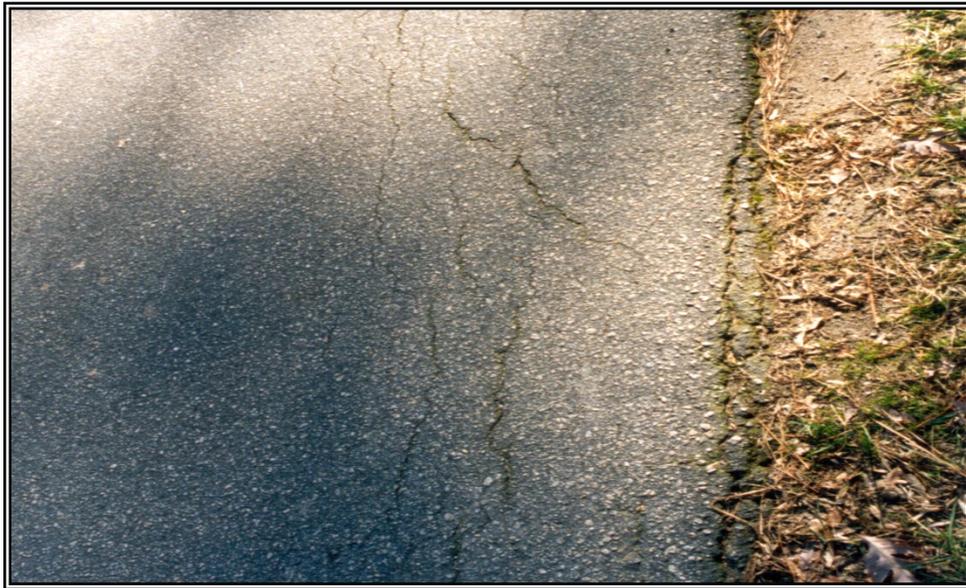
## 1. ALLIGATOR CRACKING

**(S)evere:** 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.



**1. ALLIGATOR CRACKING (EDGE)**

**(L)ight:** Hairline cracks just beginning to show; cracks are random with no pattern; cracks are about 1/8 inch wide.



**1. ALLIGATOR CRACKING (EDGE)**

**(M)oderate:** Cracks more extensive and may be forming an alligator pattern; cracks are about 1/4 inch wide and may be spalled.



**1. ALLIGATOR CRACKING (EDGE)**

**(S)evere:** Cracks are alligatored and severely spalled; cracks usually 3/8 to 1/2 inch wide or greater; pieces may be loose and potholes may be present.



**Rating Transverse Cracking, Rutting and Raveling**

1. Determine distress – type and severity
2. Determine total % of the distress type in the rating section
3. Determine % of each severity (L, M, S) of the distress type
4. Use the overall condition guidelines above

Transverse Cracking, Rutting, and Raveling are rated differently from Alligator Cracking in that a single value is used to represent the condition of the section. The rater should recognize that various amounts of Light, Moderate, and Severe distress may be present. Therefore, the rater shall use the following guidelines, along with the rating definitions, in rating the overall condition of a section.

**(L)ight:** 1/2 or more of the section shows (L)ight distress,

**OR**

A combination of distress conditions is present on 1/3 or more of the section with some (M)oderate distress.

**(M)oderate:** 1/2 or more of the section shows (M)oderate distress

**OR**

A combination of distress conditions is present on 1/3 or more of the section with some (S)evere distress.

**(S)evere:** 1/3 or more of the section shows (S)evere distress.

## 2. TRANSVERSE CRACKING

**Note:** The entire pavement surface area represents 100% of the section.

**(L)ight:** Cracks, usually only transverse, are less than 1/4 inch wide and are not spalled; block pattern may not be visible yet; transverse cracks usually 10 to 20 feet apart. Cracks have little or no spalling and joints are usually not bumped up.

**(M)oderate:** Block pattern may be visible with blocks 10 square feet or greater present; cracks are 1/4 inch to 1/2 inch wide; cracks may or may not be spalled; transverse cracks usually 5 to 20 feet apart; joints may be bumped up 1/2 inch over concrete.

**(S)evere:** Cracks may be severely spalled with smaller blocks 2 to 10 square feet present; cracks usually greater than 1/2 inch wide; transverse cracks may be 1 to 2 feet apart throughout portions of the surface; cracks may be bumped up more than 1/2 inch.

**Refer to page 32 for overall rating of section.**

### Description:

**Block cracks** divide the pavement up into roughly rectangular pieces. Block cracking is not load-associated. Cracks are generally caused by shrinkage of the asphalt concrete and daily temperature cycling. Wheel path loads can increase the severity of block cracking if water is allowed to penetrate into the cracks. It is therefore very important to seal these cracks to prevent water penetration into the base materials.

Transverse cracking also includes **reflective cracking** of plant mix resurfacing over concrete.

The primary cause of reflective cracking is movement of the concrete slab beneath the plant mix resurfacing. This movement is due to thermal and moisture changes and faulting at the joints. Typically, the reflective joints are bulged above the riding surface such that the vehicle is riding over small bumps.

For sections where the transverse cracking has been well-sealed and the sealant is in good condition, the rater should rate the severity of the crack as (L)ight. Conversely, if the crack has been sealed and the sealant has deteriorated, the rater should rate the severity of the crack as (M)oderate.

## 2. TRANSVERSE CRACKING

**(L)ight:** Cracks usually only transverse, are less than 1/4 inch wide and are not spalled; block pattern may not be visible yet; transverse cracks usually 10 to 20 feet apart. Cracks have little or no spalling and are sealed. Joints are usually not bumped up.



## 2. TRANSVERSE CRACKING

**(M)oderate:** Block pattern may be visible with blocks 10 square feet or greater present; cracks are 1/4 inch to less than 1/2 inch wide; cracks may or may not be spalled; transverse cracks usually 5 to 20 feet apart. Joints may be bumped up 1/2 to 1 inch high.



## 2. TRANSVERSE CRACKING

**(S)evere:** Cracks may be severely spalled with smaller blocks 2 - 10 square feet present; cracks usually about 1/2 inch wide or greater; transverse cracks may be 1 to 2 feet apart throughout portions of the surface. Joints may be bumped up greater than 1 inch high.



**2. TRANSVERSE CRACKING (Reflective)**

**(L)ight:** Cracks usually 1/8 to 1/4 inch wide; cracks have little or no spalling and are sealed. Joints usually not bumped up.



**2. TRANSVERSE CRACKING (Reflective)**

**(M)oderate:** Cracks are about 3/8 to 1/2 inch wide; cracks may be moderately spalled. Joints may be bumped up 1/2 to 1 inch high.



**2. TRANSVERSE CRACKING (Reflective)**

**(S)evere:** Cracks usually greater than 1/2 inch wide; cracks are severely spalled. Joints may be bumped up greater than 1 inch high.



### 3. RUTTING

**(L)ight:** Rutting 1/4 to less than 1/2 inch deep.

**(M)oderate:** Rutting 1/2 to less than 1 inch deep.

**(S)evere:** Rutting 1 inch deep or greater.

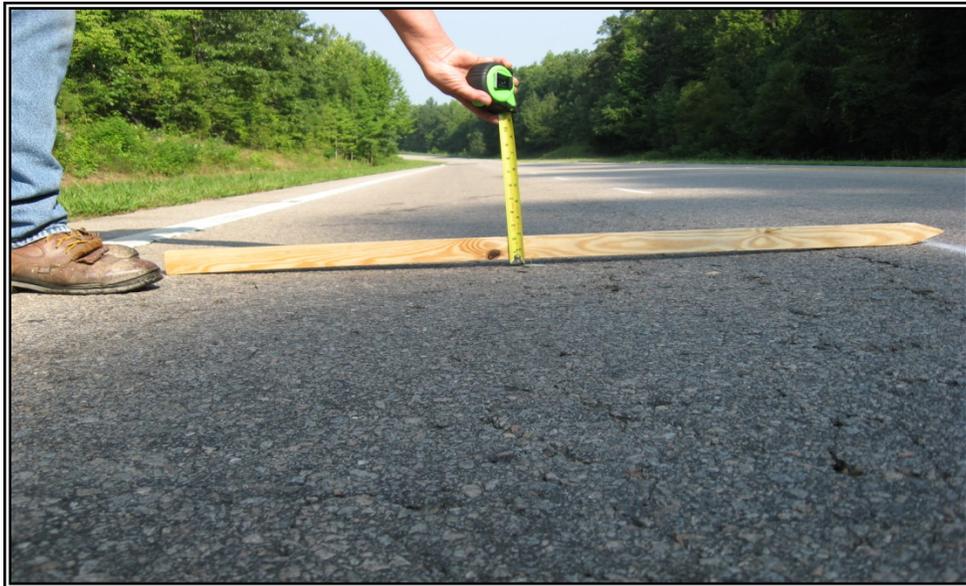
**Refer to page 32 for overall rating of section.**

Description:

A rut is a surface depression in the wheel path(s) or at the edge of pavement. Rutting comes from a pavement deformation in any of the pavement layers or in the subgrade, usually caused by consolidation or lateral movement of the materials due to traffic loads. Movement in the mix in hot weather or inadequate compaction during construction is the main cause of rutting.

### 3. RUTTING

**(L)ight:** Rutting 1/4 inch to less than 1/2 inch deep.



### 3. RUTTING

**(M)oderate:** Rutting 1/2 inch to less than 1 inch deep.



### 3. RUTTING

**(S)evere:** Rutting 1 inch or greater.



#### 4. RAVELING

**Note:** Only BST and slurry seals are rated for raveling.

- (L)ight:** Aggregate loss is not great; small amounts of stripping may be detected; aggregate has started to wear away.
- (M)oderate:** Some stripping evident; random stripping with small areas (less than one square foot) or strips of aggregate broken away.
- (S)evere:** Stripping very evident; aggregate accumulations may be a problem; large sections (greater than one square foot) of stripping with aggregate layer broken away.

**Refer to page 32 for overall rating of section.**

Description:

Raveling is the wearing away of the pavement surface caused by the dislodging of aggregate particles or loss of asphalt binder. Raveling is more common on AST or slurry surfaces than on plant mix surfaces, *therefore, indicate raveling only on BST or Slurry surfaces*. Raveling indicates either a hardening or poor application of asphalt binder.

Sand seals pose a unique problem as far as raveling is concerned. Sand seals can look moderately or severely raveled within 3 months of application. Yet the binder that was put down to seal the cracks is intact and will probably hold up for 2 to 3 years. Therefore, sand seals are not to be considered when evaluating raveling.

#### **4. RAVELING**

**(L)ight:** Aggregate loss within the pavement lanes is not great; small amounts of stripping may be detected; aggregate has started to wear away.



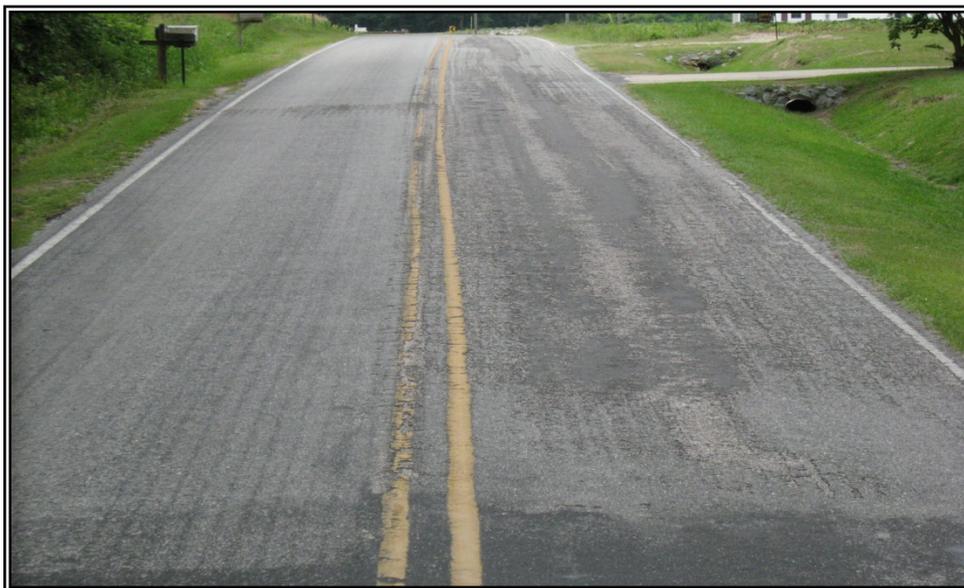
#### **4. RAVELING**

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



#### 4. RAVELING

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



**5. OXIDATION (Weathering)**

**Note:** Only **plant mix** is rated for oxidation.

**(N)one:** Oxidation is not present on the section.

**(S)evere:** Oxidation is present on the section.

Description:

Oxidation (weathering) is the hardening and aging of the asphalt binder. The surface binder has worn away to expose coarse aggregate. This condition will only be found on plant mix pavement, *therefore, indicate oxidation on plant mix surfaces only.* Weathering usually covers the entire surface and pitting is very evident.

NO



YES



YES



YES



## 6. BLEEDING

**Note:** Each wheelpath of a two-lane roadway represents 25% of the section.

**(L)ight:** Condition is present on 10 to 25 percent of the section.

**(M)oderate:** Condition is present on 26 to 50 percent of the section.

**(S)evere:** Condition is present on greater than 50 percent of the section.

### Description:

Bleeding is a film of bituminous material on the pavement surface that creates a shiny, reflective surface. Bleeding is caused by excess asphalt cement in the mix and/or low air void content. During hot weather the asphalt fills the voids of the mix and then expands out onto the surface of the pavement. The process is not reversible during cold weather, thus asphalt binder will accumulate on the surface.

No attempt has been made to define various levels of severity. Bleeding should be recognized when it is extensive enough to create a uniform coating in the wheel path(s). Each wheelpath represents 25% of the section on a two-lane facility.

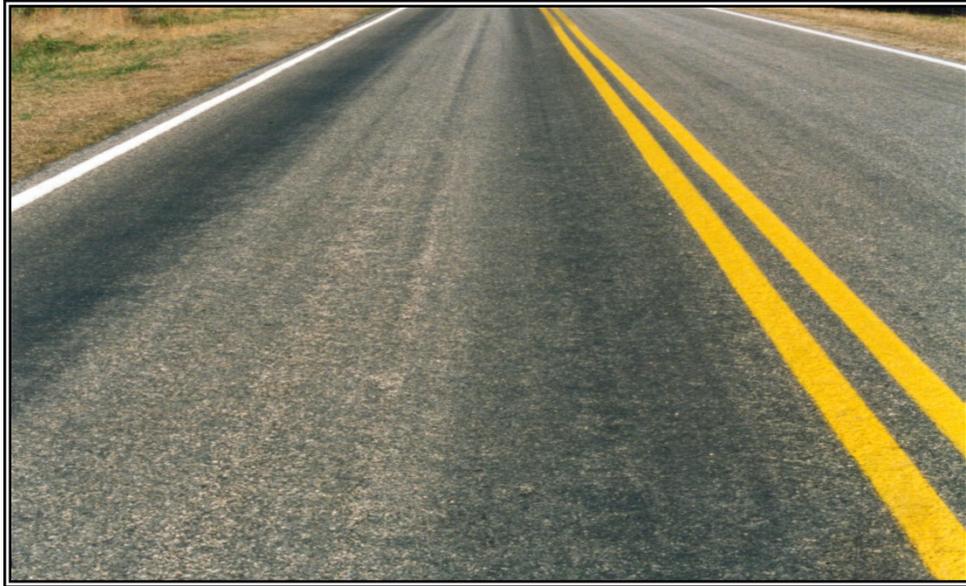
**Note:** Each wheelpath of a two-lane facility represents 25% of the section.

**(L)ight:** Condition is present on 10 - 25 percent of the section

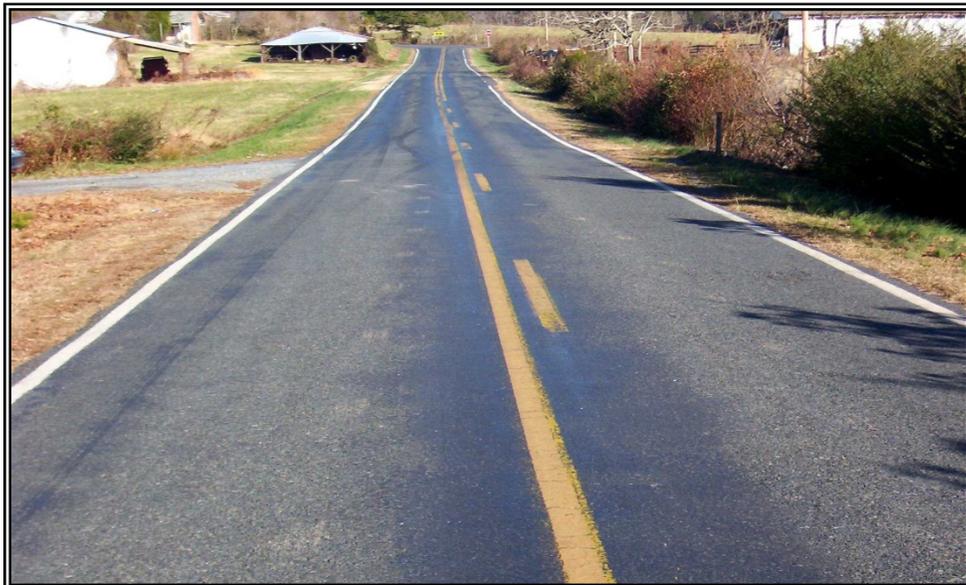


## 6. BLEEDING

**(M)oderate:** Condition is present on 26 – 50 percent of the section



**(S)evere:** Condition is present on more than 50% of the section.



## 7. RIDE QUALITY

**Note:** Average operating speed is the speed at which most drivers would travel a section of road under normal weather conditions.

**(L)ight (Average):** Pavement texture may cause minimum tire noise; isolated cases (up to 1/4 of the section) of bumps and dips; operating speed can be maintained safely.

**(M)oderate (Slightly Rough):** 1/4 to 1/2 of the section is uneven and bumpy with dips, rises, and ruts; pavement may be broken and cracked with a resulting increase in tire noise; slight difficulty in maintaining operating speed safely.

**(S)evere (Rough):** Greater than 1/2 of section is uneven and bumpy; rider is frequently jostled; rather large and frequent pavement failures and rough texture may be present causing a high increase in tire noise and jolts; operating speed cannot be maintained safely.

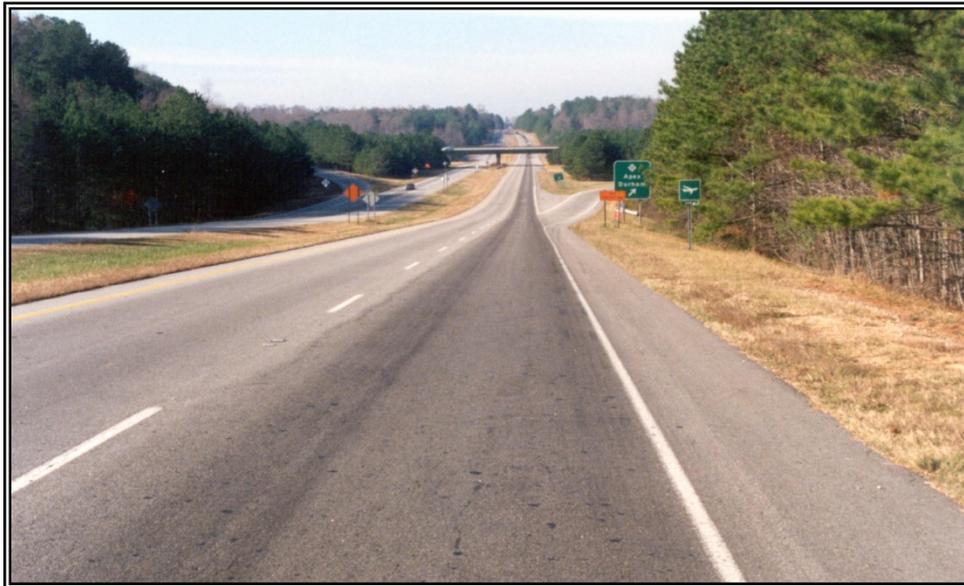
### Description:

Ride quality is what the general public perceives as the indicator of how well a road is holding up. Edge rutting, patching and localized dips significantly contribute to how the rater should look at ride quality.

Ride quality is not to take into account rolling or mountainous terrain or curved alignment. These conditions would exist no matter if the pavement was smooth or rough.

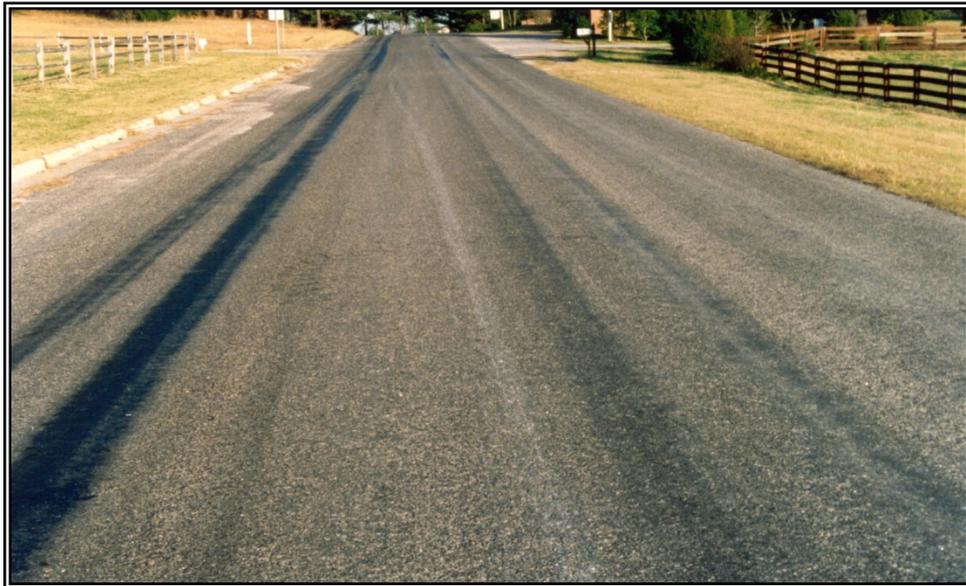
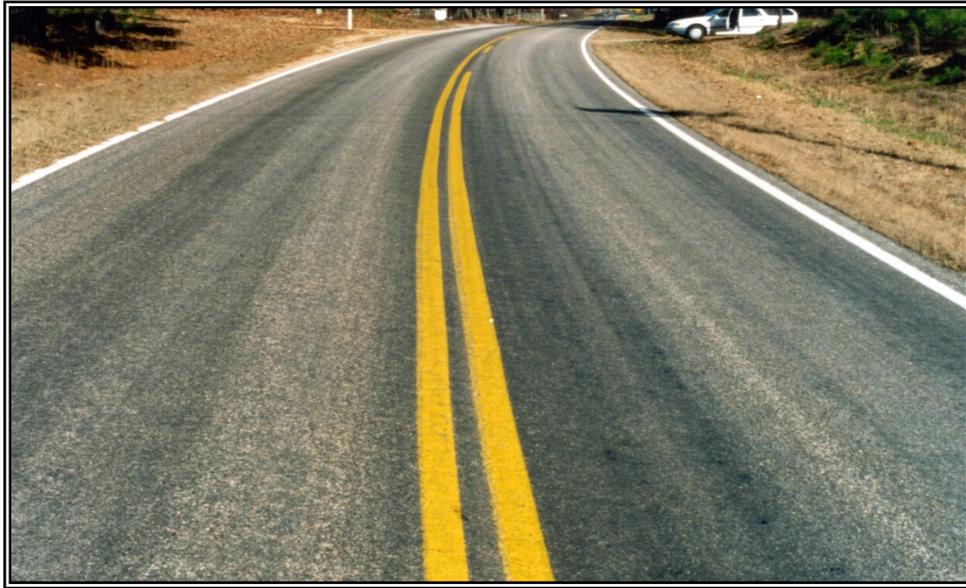
## 7. RIDE QUALITY (Plant Mix)

**(L)ight (Average):** Pavement texture may cause minimum tire noise; isolated cases (up to 1/4 of the section) of bumps and dips; operating speed can be maintained safely.



**7. RIDE QUALITY (BST)**

**Light (Average):** Pavement texture may be slightly coarser resulting in some increased tire noise; isolated cases (up to 1/4 of the section) of bumps and dips; operating speed can be maintained safely.



**7. RIDE QUALITY (Plant Mix and BST)**

**(Moderate:  
Slightly Rough)**

1/4 to 1/2 of the section is uneven and bumpy with dips and ruts; pavement may be broken and cracked with a resulting increase in tire noise; slight difficulty in maintaining operating speed safely.



**7. RIDE QUALITY (Plant Mix and BST)**

**(S)evere (Rough):** Greater than 1/2 of the pavement is uneven and bumpy; rider is frequently jostled; rather large and frequent pavement failures and rough texture may be present causing a high increase in tire noise and jolts; operating speed cannot be maintained safely.



## 8. PATCHING

**Note:** The entire pavement surface represents 100% of the section.

**(L)ight:** Condition is present on 6 to 15 percent of the section.

**(M)oderate:** Condition is present on 16 to 30 percent of the section.

**(S)evere:** Condition is present on more than 30 percent of the section.

### Description:

Patching is defined as any surface area of the existing pavement that indicates some type of maintenance repair has taken place. These patched areas may be 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 wheelpaths, across the entire surface for short distances, or a combination of any of these. In-kind treatments, such as PM edges on an existing PM surface, shall be considered as patches. Bridge approach tie-ins, intersection tie-ins, realignments, new signals or section widening and crack pouring *shall not be considered* as a type of patching to be measured.

The quality and condition of the patch is not to be considered in evaluating patching. It does not matter if all the patches are alligator cracked, rutted or potholed. These conditions are measured in the other distresses. Patching is an indication of the amount of surface area that has received some type of maintenance repair that may or may not be holding up.

The amount of patching shall be measured as a percentage of the total surface area. Be aware that a section must have at least 6 percent of the surface area to be marked as light. Do not assume that because there is some patching a light condition exists.

***Less than 315 (6%) feet of full pavement width per mile (No Patching)***

***315 to 844 (6 to 15%) feet of full pavement width per mile (Light Patching)***

***845 to 1585 (16 to 30%) feet of full pavement width per mile (Moderate Patching)***

***More than 1585 (30%) feet of full pavement width per mile (Severe Patching)***

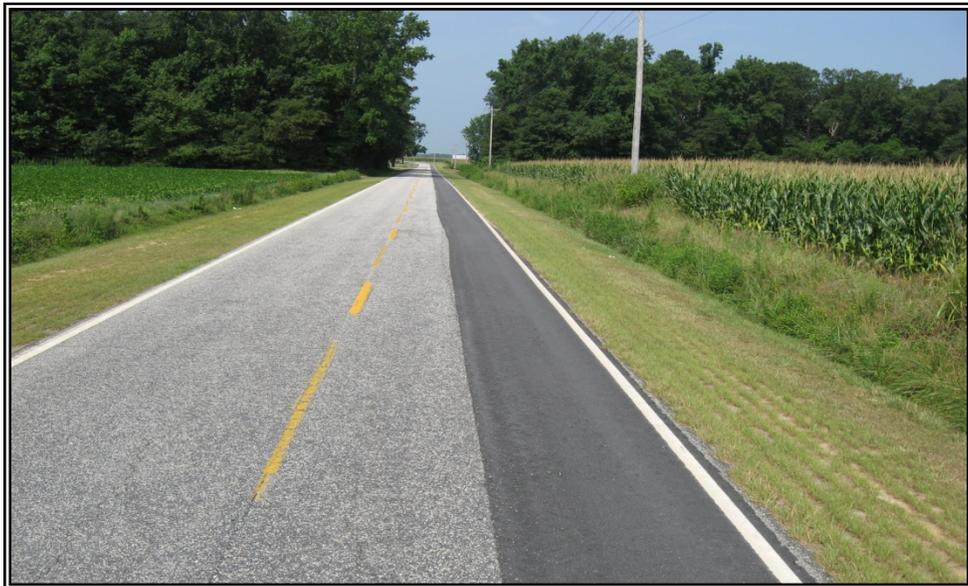
## 8. PATCHING

**(L)ight:** Condition is present on 6 to 15 percent of the section.



## 8. PATCHING

**(M)oderate:** Condition is present on 16 to 30 percent of the section.



## 8. PATCHING

**(S)evere:** Condition is present on more than 30 percent of the section.



**M. County List with SAP Number Codes**

County	SAP County Number	County	SAP County Number	County	SAP 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				

**N. Summary of Pavement Distress Conditions for Pavement Condition Survey**

**1. ALLIGATOR CRACKING – Rate sealed cracks as light – page 23**

<b>NOTE:</b> The entire lane in one direction of travel on a two-lane facility represents 50% of the section. Cracking may be only in one wheelpath and counts the same whether it is in both wheelpaths or on the edge. Recorded in percent of each severity.	
<b>Light (L)</b> Pages 24, 25, 26, 29	Longitudinal disconnected hairline cracks about 1/8" wide running parallel to each other; initially may only be a single crack but could also look like an alligator pattern
<b>Moderate (M)</b> Pages 24, 25, 27, 30	Longitudinal cracks forming an alligator pattern; cracks may be lightly spalled and are about 1/4" wide
<b>Severe (S)</b> Pages 24, 25, 28, 31	Cracking has progressed so that pieces appear loose with severely spalled edges; cracks are about 3/8 to 1/2 ' wide or greater; potholes may be present

**RATING TRANSVERSE CRACKING, RUTTING, AND RAVELING**

<b>NOTE:</b> 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, along with the distress definitions in rating the condition of the section.	
<b>Light (L)</b> Page 31	1/2 or more of the section shows <b>Light</b> distress OR a combination of distress conditions is present on 1/3 or more of the section with some Moderate distress.
<b>Moderate (M)</b> Page 32	1/2 or more of the section shows <b>Moderate</b> distress OR a combination of distress conditions is present on 1/3 or more of the section with some Severe distress
<b>Severe (S)</b> Page 32	1/3 or more of the section shows <b>Severe</b> distress

**2. TRANSVERSE CRACKING (Includes Block and Reflective) – Rate sealed cracks as light – page 32**

<b>NOTE:</b> The entire pavement surface represents 100% of the section	
<b>Light (L)</b> Pages 33, 34, 37	Cracks, usually only transverse, are about 1/4 inch wide; block pattern may not be visible yet; transverse cracks usually 10 to 20 feet apart; little or no spalling; not bumped up and sealed
<b>Moderate (M)</b> Pages 33, 35, 38	Block pattern may be visible with blocks 10 square feet or greater; cracks are 1/4 to 1/2 inch wide; cracks may be spalled; transverse cracks usually 5 to 20 feet apart; joints may be bumped up 1/4 to 1/2 inch
<b>Severe (S)</b> Pages 33, 36, 39	Cracks may be severely spalled with smaller blocks 2 to 10 square feet; cracks usually greater than 1/2 inch wide; transverse cracks may be 1 to 2 feet apart; cracks bumped up more than 1/2 inch

**3. RUTTING**

<b>Light (L)</b> Pages 40 & 41	Rutting 1/4 inch to less than 1/2 inch in wheelpaths
<b>Moderate (M)</b> Pages 40 & 42	Rutting 1/2 inch to less than one inch in wheelpaths
<b>Severe (S)</b> Pages 40 & 43	Rutting more than 1 inch in wheelpaths

**4. RAVELING (Indicated only on BST surfaces)**

<b>Light (L)</b> Pages 44 & 45	Aggregate loss is not great; small amounts of stripping; aggregate starting to wear away
<b>Moderate (M)</b> Pages 44 & 46	Stripping evident with small areas (less than one square foot) or strips of aggregate broken away
<b>Severe (S)</b> Pages 44 & 47	Stripping very evident; aggregate accumulation may be a problem; large sections (greater than 1 square foot) of aggregate broken away

**5. OXIDATION (Indicated only on Plant Mix Surfaces)**

<b>None (N)</b> Page 48	Oxidation is not present on the section
<b>Severe (S)</b> Pages 48	Oxidation is present on the section

**6. BLEEDING (Each wheelpath represents 25% of two lane section)**

<b>Light (L)</b> Pages 49	Condition is present on 10 to 25 percent of the section
<b>Moderate (M)</b> Pages 49 & 50	Condition is present on 26 to 50 percent of the section
<b>Severe (S)</b> Pages 49 & 50	Condition is present on greater than 50 percent of the section

**7. RIDE QUALITY**

<b>Light (L) - Average</b> Pages 51, 52, 53	Pavement texture may cause minimum tire noise; isolated cases (up to 1/4 of the section) of bumps and dips; operating speed can be maintained safely -
<b>Moderate (M) - Slightly Rough</b> Pages 51 & 54	1/4 to 1/2 of pavement uneven and bumpy; pavement may be broken; slightly difficult to maintain safe operating speed over the section
<b>Severe (S) - Rough</b> Pages 51 & 55	More than 1/2 of pavement uneven and bumpy; large pavement failures; rough texture; operating speed cannot be maintained safely

**8. PATCHING**

<b>Light (L)</b> Pages 56 & 57	Surface has 6 to 15 percent patching	<b>315 feet of full width pavement per mile = 6%</b>
<b>Moderate (M)</b> Pages 56 & 58	Surface has 16 to 30 percent patching	<b>845 feet of full width pavement per mile = 16%</b>
<b>Severe (S)</b> Pages 56 & 59	Surface has more than 30 percent patching	<b>1545 feet of full width pavement per mile = 30%</b>

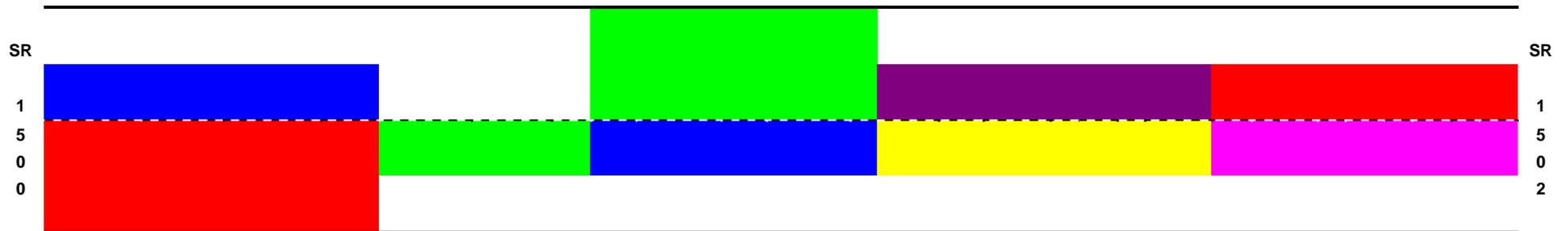
**O. PCS Rating Exercise**

**RUTTING**

- Rutting 1/4 to less than 1/2 inch deep in the wheel path.
- Rutting 1/2 to less than one inch deep in the wheel path.
- Rutting one inch deep or greater in the wheel path.

**ALLIGATOR CRACKING**

- Longitudinal disconnected hairline cracks about 1/8 inch wide running parallel to each other, may only be a single crack initially.
- Longitudinal cracks forming an alligator pattern; cracks may be slightly spalled and are about 1/4 inch wide.
- Longitudinal cracks progressed so that pieces appear loose with severely spalled edges; cracks about 3/8 to 1/2 inch wide or more.



SR 1501

ROUTE	BEGIN MP	BEGIN DESC	END MP	END DESC	SCTN LNPTH	-PVMT-			SLDR		C	N	ALLIGATOR			T	R	R	O	B	R	P
						T	WI	L	T	WI			L	M	S							
40001501	0.00	SR 1500	1.00	SR 1502	1.00	P	20	2	U	4	N											

TEST ROAD NO. 1

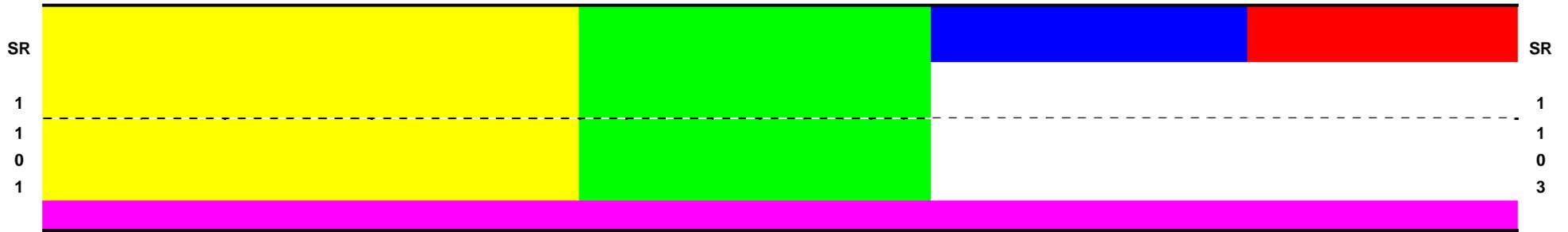
2012 NCDOT Pavement Condition Survey

**TRANSVERSE CRACKING**

- Transverse cracks less than 1/4 inch wide, 10 to 20 feet apart, joints not bumped up.
- Transverse cracks 1/4 to 1/2 inch wide, 5 to 20 feet apart, joints may be bumped up to 1/2 inch, block pattern may be visible.

**ALLIGATOR CRACKING**

- Hairline cracks just beginning to show; cracks are random with no pattern; cracks are about 1/8 inch wide.
- Longitudinal cracks forming an alligator pattern; cracks may be slightly spalled and are about 1/4 inch wide.
- Longitudinal cracks progressed so that pieces appear loose with severely spalled edges; cracks about 3/8 to 1/2 inch wide or more.



SR 1102

ROUTE	BEGIN MP	BEGIN DESC	END MP	END DESC	SCTN LNTH	-PVMT-			SLDR			C			ALLIGATOR			T V	R T	R V	O D	B E	R D	P T	
						T	WI	L	T	WI	G	N	L	M	S										
40001102	0.00	SR 1101	1.00	SR 1103	1.00	P	20	2	U	4	N														

TEST ROAD NO. 2

2012 NCDOT Pavement Condition Survey

**RUTTING**

 Rutting 1/4 to less than 1/2 inch deep in the wheel path.

**PATCHING**

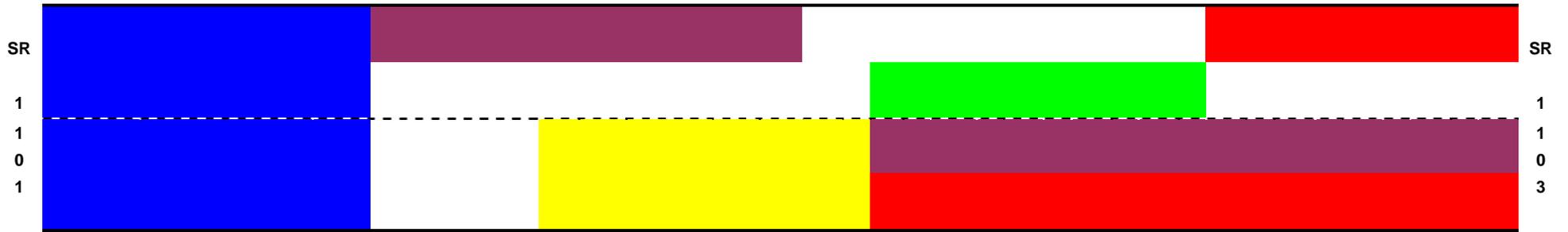


**ALLIGATOR CRACKING**

 Longitudinal disconnected hairline cracks about 1/8 inch wide running parallel to each other, may only be a single crack initially.

 Longitudinal cracks forming an alligator pattern; cracks may be slightly spalled and are about 1/4 inch wide.

 Longitudinal cracks progressed so that pieces appear loose with severely spalled edges; cracks about 3/8 to 1/2 inch wide or more.



SR 1102

ROUTE	BEGIN MP	BEGIN DESC	END MP	END DESC	SCTN LN	-PVMT-			SLDR		C		ALLIGATOR			T	R	R	O	B	R	P
						T	WI	L	T	WI	G	N	L	M	S	V	T	V	D	E	D	T
40001102	0.00	SR 1101	1.00	SR 1103	1.00	P	20	2	U	4	N											

TEST ROAD NO. 3

2012 NCDOT Pavement Condition Survey

**RAVELING**

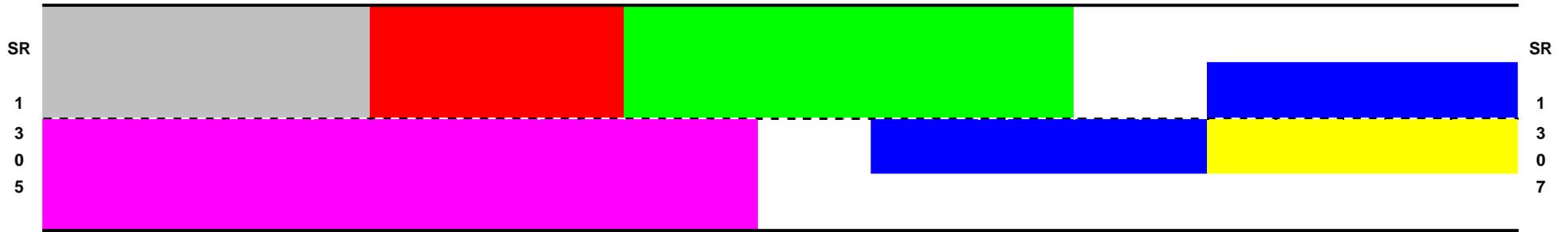
- Aggregate loss within pvt. lanes is not great; small amounts of stripping may be detected; aggregate has started to wear away.
- Some stripping evident; random stripping with small areas or strips of aggregate broken away.
- Stripping very evident; aggregate accumulation may be a problem; large sections of stripping with aggregate layer broken away.

**ALLIGATOR CRACKING**

- Longitudinal disconnected hairline cracks about 1/8 inch wide running parallel to each other, may only be a single crack initially.
- Longitudinal cracks forming an alligator pattern; cracks may be slightly spalled and are about 1/4 inch wide.
- Longitudinal cracks progressed so that pieces appear loose with severely spalled edges; cracks about 3/8 to 1/2 inch wide or more.

**BLEEDING**

- Each wheelpath represents 25% of the section on a two-lane facility.



SR 1306

ROUTE	BEGIN MP	BEGIN DESC	END MP	END DESC	SCTN LNGTH	-PVMT-			SLDR		C	ALLIGATOR			T	R	R	O	B	R	P	
						T	WI	L	T	WI	G	N	L	M	S	V	T	V	D	E	D	T
40001306	0.00	SR 1305	1.00	SR 1307	1.00	B	20	2	U	4	N											

TEST ROAD NO. 4