North Carolina Department of Transportation

Maintenance Condition Survey Manual

April 2008

OPERATIONS
CONSTRUCTION
EMERGENCY
MAINTENANCE
NC DOT
DIVISION OF HIGHWAYS

North Carolina Maintenance Condition Survey Manual

April 2008

Developed By

Institute for Transportation Research and Education
North Carolina State University

Sponsored By

North Carolina Department of Transportation

PREFACE

Welcome to the Team!! Thanks to you, the North Carolina Department of Transportation is taking a very important first step in establishing a maintenance management system. The collection of data on the condition of state-maintained highways will provide an indication of the level of maintenance we are now providing. This information will enable us to address funding level needs and develop a strategy for prioritizing maintenance operations.

This manual presents the procedures of the maintenance condition survey. Instructions on the collection and reporting of survey data are provided, as well as detailed descriptions, examples, and illustrations of the features to be measured. In addition, a summary of these feature definitions is provided in the appendix.

It is imperative that the surveys be conducted in a timely manner, and that the information entered into the computer system as soon as practical. If you have any trouble or questions, contact:

Jennifer Brandenburg
State Road Maintenance Engineer

Scott Capps
Road Maintenance Operations Engineer

Lonnie Watkins
Maintenance Systems Engineer

Phone (919) 733-3725
FAX (919) 733-1838

North Carolina Department of Transportation

MAINTENANCE CONDITION SURVEY TRAINING

Course Outline

Day 1	
10:00 am	Welcome and Introduction
10:15	Maintenance Condition Survey Manual Overview of the Manual Elements and Features
10:30	Conditions to be Surveyed Shoulders, Drainage, Roadside, Signs & Markings, Environmental
11:30	LUNCH
12:30 pm	Inventory and Thresholds Group Exercise
1:45	BREAK
2:00	Collecting the Data Worker Safety Materials and Supplies Inventory Forms
2:30	Field Review
4:00	ADJOURN FOR THE DAY
Day 2	
8:00 am	Review of Survey Data
8:30	Group Field Exercise
11:30	LUNCH
12:30 pm	Follow-up to Field Exercise
1:45	BREAK
2:00	Reporting the Survey Data
2:30	Survey Assignments
3:00	ADJOURN

CHAPTER 1. INTRODUCTION

Quality assurance in highway maintenance has been the subject of study and discourse for several years. It may best be described as the planned and systematic actions needed to provide adequate confidence that highway facilities meet specified requirements. Such requirements are usually defined by the highway agency but are intended to reflect the needs and expectations of the user.

First largely considered in the 1960s as part of the maintenance management system concept, the issue of quality assurance in highway maintenance has since remained an active topic due mainly to increased work loads, greater maintenance demands, limited maintenance funds, and public perceptions of maintenance departments. The need for better quality maintenance has increased significantly within the last few years in recognition of the change in focus from new highway construction to maintenance and rehabilitation of existing roadways.

Building off of the successes of current quality management programs and the National Cooperative Highway Research Program (NCHRP) project 14-12, *Highway Maintenance Quality Assurance,* a program is being developed to implement quality management practices for North Carolina Department of Transportation.

The program will accomplish the following objectives:

- Determine the expectations of the traveling public.
- Be able to assure the public that NCDOT is meeting those goals.
- Develop the funding level needed to achieve a desired service level.
- Develop a "priority strategy" to direct maintenance operations.
- Achieve a uniform service level throughout the state by identifying excessively high or low areas of maintenance.
- Identify areas requiring additional employee skills or equipment to accomplish assigned tasks.

Using various interactive components to fulfill these objectives will enable the NCDOT to shift from a "fixing" reactive mode to a "prevention" proactive mode, thereby incurring the benefits associated with repairs that do not have to be repeated. Eventually, this may lead the way to greater levels of customer satisfaction at unit costs below those currently experienced by the agency.

The purpose of this manual is to provide a method for collecting roadway maintenance information in order to determine the overall condition of highways in the state. With this data, a maintenance needs report can be generated addressing required funding levels, a strategy for prioritizing maintenance operations, and areas of excessively high or low maintenance. This maintenance condition survey is the first, and perhaps the most important, step of a maintenance management system for NCDOT. A quality management system must be based upon good data, therefore it is imperative that the information collected is uniform and consistent.

CHAPTER 2. CONDUCTING THE SURVEY

The maintenance condition assessment program has been developed to assist the NCDOT to plan, schedule, budget, and report highway maintenance activities and needs. The agency has performance standards that describe how individual maintenance tasks are to be performed, the resources required to carry out the task, and the expected rate of production. The information from this maintenance condition survey will be used to evaluate the effectiveness of maintenance performance and identify opportunities for improvement. To maintain credibility of the program, the data must be collected accurately and completely.

Rating teams will be composed of two persons, and will be responsible for conducting the survey and reporting the findings. Each team will be assigned several segments for survey. The element features will be reviewed and assessed according to the criteria in the next chapter. To assure statewide uniformity of the maintenance inventory system, there should be no deviation from the criteria. Several passes through the survey segment may be required to adequately assess each feature.

Because the reviews will be made on foot, special precautions must be made for protection of the reviewers from traffic. The team's first responsibility is the safety of motorists, pedestrians, and themselves. Always be aware of traffic conditions. For the safety of the crew, it may be necessary to schedule the survey of those segments with high traffic volumes during off-peak traffic periods. The survey team should walk together, on the same side of the road, facing traffic as the segment is evaluated. This is for the protection of the team, and to assure that features will not be overlooked.

A list of equipment and supplies that should be used by the survey team is shown in Table 2.1. While some of these are necessary for proper collection of the data, other items will make the survey safer and more efficient.

Before the survey begins, the team will mark on the pavement the beginning and ending points of the survey, and the site number. This will facilitate returning to the segment in the event there are problems or concerns with the data that has been collected.

Also, if there is a problem with the randomly-selected site (the road is under construction, it is in an interchange area, a significant portion of the road segment is bridge structure, etc.), do not survey the location. Mark on the top of the Inventory Form what the problem is and FAX it to the State Road Maintenance Unit.

Personal Protective Equipment (safety vest, foot protection, etc.)
Roof-top revolving amber light
Copy of the *Maintenance Condition Survey* manual
Computer printout and location maps
Inventory forms
Clipboard
Pencils and erasers
Vehicle-installed distance measuring instrument
Measuring wheel or tape
Hand-held laser range finder
Small measuring ruler (6 in)
Straightedge
Stringline
Calculator
Bush axe
Gloves
Can of paint
Insect repellent with Deet
First aid kit

Table 2.1 – Survey Equipment

CHAPTER 3. ELEMENT FEATURES AND CONDITIONS

This chapter provides a procedure for collecting information in order to evaluate the condition of selected sections of roads maintained by NCDOT. The results from this survey will be used to estimate the overall condition of roadways throughout the state and determine highway maintenance needs.

Six maintenance elements will be rated for each survey segment: (1) unpaved shoulders and ditches, (2) drainage, (3) roadside, (4) traffic control devices, (5) environmental, and (6) pavement. Each element will consist of several features and characteristics that will be evaluated against certain threshold conditions. The elements and their features to be rated are shown in Table 3.1.

An explanation of each feature follows in this chapter with a description of the feature, the threshold condition that will be rated, and photographs of the characteristics of each feature. The descriptions also provide methods of measuring the features and any special instructions to take into account during the survey.

Each team will be assigned several segments for survey. The element features will be reviewed and assessed according to the criteria on the following pages. To assure statewide uniformity of the maintenance inventory system, there should be no deviation from the criteria.

Several passes through the survey segment site may be required to adequately assess each feature. Because most of the reviews will be made on foot, special precautions must be made for protection of the reviewers from traffic. Always be aware of traffic conditions.

Element 1 - Unpaved Shoulders and Ditches
Low Shoulders
High Shoulders
Lateral Ditches
Element 2 – Drainage
Crossline Pipes Blocked
Crossline Pipes Damaged
Gutters Blocked
Gutters Damaged
Inlets Blocked
Inlets Damaged
Element 3 – Roadside
Mowing
Brush and Tree Control
Litter & Debris
Impact Attenuators
Right-of-Way Fence
Barriers
Element 4 - Traffic Control Devices
Ground-Mounted Traffic Signs
Overhead Signs
Roadway Lighting
Pavement Striping
Words and Symbols
Pavement Markers
Element 5 – Environmental
Turf Condition
Miscellaneous Vegetation Management
Element 6 – Pavement
Paved Shoulders
Asphalt Pavement
Concrete Pavement

Table 3.1 – Maintenance Elements and Features

Element 1 - Unpaved Shoulders and Ditches

Two unpaved shoulder features and one ditch feature will be rated. Low shoulders, high shoulders, and lateral ditches are to be noted. For each feature, two longitudinal measurements will be recorded: the Total Segment Inventory of the feature and the Measured Amount that the feature exceeds the threshold condition.

Low Shoulders

Feature Description: Low shoulders occur when the elevation of the unpaved shoulder is lower than the roadway edge of pavement. A low shoulder can result in an unsafe recovery in the event a vehicle leaves the roadway. A low shoulder can also hold water that may eventually penetrate the base and subgrade and weaken the roadway.

Threshold Condition: A low shoulder should be noted where the elevation difference is **2 inches** below the roadway edge of pavement, or lower.

Total Segment Inventory: The total shoulder length in the segment will be recorded. For example, if a typical two-lane, two-way roadway is being inspected, the total shoulder length will be 2,112 feet (0.2 mi. x 5,280 ft. x 2 shoulders). For the assessment of a four-lane roadway divided by a grass median, the total shoulder length may be 4,224 feet (0.2 mi. x 5,280 ft. x 4 shoulders).

Measured Amount: Each shoulder in the segment is to be evaluated. The Measured Amount is the longitudinal length wherever a shoulder is 2 inches or lower than the roadway. On the survey form, record the sum of the lengths of low shoulders that meet this condition.

Special Instructions: There may be an area in the segment where an unpaved shoulder does not exist due to a curb and gutter, valley gutter, median barrier, etc. When this occurs, the Total Segment Inventory must be reduced by this length.

Figure 3.1 – Low Shoulders

High Shoulders

Feature Description: High shoulders occur when the elevation of the unpaved shoulder is higher than that of the roadway edge of pavement. A high shoulder can restrict water drainage and result in ponding at the edge of roadway. The standing water can cause vehicle hydroplaning, and may also infiltrate the base and subgrade and weaken the roadway. The relief of ponding caused by a high shoulder may also scour the shoulder and front slope.

Threshold Condition: A high shoulder should be noted where the elevation difference is **1 inch** above the road surface, or higher.

Total Segment Inventory: This length will be the same as the Low Shoulder inventory.

Measured Amount: Each shoulder in the segment is to be evaluated. The Measured Amount is the longitudinal length wherever a shoulder is 1 inch or higher than the roadway. On the survey form, record the sum of the lengths of high shoulders that meet this condition.

Special Instructions: See the special instruction for Low Shoulders.

Figure 3.2 – High Shoulders

Lateral Ditches

Feature Description: Lateral ditches are trough-shaped channels oriented parallel to the roadway. Located along the roadside and in medians, these ditches are constructed to collect and disperse surface water in a controlled manner, and assist in the drawdown of groundwater from the road base to prevent saturation and loss of support. A blocked ditch can cause saturation of the base and subgrade, which may lead to pavement failure. The relief of ponding caused by a blocked ditch may also erode downstream slopes and ditches when the water is released. Because ditches are constructed to collect and disperse surface water in a controlled manner, they are often seeded and mulched to prevent erosion but may be lined with rip rap or even paved. A proper lining helps dissipate water flow velocities, and it prevents loss of roadbed support by stabilizing the soil. Ditch erosion can not only impact road stabilization and contaminate natural drainage areas, it can also be a safety problem for errant motorists.

Threshold Condition: Lateral ditches that are **50% blocked** or more and are not functioning properly should be noted. An eroded lateral ditch should be noted when there is a lining loss of **1 foot** below the original ditch line, or lower.

Total Segment Inventory: The total lateral ditch length in the segment will be recorded. For example, if a typical two-lane, two-way roadway is being inspected, the total ditch length will be 2,112 feet (0.2 mi. x 5,280 ft. x 2 ditches). For the assessment of a four-lane roadway divided by a grass median that has a single median lateral ditch, the total ditch length will be 3,168 feet (0.2 mi. x 5,280 ft. x 3 ditches).

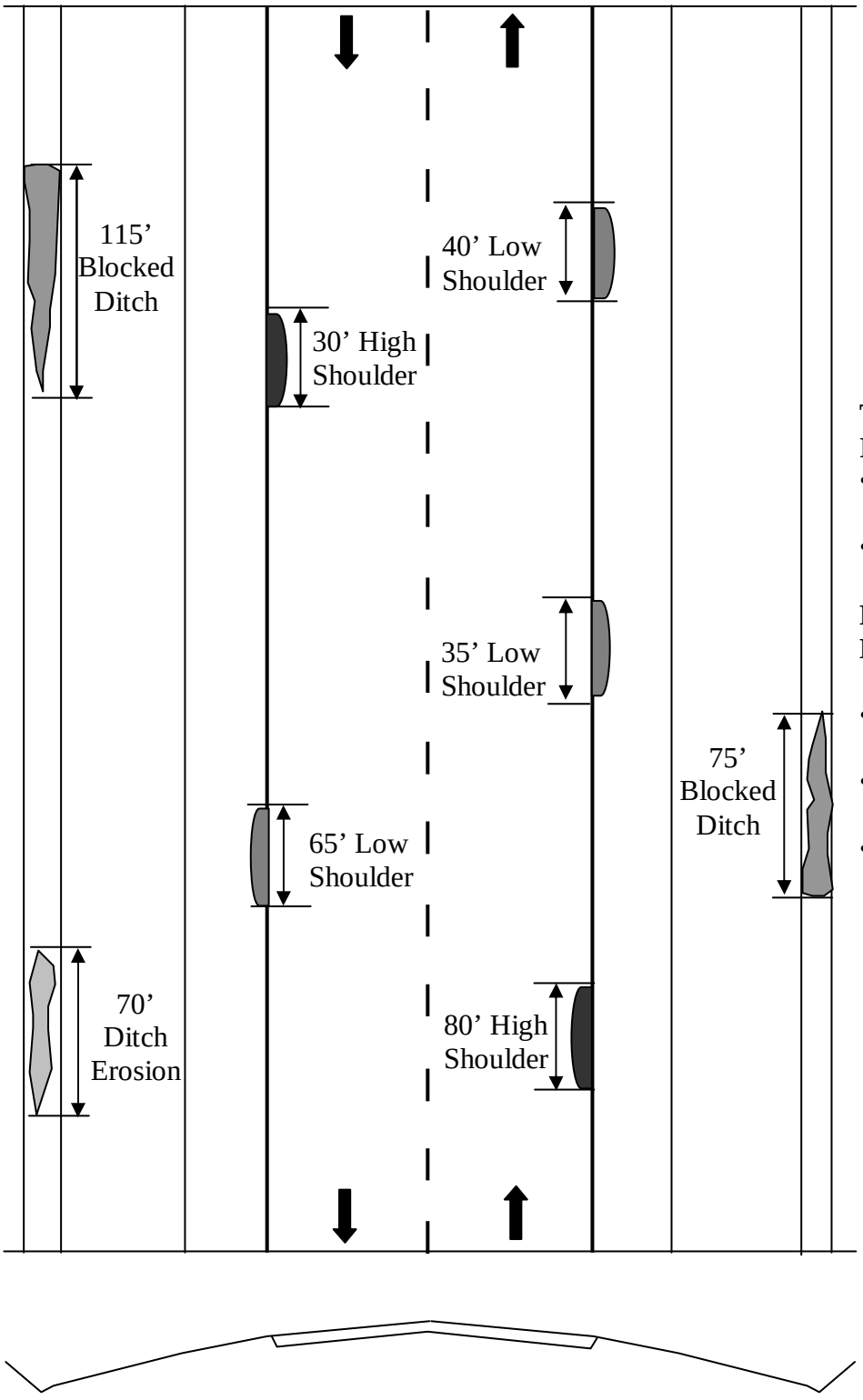
Measured Amount: Each lateral ditch in the segment is to be evaluated. Once the ditch's design shape is determined, check where blockage occurs that is 50% or higher from the ditch invert or where the ditch has eroded 1 foot or lower than the original ditch line. When noted, measure the longitudinal length of blocked ditches (that are not functioning properly) and eroded ditches. Record the sum of the lengths of blocked and eroded ditches on the survey form.

Special Instructions: Outfall ditches will not be rated as part of this survey. Also, do not deduct ordinary driveway pipe; the length of the driveway pipe will be included in the lateral ditch inventory. While ordinary driveway pipe will not be assessed for damages or erosion, it will be assessed for blockage. If either inlet or outlet is 50% blocked or more, include the length of the driveway pipe in the sum of blocked and eroded ditches. An exception is significant piping of lateral ditches, such as by a closed system. Where a closed system at least 100 feet long is encountered, the ditch inventory length will be reduced by the length of that system; the system would then be evaluated as a crossline pipe. For example, if a property owner in the segment of a typical two-lane, two-way roadway has piped 112 feet of ditch line, the total ditch inventory would be 2,000 feet (0.2 mi. x 5,280 ft. x 2 ditches - 112 ft), and the system will be evaluated as a crossline pipe under Element 2. In addition, the ditch inventory will be reduced by the length of any lateral pipe that also serves as a crossline pipe at an intersecting public road, even if less than 100 feet. This lateral pipe will also be evaluated as a crossline pipe under Element 2.

Figure 3.3 – Lateral Ditches Blocked

Figure 3.4 – Lateral Ditches Eroded

ELEMENT 1 - UNPAVED SHOULDERS & DITCHES



Total Segment Inventory

- Shoulder - 2112 ft
- Ditches - 2112 ft

Measured Amount Exceeding Threshold

- Low Shoulders - 65’+40’+35’= 140 ft
- High Shoulder - 30’+80’= 110 ft
- Lateral Ditches - 115’+ 70’+75’= 260 ft

Figure 3.5 – Example Roadway Conditions for Element 1

Element 2 - Drainage

Three drainage features will be rated: crossline pipes, gutters, and inlets. For each feature, two measurements will be recorded.

Except for gutters, the total number of drainage features in the segment will be noted as the Total Segment Inventory. Then, the number of these features that do not meet the threshold condition will be recorded as the Measured Amount. For gutters, the total longitudinal length of gutter in the segment will be recorded as the Total Segment Inventory. Next, the length of gutters exceeding the threshold conditions will be recorded as the Measured Amount.

Crossline Pipes Blocked

Feature Description: Crossline pipes are subsurface conduits that carry water under the roadway to the natural drainage area. Designed for each location, pipes come in a variety of materials, sizes, and shapes. If a blocked pipe causes ponding at the inlet and in the upstream ditch, the water can penetrate the subgrade and weaken the roadway. A restricted pipe can also result in scouring at the outlet due to the increased water flow.

Threshold Condition: Crossline pipes that have openings **50% blocked** or more should be noted.

Total Segment Inventory: The total number of crossline pipes in the segment will be recorded.

Measured Amount: If at all possible, each crossline pipe in the segment is to be evaluated. If either inlet or outlet is 50% blocked or more, that pipe will be recorded as a single feature that does not met the threshold condition. On the survey form, record the number of crossline pipes that are blocked.

Special Instructions: Only crossline pipes maintained by Roadway Maintenance (48 inches or less) will be evaluated. Pipes and culverts maintained by Bridge Maintenance (larger than 48 inches) will not be rated. Also, pipes along the lateral ditch that serve as a crossline pipe at an intersecting roadway will be evaluated. Last, where a lateral ditch has been piped for at least 100 feet, this system will be evaluated as a crossline pipe.

Figure 3.6 – Crossline Pipes Blocked

Crossline Pipes Damaged

Feature Description: See feature description for Crossline Pipes Blocked. If the pipe is damaged due to cracking, joint failures, or corrosion, water infiltration and exfiltration may result in loss of fines from the subgrade, causing roadway settlement and pavement failure.

Threshold Condition: Where a pipe is **damaged** so that it affects the functionality of the system, it should be noted.

Total Segment Inventory: The total number of crossline pipes in the segment will be recorded.

Measured Amount: If at all possible, each crossline pipe in the segment is to be evaluated. If the pipe is damaged, that pipe will be recorded as a single feature that does not met the threshold condition. On the survey form, record the number of crossline pipes that are damaged.

Special Instructions: See special instructions for Crossline Pipes Blocked.

Figure 3.7 – Crossline Pipes Damaged

Gutters Blocked

Feature Description: Gutters are open drainage channels that direct the flow of water from the road surface and roadside area to a catch basin or other outlet. Examples of open-channel gutters are curb and gutter, valley gutter, and the drainage at the base of a concrete barrier. An obstruction in the gutter may divert water flow onto the travelway and cause vehicle hydroplaning.

Threshold Condition: Gutters that are not functioning as designed due to an obstruction **2 inches or greater for at least 2 feet** of gutter length should be noted.

Total Segment Inventory: The total gutter length in the segment will be recorded. For example, if a typical five-lane roadway is being inspected, the total curb and gutter length will be 2,112 feet (0.2 mi. x 5,280 ft. x 2 gutters).

Measured Amount: Each gutter in the segment is to be evaluated. Measure the longitudinal length wherever a gutter is not functioning as designed due to an obstruction 2 inches or greater for at least 2 feet of curb length. On the survey form, record the sum of the lengths of gutter that meet this condition.

Special Instructions: Blockage will not be noted if it will not obstruct water flow (grass growing in a construction joint, trash that will be flushed clean in the next storm, etc.). At intersections, measure the gutter longitudinally through the intersection; do not measure around the corner radius. Short sections of monolithic barrier (such as a 4-foot wide by 50-foot long concrete median island) will not be included in this inventory.

Figure 3.8 – Gutters Blocked

Gutters Damaged

Feature Description: See feature description for Gutters Blocked. If the gutter is damaged, water can infiltrate the road base and weaken the roadway.

Threshold Condition: Any **damaged** gutter should be noted, such as cracking, settlement, misalignment, or deterioration.

Total Segment Inventory: See total segment inventory for Gutters Blocked.

Measured Amount: Each gutter in the segment is to be evaluated. Measure the longitudinal length wherever the gutter is damaged. On the survey form, record the sum of the lengths of gutter that meet this condition.

Special Instructions: See special instructions for Gutters Blocked.

Figure 3.9 – Gutters Damaged

Inlets Blocked

Feature Description: Inlets are the openings through which water enters an underground drainage network. They can be found in curbs, ditches, valley gutter, and at other locations that are designed to collect water runoff. Examples of inlets are catch basins, drop inlets, shoulder drains, and slope flumes. If the inlet is blocked, water ponding may occur at the obstructed opening. This can result in scour and erosion at an off-road structure, or vehicle hydroplaning if adjacent to the travelway.

Threshold Condition: Inlets that are **50% blocked** or more should be noted.

Total Segment Inventory: The total number of inlets in the segment will be recorded.

Measured Amount: Each inlet in the segment is to be evaluated. On the survey form, record the number that are 50% blocked or more.

Special Instructions: For miscellaneous drainage structures, count it as what it resembles the most.

Figure 3.10 – Inlets Blocked

Inlets Damaged

Feature Description: See feature description for Inlets Blocked. If the structure is damaged, water can penetrate the base and weaken the roadway. Also, a damaged or missing grate is a safety hazard to motorists, bicyclists, and pedestrians.

Threshold Condition: Inlets that are **damaged** or that have **missing or broken grates** should be noted.

Total Segment Inventory: See total segment inventory for Inlets Blocked.

Measured Amount: Each inlet in the segment is to be evaluated. On the survey form, record the number that are damaged or have missing or damaged grates.

Special Instructions: See special instructions for Inlets Blocked.

Figure 3.11 – Inlets Damaged

ELEMENT 2 - DRAINAGE

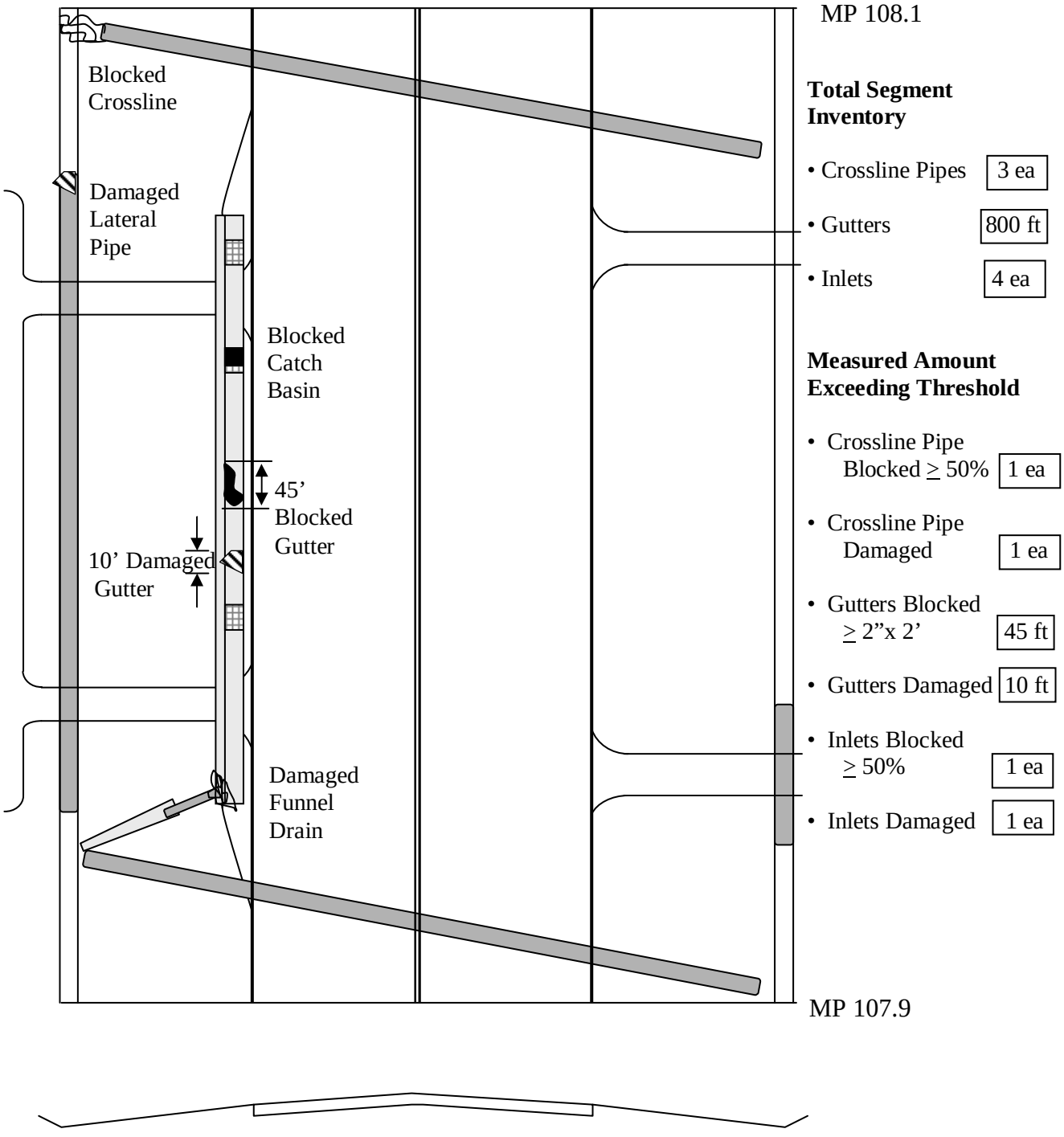


Figure 3.12 – Example Roadway Conditions for Element 2

Element 3 - Roadside

Six roadside features will be rated: mowing, brush and tree control, litter and debris, impact attenuators, right-of-way fence, and barriers. Except for mowing and litter/debris, two longitudinal measurements will be recorded: the Total Segment Inventory of the feature and the Measured Amount that the feature exceeds the threshold conditions. For mowing, a *PASS* or a *FAIL* will be recorded if the average grass height in the segment is less than or more than 15 inches. For litter and debris, a *PASS* or a *FAIL* will be recorded if the number of pieces of litter in the segment is less than or more than 100 pieces.

Mowing

Feature Description: Grass and vegetation are mowed in order to maintain roadside aesthetics and insure the safety of motorists and pedestrians. A safe sight distance must be maintained at intersections and curves, and roadside vegetation must be controlled around signs, delineators, and guardrail.

Threshold Condition: The **average height** of the roadside grass in the area will be determined.

Total Segment Inventory: There will be no inventory of mowing in the segment to be recorded.

Measured Amount: Measure the height of grass at several locations along the study area. If the average height is 15 inches or less, enter a *PASS*. If the average height is more than 15 inches, enter a *FAIL*.

Special Instructions: Ignore any residential mowing in the test section; only consider areas of normal roadside mowing when determining average grass height. In areas where there is no grass to be mowed (such as an urban area with sidewalks on both sides of the roadway), enter N/A on the survey form.

Figure 3.13 – Mowing

Brush and Tree Control

Feature Description: Brush and tree control involves the removal of large vegetation for safety reasons, to maintain a roadway clear zone, and to provide adequate sight distance from side streets and driveways. Although trees are an appealing roadside feature, the presence of large trees in the recovery area can be a hazard to errant motorists. A tree canopy can also be a problem if it restricts the visibility of traffic control devices (traffic signals or signs), reduces the stopping sight distance of drivers travelling the road, or limits the sight distance of drivers entering the roadway.

Threshold Condition: Brush, trees, and tree limbs should be noted if they are **within the control zone** of 15 feet above the roadway and 10 feet back of a ditch or shoulder point.

Total Segment Inventory: The total length of forested area in the segment will be recorded. For example, if a typical two-lane, two-way roadway is being inspected, the total length will be 2,112 feet (0.2 mi. x 5,280 ft. x 2 forested shoulders). If the road is wooded on just one side (the other side may be a pasture), the segment length would be 1,056 feet (0.2 mi. x 5,280 ft. x 1 forested shoulder).

Measured Amount: Each forested shoulder in the segment is to be evaluated. The Measured Amount is the longitudinal distances where the brush and tree control zone is not clear. Enter the sum of these lengths on the survey form.

Special Instructions: Brush and small trees within the control zone should not be noted if they would be mowed in normal mowing operations. However, if the brush and trees are so large that a tractor mower cannot mow them, then their longitudinal length should be measured. An exception is brush and trees that will not be removed due to public sensitivity, such as growth in a residential area. If a tree is beyond the control zone but is a safety concern, it should be measured. Conversely, a tall pine tree within 10 feet of the shoulder point but 5 feet behind semi-rigid guardrail can be ignored since the barrier shields it.

Figure 3.14 – Brush and Tree Control

Litter and Debris

Feature Description: Litter is composed of trash, wastepaper, carcasses, etc. An attractive appearance contributes to the beauty of the roadside and the local area, and the presence of litter impacts the appearance of the area. Large pieces of trash (tires, sofas, washing machines) may constitute a traffic hazard, and must be removed immediately. Readily observable litter is defined as anything the size of a fist or bigger that can be easily seen by pedestrians, bicyclists, and the driving public.

Threshold Condition: Litter or debris that is **fist-sized** or larger will be noted.

Total Segment Inventory: There will be no inventory of litter and debris in the segment to be recorded.

Measured Amount: Measure the number of pieces of litter in the study area that are fist-sized or larger. If the number of litter or debris is 100 pieces or less, enter a *PASS*. If the number is more than 100, enter a *FAIL*.

Special Instructions: None.

Figure 3.15 – Litter and Debris

Impact Attenuators

Feature Description: Impact attenuators are a safety device designed to protect errant motorists from roadside fixed obstacles, typically the blunt ends of concrete barrier. Impact attenuators that are not functioning properly can be as dangerous as the hazard they mean to protect. While severely damaged impact attenuators need to be repaired as soon as possible, impact attenuators that are only moderately damaged and still function may be scheduled for repair later with other work. Minor damage that is only aesthetic may not need repair at all.

Threshold Condition: Impact attenuators should be noted when they are **damaged** or are **not functioning as designed**.

Total Segment Inventory: The total number of impact attenuators in the segment will be recorded.

Measured Amount: Each impact attenuator in the segment is to be evaluated. On the survey form, record the number that are damaged or are not functioning as designed.

Special Instructions: Do not record a measured amount of impact attenuators that are an old design, are only slightly damaged and still function as designed, or are just aesthetically unpleasing. Do not evaluate guardrail end treatments.

Figure 3.16 – Impact Attenuators

Barriers

Feature Description: Barriers are a safety device designed to protect errant motorists from hazards near the roadway. They shield roadside obstacles, protect drivers from steep drop-offs, and can even be used to separate opposing traffic. Examples of barriers are W-beam guardrail, cable rail, and concrete barrier. Barrier that is not functioning properly can be as dangerous as the hazard it is meant to protect. While severely damaged barrier needs to be repaired as soon as possible, barrier that is only moderately damaged and still functions may be scheduled for repair later with other work. Minor damage that is only aesthetic may not need repair at all.

Threshold Condition: Barrier should be noted when it is **not functioning as designed** or has been **damaged**. Damaged barrier is defined as follows:

W-beam guardrail – the rail beam is crushed more than 18 inches out of line, if the rail has been severed, or if three or more posts have been broken,

Cable rail – if any cable is broken, if the cable is sagging to the point that it would not function properly, or if four or more posts have been knocked down, and

Concrete barrier – if it has been damaged such that it would not function properly.

Total Segment Inventory: The total length of barrier in the segment will be recorded.

Measured Amount: Each section of barrier in the test section is to be evaluated. Measure the longitudinal length of any barrier that is not functioning as designed or has been damaged. On the survey form, record the sum of the barrier lengths that meet this condition.

Special Instructions: Do not record a measured amount of barrier that is an old design, is only slightly damaged and still functions as designed, or is just aesthetically unpleasing. Where double-faced guardrail is encountered, inventory and measure it as two separate sections of rail.

Figure 3.17 – Barriers

Right-Of-Way Fence

Feature Description: Right-of-way fence is used to help control and restrict highway access. This fencing not only inhibits movement of wildlife across the roadway, but also deters access to and from the highway by road users. Right-of-way fence that is not functioning properly can lead to hazardous conflicts of highway traffic with wildlife and as well as people leaving/entering from illegal access points.

Threshold Condition: Right-of-way fence should be noted when it is **damaged** or is **not functioning as intended**.

Total Segment Inventory: The total length of right-of-way fence in the segment will be recorded.

Measured Amount: The Measured Amount is the longitudinal length of fence that is damaged or not functioning as intended. On the survey form, record the sum of the lengths of right-of-way fence that meets this condition.

Special Instructions: This evaluation will be made from the shoulder; it is unnecessary to walk the fence line. Ignore changes in alignment of right-of-way fence; measurements will be made parallel to the segment roadway. Do not record a measured amount of right-of-way fence that is only slightly damaged and still function as intended, or is just aesthetically unpleasing. Do not evaluate noise barriers.

Figure 3.18 – Right-Of-Way Fence

ELEMENT 3 - ROADSIDE

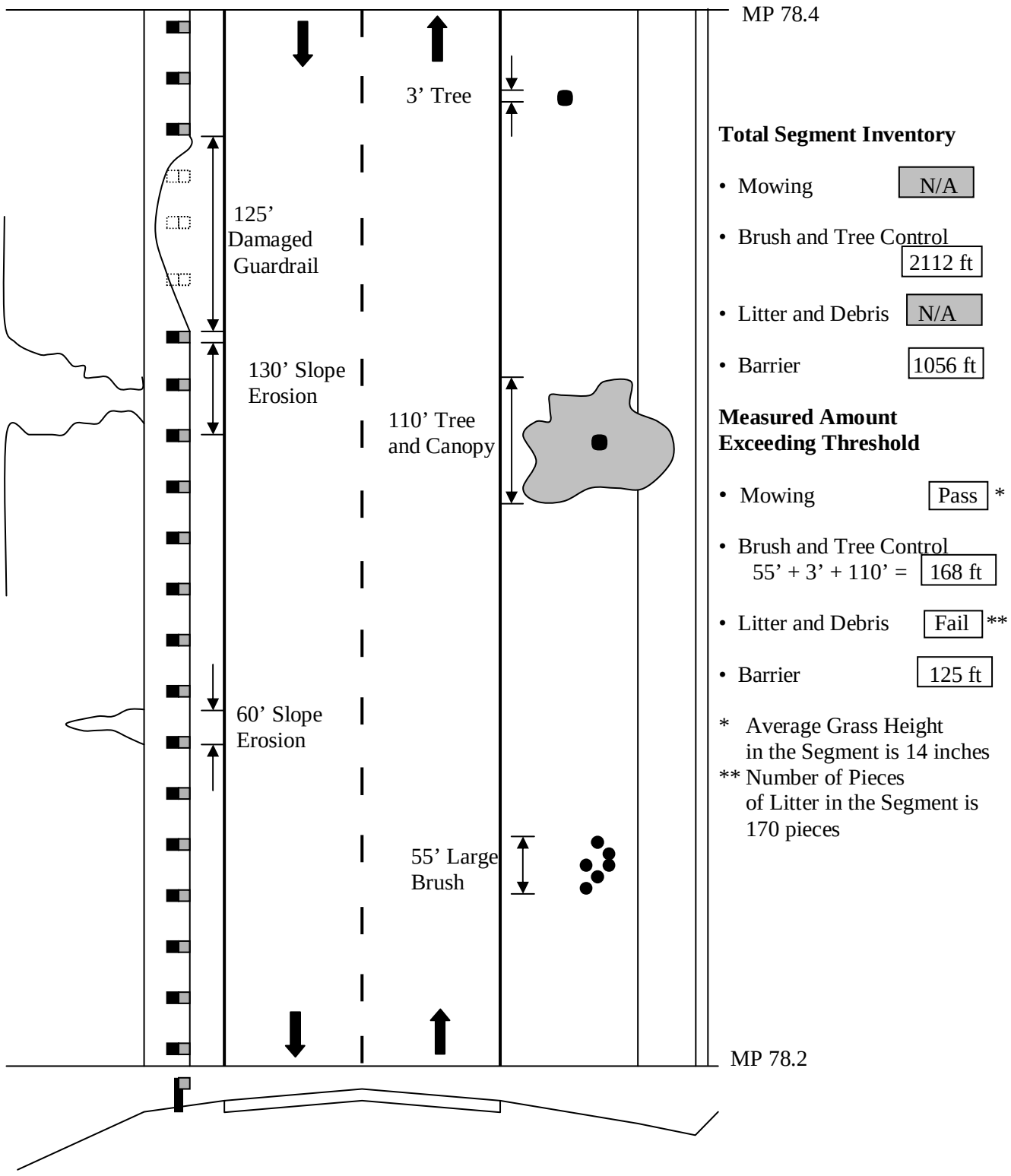


Figure 3.19 – Example Roadway Conditions for Element 3

Element 4 – Traffic Control Devices

Six traffic control device features will be rated: ground-mounted traffic signs, overhead traffic signs, pavement striping, word and symbol markings, pavement markers, and roadway lighting. For each feature, two measurements will be recorded.

Except for pavement striping, the total number of traffic control device features in the segment will be noted as the Total Segment Inventory. Then, the number of these features that do not meet the threshold condition will be recorded as the Measured Amount. For pavement striping, the total length of center lines, edge lines, and lane lines in the test section will be recorded as the Total Segment Inventory. Next, the length of pavement striping worn, missing, or nonretroreflective according to the threshold conditions will be recorded as the Measured Amount.

Ground-Mounted Traffic Signs

Feature Description: Signs control traffic and convey information. The three types of traffic signs are regulatory, warning, and guide signs. Detailed sign standards can be found in the Manual on Uniform Traffic Control Devices (MUTCD). To be effective, signs must be easily visible and legible to both vehicular and pedestrian traffic. If not, the result may be motorist confusion and error.

Threshold Condition: Signs that are **illegible, missing, obliterated, or non-retroreflective** should be noted.

Total Segment Inventory: The total number of traffic signs in the segment will be recorded.

Measured Amount: Count the number of signs that are illegible, missing, obliterated, or non-retroreflective, and record on the survey form.

Special Instructions: This inspection will be done at night. While overhead traffic signs on a structure will be evaluated as the feature on the next page, overhead signs suspended by span-wire will be included in this feature of ground-mounted signs. The following signs will not be included in this feature: street name signs, historic marker signs, and non-DOT signs. Where there is a sign assembly (such as a warning sign with supplemental plaque or a route marker with auxiliary plates), consider the assembly as one sign and count as one if any of the signs meet the threshold condition. An assembly has only one message.

****Logo Signs will NOT be assessed.****

Figure 3.20 – Ground-Mounted Traffic Signs

Overhead Traffic Signs

Feature Description: Signs control traffic and convey information. The three types of traffic signs are regulatory, warning, and guide signs. Detailed sign standards can be found in the Manual on Uniform Traffic Control Devices (MUTCD). To be effective, signs must be easily visible and legible to road users. If not, the result may be motorist confusion and error.

Threshold Condition: Signs that are **illegible, missing, obliterated, or non-retroreflective** should be noted.

Total Segment Inventory: The total number of traffic signs in the segment will be recorded.

Measured Amount: Count the number of signs that are illegible, missing, obliterated, or non-retroreflective, and record on the survey form.

Special Instructions: This inspection will be done at night. While overhead traffic signs on a structure will be evaluated under this feature, overhead signs suspended by span-wire will be included in the feature of ground-mounted signs described on the previous page. Do not include street name signs nor non-DOT signs in the survey with overhead traffic signs. Where there is a sign assembly (such as a guide sign with an exit number plaque), consider the assembly as one sign and count as one if any of the signs meet the threshold condition.

Figure 3.21 – Overhead Traffic Signs

Pavement Striping

Feature Description: Pavement striping are markings applied to the road surface to convey warnings or information without diverting the driver's attention from the roadway. They consist of center lines that separate traffic traveling in opposite directions, edge lines that provide an edge of pavement guide for drivers, and lane lines that separate traffic traveling in the same direction. When pavement striping is worn or missing, this important traffic control device does not guide and direct motorists as intended, may cause driver confusion, and could even direct motorists into the wrong path.

Threshold Condition: Pavement striping that is **worn, missing, obliterated, or non-retroreflective** should be noted.

Total Segment Inventory: There will be no segment inventory of pavement striping in the segment to be recorded.

Measured Amount: If any of the threshold conditions are present within the segment then it ***FAILS***.

Special Instructions: This inspection will be done at night.

Figure 3.22 – Pavement Striping

Figure 3.22 - Pavement Striping

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Words and Symbols

Feature Description: Words and symbols on the pavement may be used for the purpose of guiding, warning, or regulating traffic. Some examples are pavement arrows, stop bars, crosswalks, school area markings, and railroad crossing markings.

Threshold Condition: Word or symbol markings that have portions that are **worn, missing, obliterated, or non-retroreflective** should be noted.

Total Segment Inventory: The total number of word and symbol markings in the segment will be recorded.

Measured Amount: Count the number of words or symbols that are either worn, missing, obliterated, or non-retroreflective, and record on the survey form.

Special Instructions: This inspection will be done at night. For two-way left turn lane paired arrows, count as two symbols. Even though individual pavement marking patterns will make up a word (such as an ONLY, a RXR, or a SCHOOL), count the entire pattern as one word. All types of crosswalks (hi-visibility and standard) will count as one symbol.

Figure 3.23 – Words and Symbols

Pavement Markers *(on applicable routes)*

Feature Description: Pavement markers may be used as positioning guides or to supplement pavement markings. These may be surface-mounted, recessed, or snowplowable. Pavement markers are normally spaced every 80 feet, except in areas of severe road curvature (horizontal curves > 6°) where the spacing is 40 feet. A spacing chart for pavement markers is provided in theNCDOT Roadway Standard Drawings on standard 1250.01, sheet 1 of 3.

Threshold Condition: Pavement markers that are **damaged, missing, or non-retroreflective** should be noted.

Total Segment Inventory: There will be no segment inventory of pavement markers in the segment to be recorded.

Measured Amount: If any of the threshold conditions are present multiple places within the segment then it ***FAILS***.

Special Instructions: This inspection will be done at night. Pavement markers will only be assessed where they have been installed. If pavement markers have not been installed in the segment being rated, both the Total Segment Inventory and the Measured Amount will be N/A.

****Markers will be assessed on the STATEWIDE TIER ONLY.****

Figure 3.24 – Pavement Markers

Roadway Lighting

Feature Description: Roadway lighting enhances the safety of nighttime driving by improving seeing conditions. With improved motorist visibility, the driver makes more accurate decisions with quicker response time, and drives more efficiently and comfortably with less tension and fatigue. Roadway lighting provides contrast so that the motorist has better view of highway alignment, hazards in the roadway, and pedestrians. Lighting also reduces the effects of glare, not only in rural areas but in urban areas. The impacts of oncoming vehicles' headlights as well roadside lighting distractions are minimized. Where roadway lighting is not functioning, not only are hazards and conditions not nearly as visible in the dark spots, but a driver suffers temporary night blindness when passing from a lighted area to an unlighted area.

Threshold Condition: Luminaires or light heads that are **inoperable, damaged, or missing** should be noted.

Total Segment Inventory: The total number of luminaires in the segment will be recorded. For the high mast light shown below, the number of luminaries is four (4), while the butterfly pole has two (2).

Measured Amount: Count the number of luminaires that are inoperable, damaged, or missing, and record on the survey form.

Special Instructions: This inspection will be done at night.

Figure 3.25 – Roadway Lighting

ELEMENT 4 - TRAFFIC CONTROL DEVICES

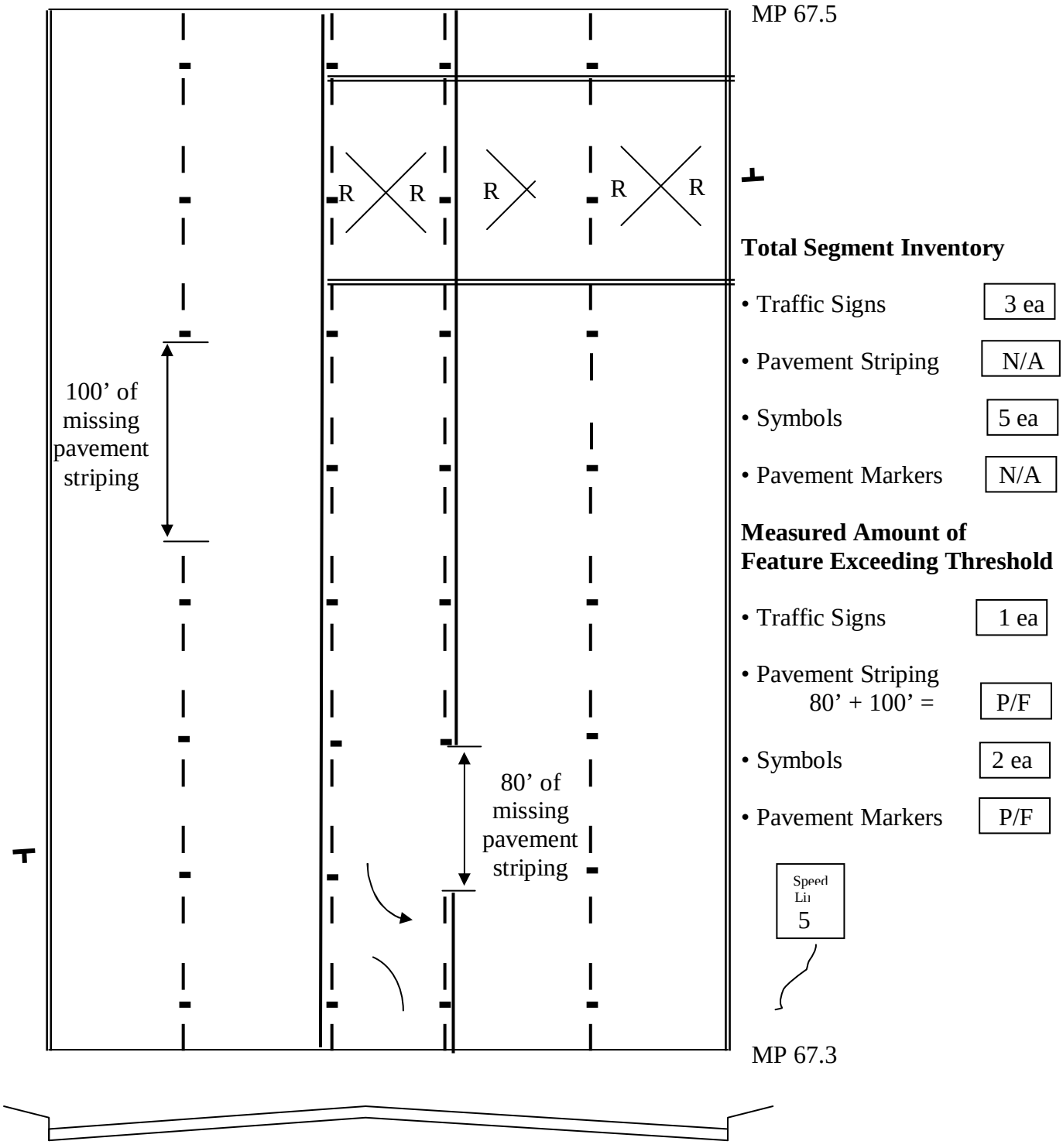

Figure 3.26 – Example Roadway Conditions for Element 4

Element 5 - Environmental

Two environmental features will be rated: turf condition and miscellaneous vegetation management. For each feature, two longitudinal measurements will be recorded: the Total Segment Inventory of the feature and the Measured Amount that the feature exceeds the threshold condition.

Turf Condition

Feature Description: Turf cover is essential to maintaining the stability of unpaved shoulders, slopes, and the ditch line. Without proper vegetation, soil erosion can lead to water infiltration and loss of roadbed support, and even contamination of natural drainage areas due to sediment loss.

Threshold Condition: Areas of **bare, dead, diseased, distressed, or weedy** turf will be noted.

Total Segment Inventory: The total roadside length in the segment will be recorded. For example, if a typical two-lane, two-way roadway is being inspected, the total roadside length will be 2,112 feet (0.2 mi. x 5,280 ft. x 2 shoulders). For the assessment of a four-lane roadway divided by a grass median, the total roadside length may be 4,224 feet (0.2 mi. x 5,280 ft. x 4 shoulders).

Measured Amount: Each shoulder, slope, and ditch in the segment is to be evaluated. The Measured Amount is the longitudinal length (parallel to the roadway) of any area that has poor turf growth. On the survey form, record the sum of the lengths of poor turf growth.

Special Instruction: Only the condition of turf within the normal mowing limits will be evaluated.

Figure 3.27 – Turf Condition

Miscellaneous Vegetation Management

Feature Description: Stationary objects, such as guardrail, cable rail, and traffic signs, must remain clear of unsightly vegetation for them to serve a useful purpose. The vegetation must be managed around these objects because uncontrolled weed growth can create sight distance problems, resulting in a traffic hazard.

Threshold Condition: Areas of **uncontrolled vegetation growth** around guardrail, cable rail, and sign posts will be noted.

Total Segment Inventory: The longitudinal length of all guardrail, cable rail, and traffic sign posts will be measured. The sum of these lengths will be the Total Segment Inventory.

Measured Amount: Each section of guardrail and cable rail, and each sign post in the segment is to be evaluated. Measure the longitudinal length of any area that has uncontrolled vegetation growth around the guardrail, cable rail, or sign posts. On the survey form, record the sum of the lengths of uncontrolled growth.

Special Instructions: To simplify the inventory and evaluation of traffic signs, use a longitudinal measurement of 2 feet for each sign post. Uncontrolled growth around guardrail and cable rail will be noted and measured only if the height of the vegetation is higher than the bottom of the rail or cable; if the vegetation is lower than the rail or cable, do not measure it.

Figure 3.28 – Uncontrolled Vegetation Growth

ELEMENT 5 - ENVIRONMENTAL

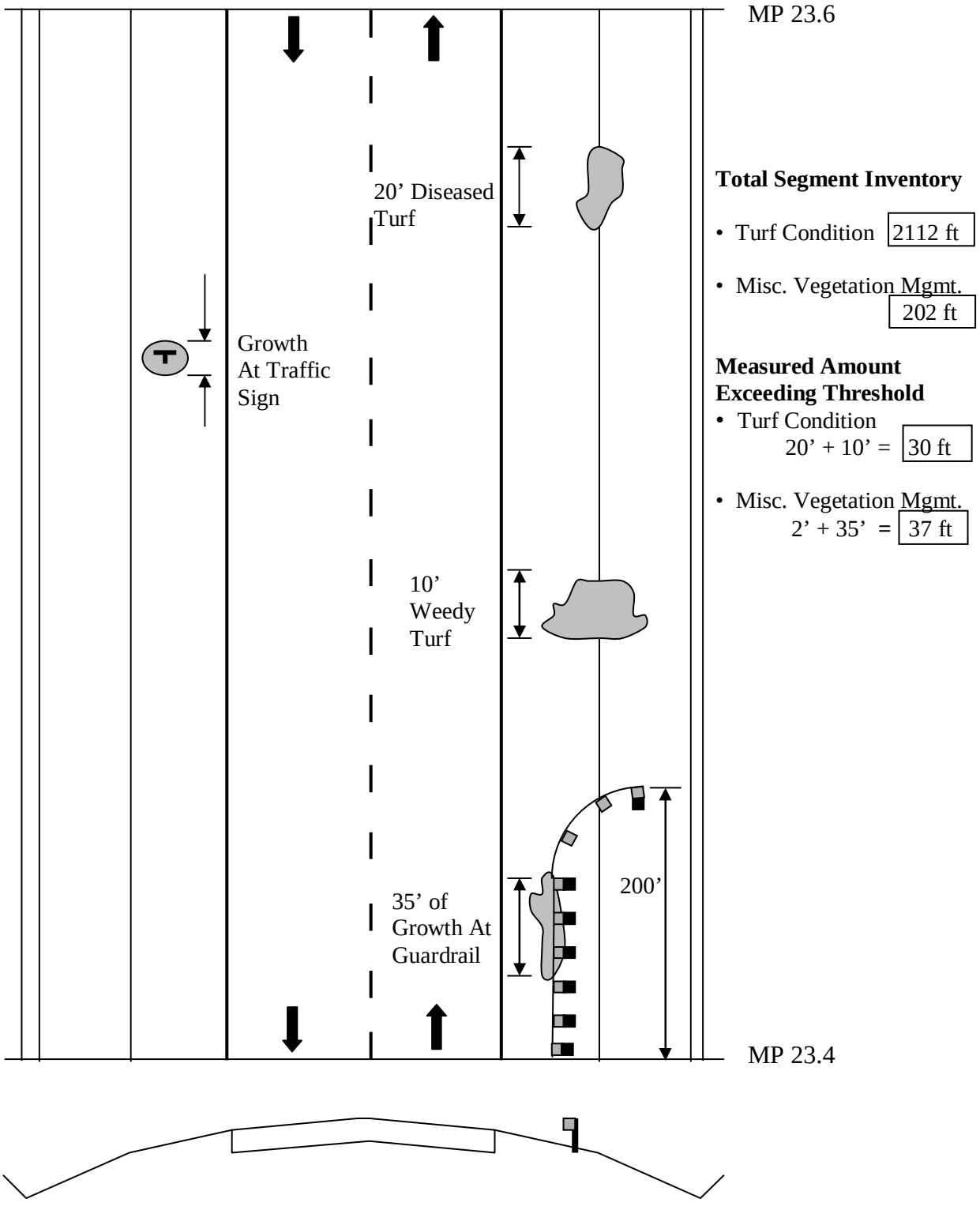

Figure 3.29 – Example Roadway Conditions for Element 5

Element 6 - Pavement

Three pavement features will be rated: paved shoulders asphalt pavement, and concrete pavement. For each feature, a *PASS* or a *FAIL* will be recorded.

Paved Shoulders

Feature Description: Intact quality shoulders allow vehicles to pull off the road in the event of emergencies or breakdowns. The condition should allow the driver to maintain control while slowing from a driving speed to a stop.

Threshold Condition: Pavement failures within shoulders are patched permanently (asphalt with asphalt, concrete with concrete). Rumble strips, if present, are retained or replaced when damaged. Longitudinal joint separation is less than 0.5 inches or is sealed. No unsealed cracks in asphalt shoulders are larger than 0.5 inches. The cross section allows positive drainage from the mainline.

Total Segment Inventory: There will be no segment inventory of paved shoulders in the segment to be recorded.

Measured Amount: If any of the threshold conditions are present for more than ten linear feet of the shoulder or if there are multiple pavement failures (pot holes), then the segment *FAILS*.

Special Instruction: Only shoulders wider than 4 feet will be evaluated as paved shoulders.

Figure 3.30 – Paved Shoulders

Asphalt Pavement

Feature Description: Asphalt pavements should provide a sound and reasonably smooth driving surface.

Threshold Condition: Potholes or pavement failures are repaired with permanent patches. Rut depths are less than 0.25 inches. No unsealed cracks larger than 0.5 inches are present.

Total Segment Inventory: There will be no segment inventory of asphalt pavement in the segment to be recorded.

Measured Amount: If any of the threshold conditions are present for more than ten linear feet of any travel lane within the segment or if there are multiple pavement failures (pot holes), then the segment *FAILS.*

Special Instruction: None.

Figure 3.31 – Asphalt Pavement

Concrete Pavement

Feature Description: Concrete pavements should provide a sound and reasonably smooth driving surface.

Threshold Condition: Punchouts are not repaired. Cracks in slabs broken in 2 or 3 pieces are sealed. Slabs are repaired where movement is evident or when slab is broken into 4 or more pieces.

Total Segment Inventory: There will be no segment inventory of concrete pavement in the segment to be recorded.

Measured Amount: If any of the threshold conditions are present for more than ten linear feet of any travel lane within the segment or if there are multiple unrepaired punchouts, then the segment *FAILS.*

Special Instruction: None.

Figure 3.32 – Concrete Pavement

CHAPTER 4. REPORTING SURVEY DATA

The information collected during the maintenance condition survey will be recorded on the inventory form shown in Figure 4.1. Location information will include a site number (which is unique to the segment being inspected), the beginning and ending mileposts, division and county numbers, and the number of lanes. The date of the survey and names of those conducting the survey must also be provided on the form.

It is important that the inventory form be filled out with pencil. Be sure to write as neatly and legibly as possible. All information blocks on the form must be completed. If a feature does not exist in the segment (for example, there may be no guardrail), enter "0" in both the Inventory and Condition blocks. A completed sample form is shown in Figure 4.2.

Follow-up visits will be made while the survey is being conducted. This will assist the raters by clearing up questions and problems that may arise. Any remarks about the survey can also be made on the back of the form. If a concern needs to be addressed, write "OVER" on the bottom of the of the inventory form then relay the problem on the back. When this is done, duplicate the site number with the note in case the pages become separated during FAX transmittal.

Each week, data from the completed survey forms should be entered and the original forms forwarded to the State Road Maintenance Unit.

2006 NCDOT Maintenance Condition Assessment Program
Condition Survey Form

Location: 24201 Route: NC-13 Beg MP: 4.1 End MP: 4.3 County: Hyde Division: 1

# of Lanes: 2 Area of Map: NE Team Members:

Survey Date: City Name:

Directions: 2.9 miles past ERRY and 4.1 miles before getting to Bridge-50

Element 1 - Unpaved Shoulders and Ditches	*INVENTORY*		*CONDITION*
Low Shoulder	FT	Low ≥ 2 inches	FT
High Shoulder		High ≥ 1 inch	FT
Lateral Ditches	FT	Blocked ≥ 50% and Not Funct. as designed or Eroded ≥ 1 ft	FT

Element 2 – Drainage	*INVENTORY*		*CONDITION*
Crossline Pipes Blocked	EA	Blocked ≥ 50%	EA
Crossline Pipes Damaged		Damaged	EA
Gutters Blocked	FT	Blocked ≥ 2 in x 2 ft	FT
Gutters Damaged		Damaged	FT
Inlets Blocked	EA	Blocked ≥ 50%	EA
Inlets Damaged		Damaged or Grate Problem	EA

Element 3 – Roadside	*INVENTORY*		*CONDITION*
Mowing	N/A	Average Grass Height	P/F
Brush and Tree Control	FT	Within 15' above, 10' back of ditch/shoulder	FT
Litter & Debris	N/A	Number of Pieces ≥ Fist-Sized	P/F
Barriers	FT	Damaged, or Not Functioning as designed	FT
Impact Attenuators	EA	Not Functioning as Designed	EA
Right of Way Fence	FT	Not Functioning as Designed/Damaged	FT

Element 4 - Traffic Control Devices	*INVENTORY*		*CONDITION*
Traffic Signs	EA	Illegible, Missing, or Obliterated	EA
Pavement Striping	N/A	Worn, Missing, or Obliterated	P/F
Words and Symbols	EA	Worn, Missing, or Obliterated	EA
Pavement Markers	N/A	Damaged or Missing	P/F
Overhead Signs	EA	Not Visible or Legible	EA
Roadway Lighting	EA	Not Operational	EA

Element 5 – Environmental	*INVENTORY*		*CONDITION*
Turf Condition	FT	Bare, Dead, Diseased, Distressed, or Weedy	FT
Misc. Vegetation Management	FT	Uncontrolled Growth at Signs or Guardrail	FT

Element 6 – Pavement	*INVENTORY*		*CONDITION*
Paved Shoulders	N/A	Pavement Failed, Cracked	P/F
Asphalt Pavement	N/A	Potholes, ruts, and cracks present	P/F
Concrete Pavement	N/A	Punchouts, cracks, slab movement present	P/F

Figure 4.1 – Example Inventory Form

North Carolina Department of Transportation

2008 Maintenance Condition Survey

APPENDIX

Condition Summary Sheets

Element 1 – Unpaved Shoulders and Ditches

Low Shoulders	**High Shoulders**	**Lateral Ditches**
Threshold Condition Low ≥ 2 inches.	*Threshold Condition* High ≥ 1 inch.	*Threshold Condition* Blocked ≥ 50% and not functioning properly, or eroded.
Total Segment Inventory Total shoulder length in the segment.	*Total Segment Inventory* Same as Low Shoulder inventory.	*Total Segment Inventory* Total ditch length in the segment.
Measured Amount Sum of longitudinal lengths of low shoulder.	*Measured Amount* Sum of longitudinal lengths of low shoulder.	*Measured Amount* Sum of longitudinal lengths of blocked ditch that are not functioning properly, or eroded ditches.
Special Instructions Adjust shoulder inventory where unpaved shoulder does not exist (due to curb and gutter, median barrier, etc.).	*Special Instructions* See special instructions for Low Shoulders.	*Special Instructions* Outfall ditches will not be rated. Do not deduct ordinary driveway pipe from inventory. Deduct closed systems and side-road crossline pipe from inventory.

Element 2 – Drainage (1 of 2)

Crossline Pipes Blocked	**Crossline Pipes Damaged**	**Gutters Blocked**	**Gutters Damaged**
Threshold Condition Blocked ≥ 50%.	*Threshold Condition* Damaged.	*Threshold Condition* Blocked 2 in. x 2 ft.	*Threshold Condition* Damaged.
Total Segment Inventory Number of crossline pipes in the segment.	*Total Segment Inventory* Same as Crossline Pipes Blocked inventory.	*Total Segment Inventory* Total length of gutters in the segment.	*Total Segment Inventory* Same as Gutters Blocked inventory.
Measured Amount Number of blocked crossline pipes, at either inlet or outlet.	*Measured Amount* Number of damaged crossline pipes.	*Measured Amount* Sum of longitudinal lengths of blocked gutters.	*Measured Amount* Sum of longitudinal lengths of damaged gutters.
Special Instructions Only pipes 48 inches or less will be evaluated. Lateral pipes that are side-road crossline pipes will be evaluated. Significant piping of lateral ditches (longer than 100 feet) will be evaluated.	*Special Instructions* See special instruction for Crossline Pipes Blocked.	*Special Instructions* Only blockage that creates a diversion of water flow is to be recorded. Measure gutters longitudinally at intersections. Do not evaluate short sections of monolithic barrier.	*Special Instructions* See special instructions for Gutters Blocked

Element 2 – Drainage (2 of 2)

Inlets Blocked	**Inlets Damaged**
Threshold Condition Blocked ≥ 50%.	*Threshold Condition* Structural damage, or missing or damaged grates.
Total Segment Inventory Number of inlets in the segment.	*Total Segment Inventory* Same as Inlets Blocked inventory.
Measured Amount Number of inlets that are blocked.	*Measured Amount* Number of inlets that are damaged, or have missing or damaged grates.
Special Instructions None	*Special Instructions* None

Element 3 – Roadside (1 of 2)

Mowing	**Brush and Tree Control**	**Litter & Debris**
Threshold Condition Determine the average height of the grass in the area.	*Threshold Condition* Brush and trees within 15 feet above the road, and 10 feet back of ditch or shoulder point.	*Threshold Condition* Note litter or debris that is fist-sized or larger.
Total Segment Inventory There will be no inventory of mowing.	*Total Segment Inventory* The total length of forested area in the segment.	*Total Segment Inventory* There will be no inventory of litter/debris.
Measured Amount Record *PASS* if the average grass height is 15 inches or less. If the height is more than 15 inches, record *FAIL*.	*Measured Amount* Sum of longitudinal distances where the brush and tree control zone is not clear.	*Measured Amount* Record *PASS* if there are100 pieces of litter or less. If there are more than 100 pieces, record *FAIL*.
Special Instructions Ignore any residential mowing. Record N/A where there is no grass.	*Special Instructions* Note brush and trees that a tractor mower cannot mow, and trees beyond the control zone but are a safety concern. An exception is brush and trees that will not be removed due to public sensitivity.	*Special Instructions* None.

Element 3 – Roadside (2 of 2)

Impact Attenuators	**Barriers**	**Right-Of-Way Fence**
Threshold Condition Not functioning as designed, or damaged.	*Threshold Condition* Not functioning as designed, or damaged.	*Threshold Condition* Damaged or not functioning as intended.
Total Segment Inventory Number of impact attenuators in the segment.	*Total Segment Inventory* The total length of barriers in the segment.	*Total Segment Inventory* The total length of right-of-way fence in the segment.
Measured Amount Number of impact attenuators damaged or not functioning as designed.	*Measured Amount* Sum of longitudinal length of barrier that is not functioning as designed or has been damaged.	*Measured Amount* Sum of longitudinal length of right-of-way fence that is damaged or not functioning as intended.
Special Instructions Do not record impact attenuators that are an old design, are only slightly damaged and still function as designed, or are just aesthetically unpleasing. Do not evaluate guardrail end treatments.	*Special Instructions* Do not record barrier that is an old design, is only slightly damaged and still functions as designed, or is just aesthetically unpleasing. Measure double-faced guardrail as two barriers.	*Special Instructions* Evaluations will be made from the shoulder. Measure fence length parallel to the roadway. Do not measure fence that is only slightly damaged and still functions as intended, or is just aesthetically unpleasing. Do not evaluate noise barriers.

Element 4 - Traffic Control Devices (1 of 2)

Ground-Mounted Traffic Signs	**Overhead Traffic Signs**	**Pavement Striping**
Threshold Condition Note signs that are illegible, missing, obliterated, or non-retroreflective.	*Threshold Condition* Note signs that are illegible, missing, obliterated, or non-retroreflective.	*Threshold Condition* Note pavement striping that is worn, missing, obliterated, or non-retroreflective.
Total Segment Inventory The total number of traffic signs in the segment.	*Total Segment Inventory* The total number of traffic signs in the segment.	*Total Segment Inventory* There will be no segment inventory of pavement striping in the segment to be recorded.
Measured Amount Number of illegible, missing, obliterated, or non-retroreflective signs.	*Measured Amount* Number of illegible, missing, obliterated, or non-retroreflective signs.	*Measured Amount* If any of the threshold conditions are present within the segment then it FAILS.
Special Instructions Inspect at night. Do not rate street name signs, historic marker signs, Logo signs, and non-DOT signs. Count a sign assembly (signs with plaques or auxiliary plates) as one sign.	*Special Instructions* Inspect at night. Do not rate street name signs, Logo signs, and non-DOT signs. Count a sign assembly (signs with plaques) as one sign.	*Special Instructions* Inspect at night

Element 4 - Traffic Control Devices (2 of 2)

Words and Symbols	**Pavement Markers**	**Roadway Lighting**
Threshold Condition Note words or symbol markings that are worn, missing, obliterated, or non-retroreflective.	****Statewide Tier ONLY**** *Threshold Condition* Note pavement markers that are damaged, missing, or non-retroreflective.	*Threshold Condition* Note luminaires or light heads that are inoperable, damaged, or missing.
Total Segment Inventory The total number of word and symbol markings in the segment.	*Total Segment Inventory* There will be no segment inventory of pavement markers in the segment to be recorded.	*Total Segment Inventory* The total number of luminaires in the segment.
Measured Amount Number of words or symbols worn, missing, obliterated, or non-retroreflective.	*Measured Amount* If any of the threshold conditions are present multiple places within the segment: It FAILS.	*Measured Amount* Number of luminaires that are inoperable, damaged, or missing
Special Instructions Inspect at night. Count paired two-way left-turn arrows as two arrows. Count an entire pattern as one word (an ONLY, a RXR, a SCHOOL). All types of crosswalks will count as one symbol.	*Special Instructions* Inspect at night. ****Statewide Tier ONLY****	*Special Instructions* Inspect at night.

Element 5 – Environmental

Turf Condition	Misc. Vegetation Management
Threshold Condition Note areas of bare, dead, diseased, distressed, or weedy turf.	*Threshold Condition* Note areas of uncontrolled vegetation growth around guardrail, cable rail, and sign posts.
Total Segment Inventory Total roadside length in the segment.	*Total Segment Inventory* The longitudinal length of all guardrail, cable rail, and traffic sign posts.
Measured Amount Sum of longitudinal lengths (parallel to the roadway) of poor turf growth.	*Measured Amount* Sum of longitudinal lengths of uncontrolled vegetation growth around guardrail, cable rail or sign posts.
Special Instructions Only the condition of turf within the normal mowing limits will be evaluated.	*Special Instructions* Use a length of 2 feet for each sign post. Do not measure vegetation that is lower than the bottom of the rail or cable.

Element 6 - Pavement

Paved Shoulders	**Asphalt Pavement**	**Concrete Pavement**
Threshold Condition Pavement failures are patched in permanently. Rumble strips are retained or replaced. Longitudinal joint separation is less than 0.5 inches or sealed. No unsealed cracks greater than 0.5 inches. Cross section allows positive drainage from the mainline.	*Threshold Condition* Potholes or pavement failures are repaired with permanent patches. Rut depths are less than 0.25 inches. No unsealed cracks greater than 0.5 inches.	*Threshold Condition* Punchouts are not repaired. Cracks in slabs broken in 2 or 3 pieces are sealed. Slabs are repaired where movement is evident or when slab is broken into 4 or more pieces.
Total Segment Inventory There will be no inventory of paved shoulders.	*Total Segment Inventory* There will be no inventory of asphalt pavement.	*Total Segment Inventory* There will be no inventory of concrete pavement.
Measured Amount Record *FAIL* if any of the threshold conditions are present for more than 10 linear feet of the shoulder or if there are multiple pavement failures (potholes).	*Measured Amount* Record *FAIL* if any of the threshold conditions are present for more than 10 linear feet of any travel lane or if there are multiple pavement failures (potholes).	*Measured Amount* Record *FAIL* if any of the threshold conditions are present for more than 10 linear feet of any travel lane or if there are multiple unrepaired punchouts.
Special Instructions Only shoulders wider than 4 feet will be evaluated.	*Special Instructions* None.	*Special Instructions* None.