

# North Carolina

DEPARTMENT OF TRANSPORTATION

## Level of Service Ratings For Asset Management of BMPs

Craig Deal, PE CPM

Stormwater Practitioner's Meeting  
July 30, 2014  
Washington, DC

# Overview

- Asset Management Program
- Structural Stormwater Control Inventory
- Performance Measures
- Ties Back to NCDOT Mission and Goals



# NCDOT Assets

## NCDOT System

- 80,000 road miles
- >160,000 paved lane miles
- 13,500 bridges
- 88.1 M sf bridge deck area
- 8,900 signals



# NCDOT Asset Management Program

Statutory Requirements: Biennial Report on Maintenance Condition and Costs

Conduct comprehensive statewide surveys

1. Maintenance Condition Survey
2. Bridge Condition Survey
3. Pavement Condition Survey

Establish Performance Standards

Outcomes with Targets: Bridge deck ratings in good condition; Pavement markings visible

2012 Report on the Condition of the State Highway System

Roadway			Interstate		Primary		Secondary		
			2012	State Average	2012	State Average	2012	State Average	
ELEMENT			PERFORMANCE MEASURE	Target	Score	Target	Score	Target	Score
DRAINAGE	Unpaved Shoulders	No dropoffs greater than 3 inches and no shoulders higher than 2 inches	95	92	90	92	85	93	
	Ditches (Lateral Ditches)	No blocked, eroded, or nonfunctioning ditches	95	99	90	97	85	96	
	Crossline Pipe (Blocked)	Greater than 50% diameter open	95	87	90	81	85	82	
	Crossline Pipe (Damaged)	No damage or structural deficiency effecting functionality	95	91	90	97	85	96	
	Curb & Gutter (Blocked)	No obstruction greater than 2 inches for 2 feet	95	96	90	97	85	97	
	Boxes (Blocked or Damaged)	Grates and outlet pipes of boxes blocked <50%. Inlets and outlets of boxes are not damaged, and grates are present and not broken.	95	84	90	90	85	92	
ROADSIDE	Vegetation (Brush & Tree)	Freeways: 45' from travelway, 5' behind guardrail, not blocking signs; Non-Freeways: Vertical clearance of 15' over roadway and 10' back of ditch centerline or shoulder point	90	92	85	90	80	86	
	Vegetation (Turf Condition)	Areas free of erosion	95	91	90	94	85	94	
	Stormwater Devices (NPDES)	Functioning as designed	90	94	90	94	90	94	
	Landscape Plant Beds	Achieving a score of 2 or higher on the inspection form	90	90	80	90	N/A	N/A	
	Rest Areas & Welcome Centers	Condition Rating of 90	90	96	90	93	N/A	N/A	
TRAFFIC	Long Line Pavement Markings	Present, visible	90	96	85	94	80	88	
	Words and Symbols	Present, visible	N/A	N/A	85	87	80	85	
	Pavement Markers	Present and reflective	90	91	85	81	N/A	N/A	
	Ground Mounted Signs	Visible and legible	90	94	85	94	85	89	
	Overhead Signs	Visible and legible	92	99	85	97	N/A	N/A	
BRIDGE	NBIS Culverts	Condition Rating >= 6	85	86	80	87	75	89	
	Non-NBIS Culverts	Condition Rating = Good	80	81	70	72	60	56	
	Overhead Sign Structures	Condition Rating = Good	95	88	92	93	92	84	
<b>Totals</b>			<b>91.27</b>	<b>91.43</b>	<b>86.16</b>	<b>90.27</b>	<b>82.16</b>	<b>87.43</b>	

Red – More than 10% below the target; Yellow – Within 10% of the target, Green – Met or exceeded target; Gray – Element was not rated

Table 5– Summary of Roadway Performance Condition Scores with 100 Being the Highest Score on a 0 to 100 Scale.



# NPDES Permit Requirements

## Beginning in 2005 with Second Term Permit

- Evaluate new BMP inspection and maintenance needs (create stormwater control inventory and conduct assessments)
- Develop a BMP Inspection and Maintenance Manual
- Develop and implement a BMP Inspection and Maintenance Program
- Submit BMP Inspection and Maintenance information to NCDENR for review

# Devices & Locations

## Types

- Bioretention Basin
- Filtration Basin
- Infiltration Basin
- Dry Detention Basin
- Wet Detention Basin
- Hazardous Spill Basin
- Stormwater Wetland
- Swale
- Level Spreader
- Preformed Scour Hole

## Locations

- Existing rights-of-way
- Interchanges and ramps
- Bridges
- Rest areas
- Industrial facilities
- Weigh stations



# Statewide BMP Inspection & Maintenance Program - Website

## **Stormwater Control Management System**

- GIS – Web-based Tool
- Inventory Stormwater Controls (BMPs)
- Integrate Site Specific Information
- Accessible by NCDOT Staff, Consultants, Contractors



# Stormwater Control Management System (SCMS)

## Division Summary

NCDOT INTRANET
NCDOT Portal

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

bholman : [Logout](#) [Help](#)

NCDOT SCMS

- SCMS
  - Search Controls
  - Maps
    - Control Map
    - Control LOS Map
  - Inspection and Maintenance
    - Add New Control
    - Add New Nonstructural Control
    - Inspections Overdue
    - Maintenance Needed
  - SC Inventory
    - LOS Report
    - Retrofit Credits
    - Retrofit Listing
    - SC Summary
    - SC Location
    - SC Funding
    - SC Permitted
    - SC Construction
    - SC Not Mapped
    - Research Details
  - Admin
    - User Management
    - Control Types
    - Inspection Report
    - Questions

Search Results

Control ID	Division	County	Retrofit	Cross Street	Phase	SMP
<a href="#">IM-14-20-PWS-1</a>	14	Cherokee	False		Maintenance	No
<a href="#">IM-14-20-PWS-2</a>	14	Cherokee	False		Maintenance	No
<a href="#">IM-14-44-CBI-01</a>	14	Haywood	False		Maintenance	No
<a href="#">IM-14-44-CBI-02</a>	14	Haywood	False		Maintenance	No
<a href="#">IM-14-44-CBI-03</a>	14	Haywood	False		Maintenance	No
<a href="#">IM-14-44-CBI-04</a>	14	Haywood	False		Maintenance	No
<a href="#">IM-14-44-PWS-1</a>	14	Haywood	True		Maintenance	No
<a href="#">IM-14-44-PWS-5</a>	14	Haywood	True		Maintenance	No
<a href="#">IM-14-44-PWS-4</a>	14	Haywood	True		Maintenance	No
<a href="#">IM-14-44-PWS-6</a>	14	Haywood	True		Maintenance	No
<a href="#">IM-14-44-PWS-7</a>	14	Haywood	True		Maintenance	No
<a href="#">IM-14-50-DDB-01</a>	14	Jackson	True		Maintenance	No
<a href="#">IM-14-56-PWS-1</a>	14	Macon	True		Maintenance	No
<a href="#">IM-14-56-PWS-2</a>	14	Macon	True		Maintenance	No
<a href="#">IM-14-75-PWS-3</a>	14	Polk	True		Maintenance	No
<a href="#">IM-14-75-PWS-4</a>	14	Polk	True		Maintenance	No
<a href="#">IM-14-75-PWS-2</a>	14	Polk	True		Maintenance	No
<a href="#">IM-14-75-PWS-1</a>	14	Polk	True		Maintenance	No
<a href="#">IM-14-44-PWS-3</a>	14	Haywood	False		Maintenance	No
<a href="#">IM-14-44-PWS-2</a>	14	Haywood	False		Maintenance	No
<a href="#">D-14-22-SS-1</a>	14	Clay	True		Design	No
<a href="#">IM-14-20-HSB-1</a>	14	Cherokee	False		Maintenance	No
<a href="#">IM-14-20-HSB-2</a>	14	Cherokee	False		Maintenance	No
<a href="#">D-14-45-S-1</a>	14	Henderson	True		Preliminary	No
<a href="#">D-14-45-O-1</a>	14	Henderson	True		Preliminary	No
<a href="#">IM-14-56-HSB-1</a>	14		False		Maintenance	No
<a href="#">IM-14-56-HSB-2</a>	14		False		Maintenance	No

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# Stormwater Control Management System (SCMS)

## Individual BMP

**NCDOT INTRANET**  
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NCDOT Portal  
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Control ID: **IM-14-50-DDB-01** Phase: **Maintenance** Type: **Dry Detention Basin (DDB)**

General Hydrologic Roads Regulations Contacts Design Construction Documents Images

**Quick Links**

- [Inspection and Maintenance](#)
- [Add/View Research](#)
- [View Control Map](#)

**General Information** [Delete](#)

County:	Jackson
Control Type:	Dry Detention Basin (DDB)
Control ID:	IM-14-50-DDB-01
Paper ID:	D14_C050_0001
Retrofit:	<input checked="" type="checkbox"/>
Research:	<input type="checkbox"/>
Nonstructural:	<input type="checkbox"/>
TIP:	
*Route Type:	US
*Route:	US 441 and US 74
Removed:	
Inactive:	
Inspection Frequency:	6 months
Nearest Town:	Dillsboro
Latitude:	35.37951
Longitude:	-83.25743
State Plane Coordinates X:	
State Plane Coordinates Y:	
Location Description:	Off US 441 Exit Ramp Loop near Dillsboro
Notes:	

[Save](#)

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**NCDOT SCMS**

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    - Control Types
    - Inspection Report Questions

# Stormwater Control Management System (SCMS)

## Location Map

The screenshot displays the NCDOT INTRANET interface for the Stormwater Control Management System (SCMS). The header includes the NCDOT logo and the text "NCDOT INTRANET NORTH CAROLINA DEPARTMENT OF TRANSPORTATION". On the right, it shows the user "bholman" with links for "logout" and "Help".

The main content area is titled "Stormwater Control Map" and features a map interface with navigation controls (2D, 3D, Road, Aerial, Bird's eye, Labels) and a red pushpin marker. The map shows a network of roads, including M-Zion Church Rd, Mince Rd, Long Branch Church Rd, Haywood Rd, Joe Wiley Rd, Tunnel Mountain F, Rufus Robinson Rd, Mountain Her Page Dr, Thornhill Dr, Dillab, E Homelo, 600 yds, and Homestown Pt. Major roads like 81A and 81 are highlighted in orange. The map also shows "Nantahala National Forest" and "Great Smoky Mountain Expy".

A left-hand sidebar contains a navigation menu for "NCDOT SCMS" with the following categories and items:

- SCMS
  - Search Controls
- Maps
  - Control Map
  - Control LOS Map
- Inspection and Maintenance
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  - Control Types
  - Inspection Report
  - Questions

The footer of the page contains the text "Copyright © 2008 NCDOT NCDOT Home | NC.gov".

# Stormwater Control Management System (SCMS)

## Inspection Report

**NCDOT INTRANET**  
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
NCDOT Portal

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### Inspection Report Delete

Control ID:	IM-14-50-DDB-01		
Inspection Date:	08/26/2010		
Inspector:	bholman		
Questions:	Y	N	N/A

	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Inlet drainage system is structurally sound and functional
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sluice gate is in place, structurally sound, and functional.
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Drawdown orifice plate is in place, structurally sound, and functional.
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Trash rack is in place, structurally sound, and functional.
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Trash screen is in place, structurally sound, and functional.
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Forebay and transition berm are structurally sound and functional.
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Basin, embankment, and emergency spillway are structurally sound and functional. (Sediment must be removed when it reduces the design depth by 50%)
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Outlet control structure is in place, structurally sound, and functional.
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Trash rack is unobstructed and free of sediment, leaves, trash and other debris.
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Openings in the drawdown orifice plate are unobstructed and free of sediment, leaves, trash, and other debris.
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Trash screen is unobstructed and free of sediment, leaves, trash, and other debris.
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sluice gate is unobstructed and free of sediment, leaves, trash, and other debris.
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Forebay is clean and free of sediment, leaves, trash, and other debris. (Sediment must be removed when it exceeds 50% or more of the forebay's storage capacity.)
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Inlet and outlet ditches/pipes are free of sediment, leaves, trash, and other debris.
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Grass has been mowed and undesirable vegetation removed
	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Do any components at this site need structural repairs? (If yes, describe below:)
	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Is any maintenance necessary at this site (i.e., areas of erosion, unwanted vegetation)? (If yes, describe in Comments section.)
	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Were maintenance activities conducted during the time of inspection? (If yes, describe in Comments section)

LOS Ranking: A - No structural deterioration or maintenance needs were found. Functioning Properly.

Inspection Observations/Comments: Device in very good condition; well maintained  
Some sediment noted in forebays - suggest removing sediment as soon as possible to regain storage capacity

Maintenance Needed:

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# Stormwater Control Management System (SCMS)

## BMP Photos

The screenshot displays the NCDOT INTRANET interface for the Stormwater Control Management System (SCMS). The header includes the NCDOT logo and navigation links. The main content area shows the details for a specific control: Control ID: IM-14-50-DDB-01, Phase: Maintenance, Type: Dry Detention Basin (DDB). The interface is divided into several tabs: General, Hydrologic, Roads, Regulations, Contacts, Design, Construction, Documents, and Images. The 'Images' tab is active, showing an 'Upload Image' section with a 'Choose an Image' button and a 'Browse...' button. Below this, there are two 'Attached Images' sections. Each section displays a photo of a dry detention basin and associated metadata. The first image has a description of 'DDB-2003' and an image type of 'Maintenance'. The second image also has a description of 'DDB-2003' and an image type of 'Maintenance'. Both images have 'Update' and 'Delete' buttons. A sidebar on the left contains a navigation menu for SCMS, including options like Search Controls, Maps, Inspection and Maintenance, SC Inventory, and Admin. The footer of the page contains copyright information: Copyright © 2008 NCDOT, NCDOT Home, NC.gov.

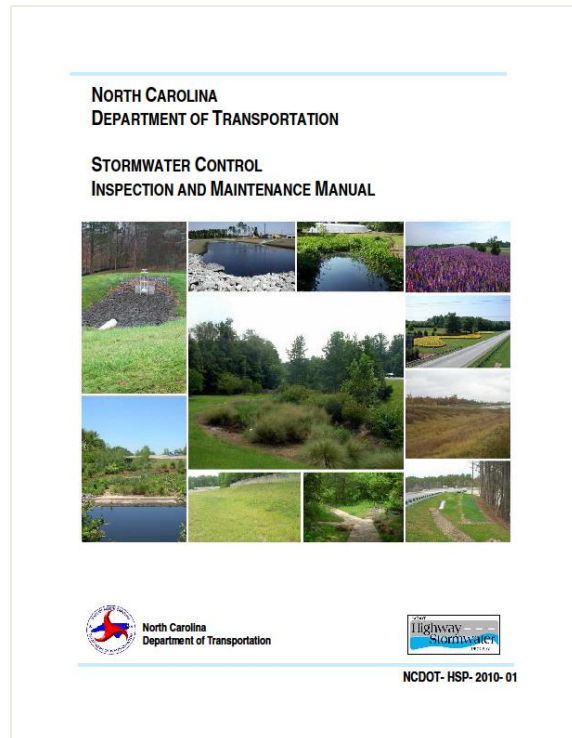


# Stormwater Control Inventory

- Bioretention (21)
- Infiltration Basin (75)
- Dry Detention Basin (75)
- Level Spreader (105)
- Wet Detention Basin (14)
- Pet Waste Stations (157)
- Filtration Basin (28)
- Stormwater Wetland (24)
- Hazardous Spill Basin (191)
- Swale (199)
- Others (121)

Updated February 2014

# Stormwater Control Inspection and Maintenance Manual



Completed in 2009

Provides Guidance on:

- Inspection
- Reporting and Record Keeping
- Chapters on Control Devices
- Inspection Forms

[http://www.ncdot.gov/doh/operations/dp\\_chief\\_eng/roadside/envoperations/other\\_links/](http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/envoperations/other_links/)

# Performance Measures

## Level of Service Rankings (LOS)

- LOS A**     Some aging and wear but no major deficiencies
- LOS B**     Minor structural deterioration and maintenance needs identified
- LOS C**     Moderate structural deterioration and maintenance needs identified but is still functioning properly
- LOS D**     Serious deterioration in a least one structural item and major maintenance needs identified. Function is inadequate
- LOS F**     Device has general or complete failure

# Maintenance Needs Identified During 2014 Assessment Inspections

- Maintenance needs were found to be more routine in nature
- Problems associated with maintenance and not structural
- Maintenance needs found:
  - Maintenance of grasses, trees, shrubs and other desirable vegetation (mowing, pruning, etc.)
  - Removal of unwanted plant species
  - Removal of trash and debris (functionality/aesthetics)
  - Upkeep of mechanical components (ex. - grease gate)

# Maintenance Needs Increase with Time



New



1 to 2 years



3 to 5 years



# Level of Service

- What's the value of LOS Ratings?
  - Compliance
  - Accountability
  - Asset Management
  - Data Driven Decisions
  - Resource Prioritization



## Highway Performance Profile: Infrastructure Health Condition Scores

Division	2012 Pavement Conditions*			2013 Bridge	2012*
	Statewide Tier (70-85%=yellow)	Regional Tier (65-80%=yellow)	Subregional Tier (60-75%=yellow)	Conditions (55-65%=yellow)	Roadside Features Index (80-84%=yellow)
1	58.7%	65.3%	63.7%	56.3%	86.1
2	81.8%	49.3%	62.2%	71.2%	90.0
3	64.6%	54.5%	68.5%	58.1%	86.9
4	71.8%	54.9%	76.5%	70.9%	90.6
5	82.8%	71.1%	67.1%	75.0%	89.1
6	81.0%	65.5%	83.1%	59.3%	87.5
7	74.1%	54.2%	68.9%	59.3%	87.7
8	81.7%	68.8%	74.6%	64.5%	91.3
9	72.9%	77.4%	68.9%	68.0%	91.4
10	61.2%	59.3%	68.3%	72.6%	89.0
11	77.0%	61.0%	64.0%	60.1%	90.0
12	71.6%	61.5%	68.2%	69.2%	89.5
13	87.9%	78.0%	69.8%	61.6%	91.1
14	68.0%	60.1%	60.3%	62.2%	89.5
<b>Statewide</b>	<b>73.5%</b>	<b>62.5%</b>	<b>69.3%</b>	<b>64.9%</b>	<b>89.7</b>

Notes:

- \* Pavement Conditions and Roadside Features are currently produced biennially. These conditions will be reevaluated in 2014.
- Pavement Condition is defined as the percentage of pavement miles in good condition.
- Bridge Condition is defined as the percentage of bridges in good condition.
- Roadside Features is defined as a composite score from 1-100 with 100 being the best.
- For counties included in each division, please see map on page 9.

# Accountability

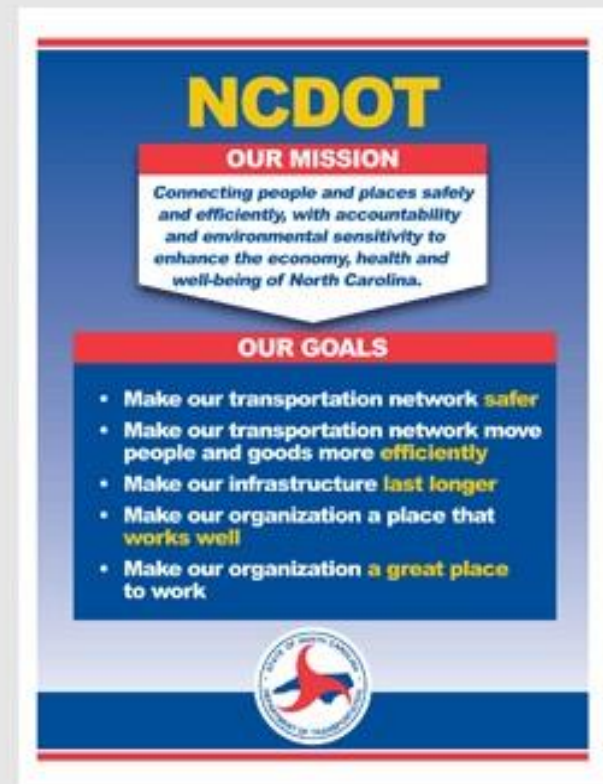
## Mission & Goals

### Mission:

*Connecting people and places safely and efficiently, with accountability and environmental sensitivity<sup>1</sup> to enhance the economy, health and well-being of North Carolina.*

### Goals:

- Make our transportation network **safer**.
- Make our transportation network move people and goods more **efficiently**
- Make our infrastructure **last longer**.
- Make our organization a place that **works well**.
- Make our organization a **great place** to work.





Questions?