North Carolina Department of Transportation

Program Model for NPDES Compliance

Presented By:
Matthew Lauffer

FHWA Midwestern Hydraulic Engineering Conference, August 28

“To the man/woman who only has a hammer in the tool kit, every problem looks like a nail.” – Abraham Maslow

Objectives of Presentation:

1. Discuss the NCDOT's NPDES Program Model by discussing some of the permit compliance programs.

2. Share some of the highlights and lessons learned through examples.

3. Discuss Strategy for second Permit term.

4. Share some BMP Construction Sequence Examples (If time)

Essence of NPDES Stormwater Program:

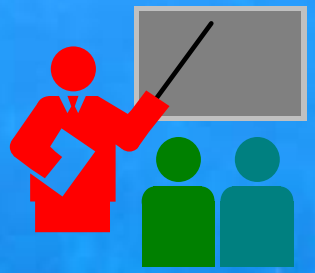
Management, Minimization, and Reduction of stormwater pollution (not complete elimination) through the use of both Non-Structural and Structural Stormwater Best Management Practices (BMPs)

What is a BMP?

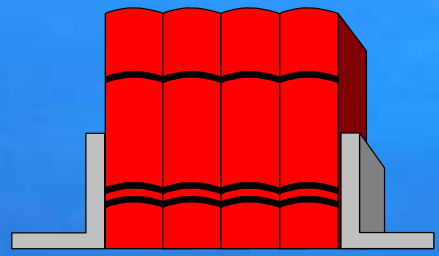
According to EPA:

"technique, measure (non-structural) or structural control that is used for a given set of conditions (context) to manage quantity and improve the quality of stormwater runoff in the most cost effective manner."

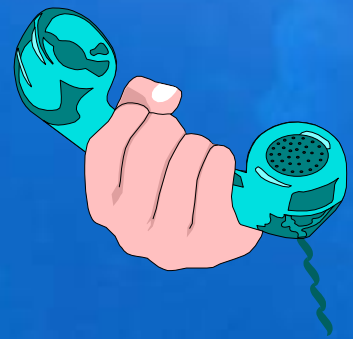
Non-Structural BMPs



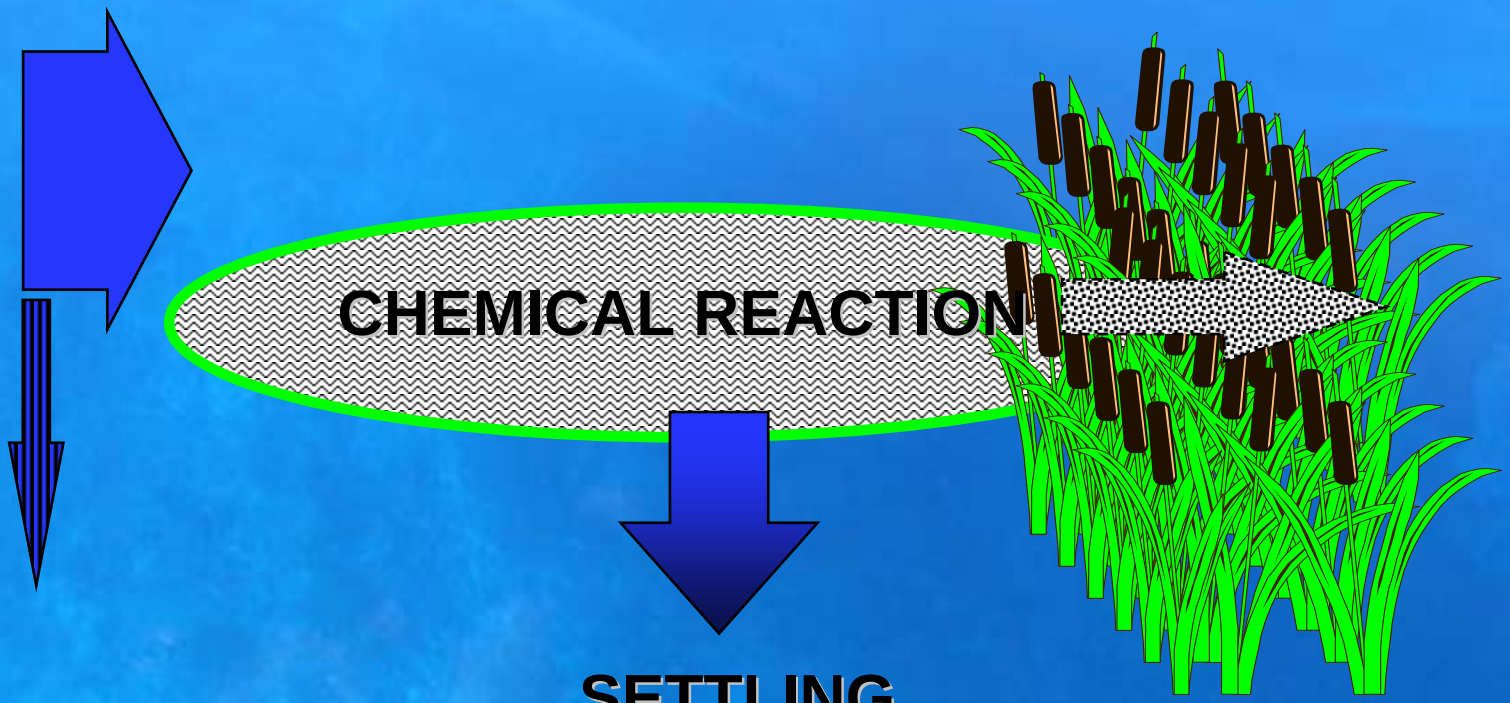
Programs, Policies, and Practices



- Target pollutant
- Pollutant delivery vectors
- Interception or removal strategies
- Measures of success
- Implementation steps and responsibilities



STRUCTURAL BMPS



FHWA Midwestern Hydraulic Engineering Conference, August 28

What are the set of conditions in NC

1 Geographic

2. Transportation

3. Organization

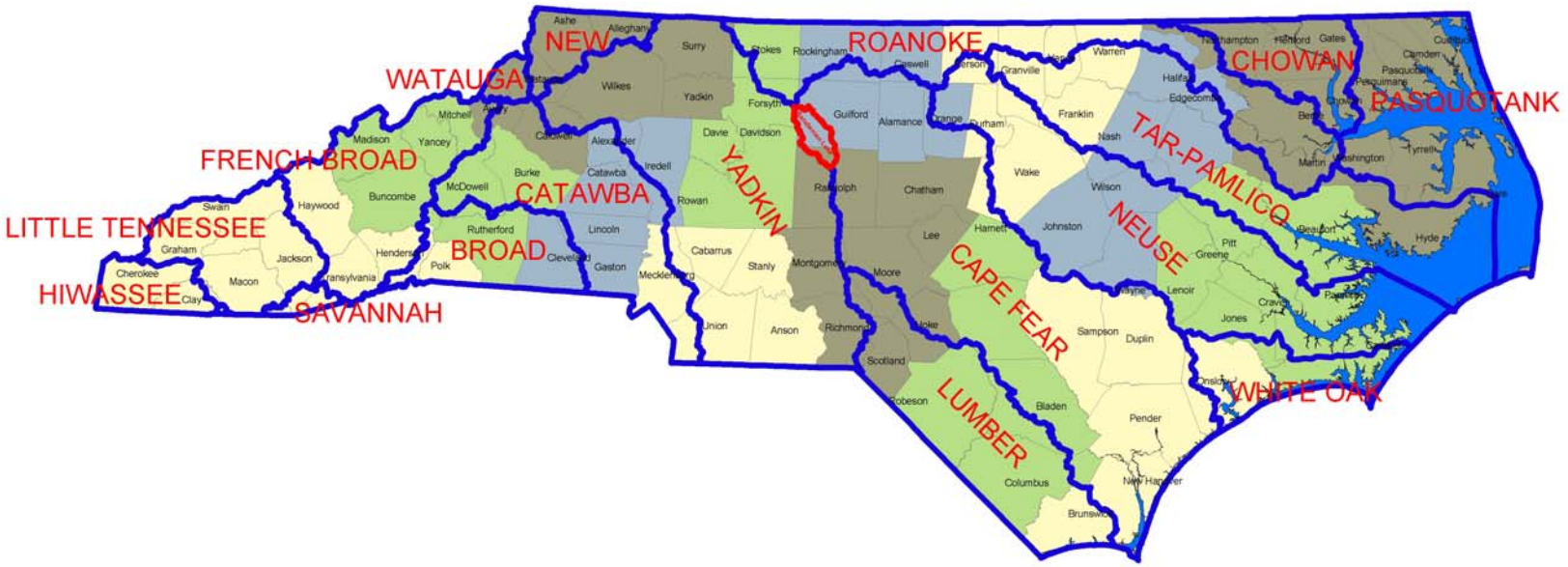
4. Other Related Regulations

Geographic Characteristics

- Physiographic Regions
- Climate
- Population Distribution
- Water Resources

FHWA Midwestern Hydraulic Engineering Conference, August 28

North Carolina Riverbasins



FHWA Midwestern Hydraulic Engineering Conference, August 28

NCDOT Transportation Characteristics:

Primary Routes (US, NC, and Interstate)	14,669
Secondary Routes	63,821
NCDOT Total	**78,490**
Other (City, State, Federal)	23,224
NC Total	**101,714**

Organization

MISSION

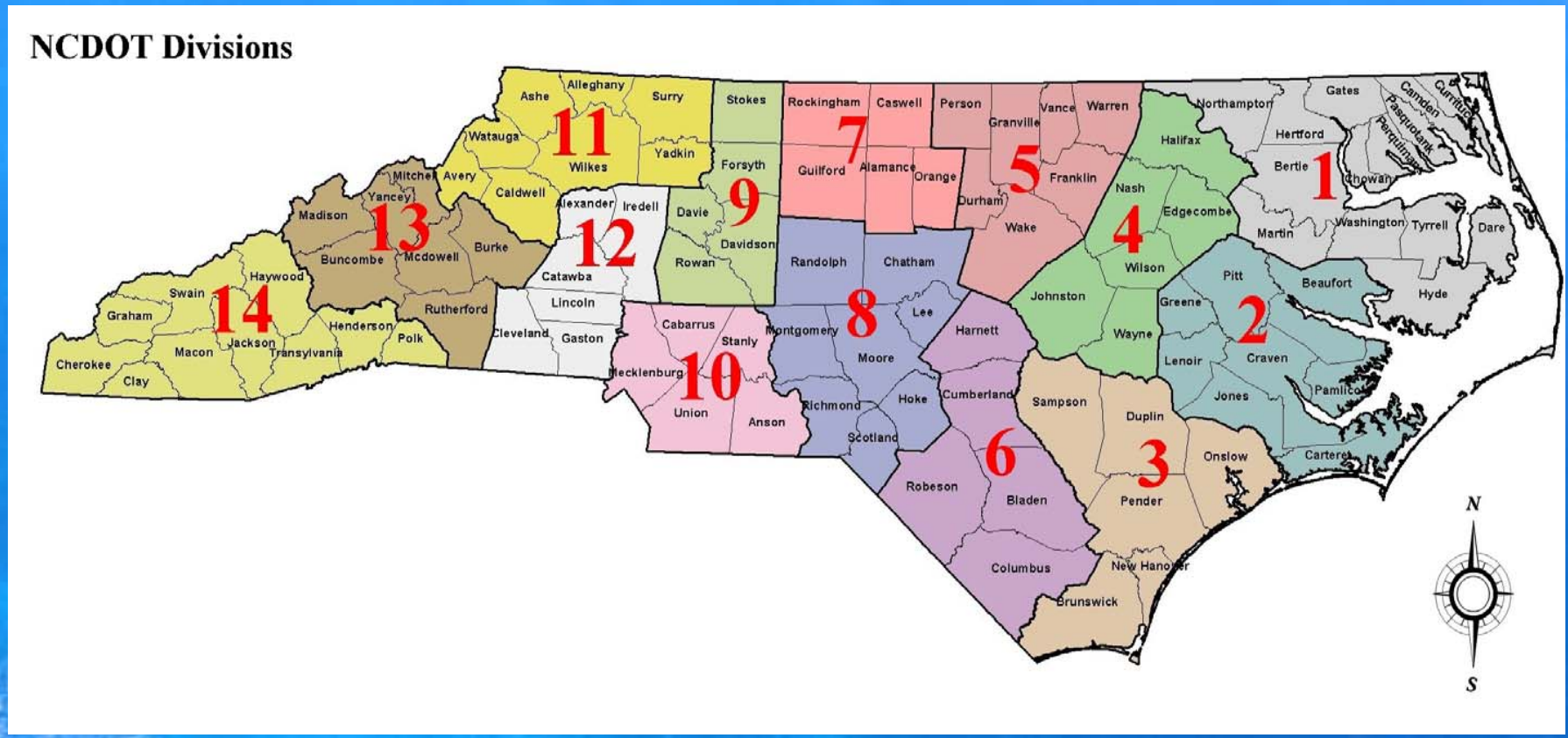
The North Carolina Department of Transportation's (NCDOT) mission is to provide and support a safe and integrated transportation system that enhances the state. NCDOT fulfills this mission through two major thrusts. First, NCDOT directs, plans, constructs, maintains and operates the second largest state-maintained transportation system in the nation to include aviation, ferry, public transportation, rail and highway systems. Second, NCDOT licenses and regulates the citizens and motor vehicles that utilize these transportation systems.

Organization

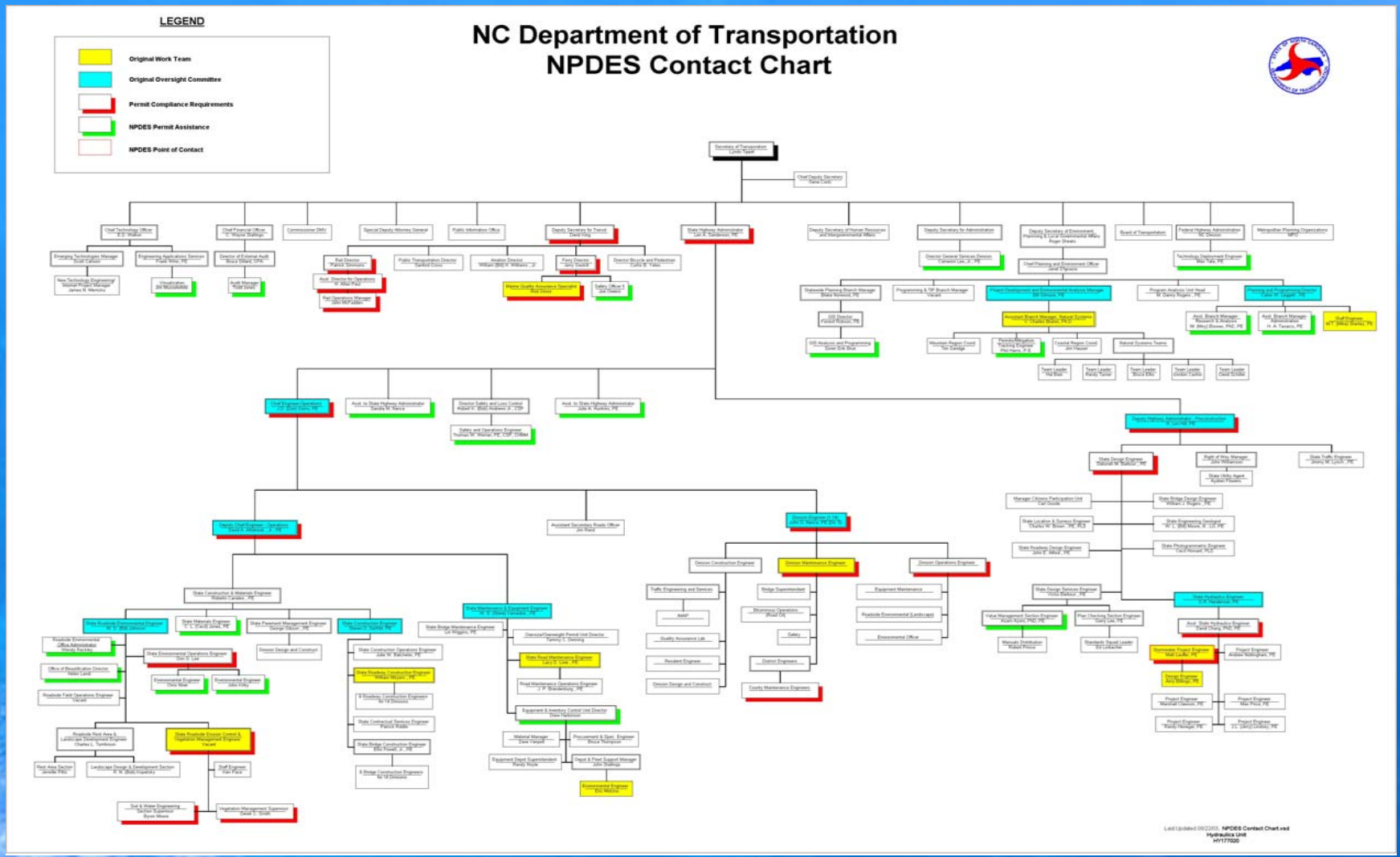
NCDOT's Environmental Stewardship Policy

- ... conducting our business in an environmentally responsible manner
- Demonstrating…commitment to the environment.
- …provide mobility and quality of life that includes protection of …natural resources, and cultural and social values…

Organization



Organization



Regulations

Federal Requirements

Clean Water Act

- **NPDES Phase I**
  NPDES Phase II
  Section 402
- **Discharge of Dredge and Fill Material**
  Section 404
- **Water Quality Certifications**
  Section 401

- **National Environmental Policy Act (NEPA)**
- **Coastal Zone Management Act**
- **Resource Conservation Recovery Act**

State Requirements

- **Nutrient Sensitive Water Strategy**
- **Riparian Area Rules**
- **State Stormwater**
- **Sedimentation Control Act**

Program Model and Guiding Principles

(1) Comply with permit requirements in order to manage, minimize, and reduce pollutant loading from roadways and industrial areas.

(2) Develop programs that can be effectively managed, implemented and integrated into NCDOT operations.

(3) Develop solutions that are proactive, form partnerships, have technical merit and are fiscally responsible.

Program Process Model

Program Compliance

Policy Review | **Develop** | **Implement** | **Integrate**

Process Improvement

Monitor
Evaluate
Maintain

Program Research

Research Definition | **Conduct Research** | **Apply Research**

Partnerships:

Internal NCDOT

External:

- Federal Agencies
- State Agencies
- Other State DOTs
- Communities
- Universities

Legislative

Consultants

NPDES ORGANIZATION STRUCTURE

PROGRAM DEVELOPMENT /MANAGEMENT

HYDRAULICS UNIT

- Annual Report
- Stormwater Inventory
- BMP Retrofit
- BMP Tool Box
- NSW
- AMP
- Training

ROADSIDE ENVIRONMENTAL

- ICID
- SPPP
- Erosion and Sedimentation Control
- Roadside Enviromental Mngmt.
- Maintenance Activity Assessment
- Training
- Additional Site Controls

FERRY AND RAIL

- SPPP
- Training
- Additional Site Controls

PROGRAM OVERSIGHT

- Cheif Engineer-Operations
- Deputy Highway Admin - Preconstruction
- PDEA-Manager
- Planning and Programming Director
- Deputy Chief Engineer - Operations
- State Design Engineer
- State Maintenance and Equipment Engineer
- State Environmental Engineer
- State Construction Engineer
- Division Engineer
- State Hydraulics Engineer
- Stormwater Project Engineer

PROGRAM INTEGRATION/ MAINTENANCE

Divisions
State Construction
State RoadsideEnvironmental
State Maintenance and Equipment
Hydraulics
Ferry
Rail

PROGRAM ASSISTANCE AND SUPPORT

- Consultant
- Researchers
- FHWA
- Attorney General
- ITS
- GIS Analysis and Programming
- Planning and Programming
- Research and Analysis
- PDEA

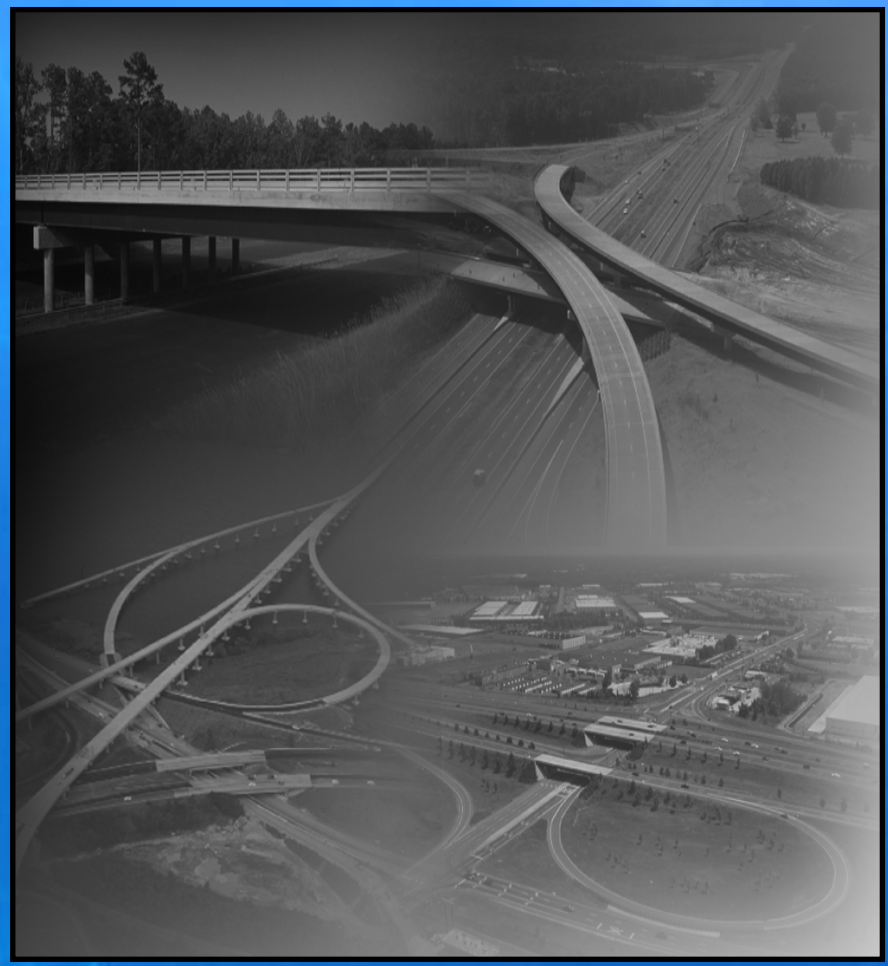
NC Division of Water Quality issued National Pollutant Discharge Elimination System (NPDES) Permit No. NCS000250 to NCDOT (June 8, 1998 through May 31, 2003)

FHWA Midwestern Hydraulic Engineering Conference, August 28

First Term Requirements:

Roadway Drainage and Construction Activities

1) Stormwater System Inventory and Prioritization
2) BMP Retrofits
3) BMP Toolbox
4) Illicit Connection and Illegal Dumping Program
5) New Private Sector Development
6) Nutrient Sensitive Waters Strategy
7) Education and Public Participation Program
8) Sediment and Erosion Control Program
9) Analytical Monitoring Program
10) Roadside Environmental Management Program
11) Maintenance Activity Assessment
12) Training
13) Additional Site Controls



Industrial Activities

- Asphalt Plants
- Ferry Terminals
- Maintenance Yards

1) Stormwater Pollution Prevention Plans
2) Qualitative Monitoring
3) Quantitative Monitoring

Borrow Pits / Waste Piles

1) Sediment and Erosion Control Measures
2) Reclamation Plans
3) Borrow Pit Wastewater Discharges

Industrial Facilities

Program Compliance:

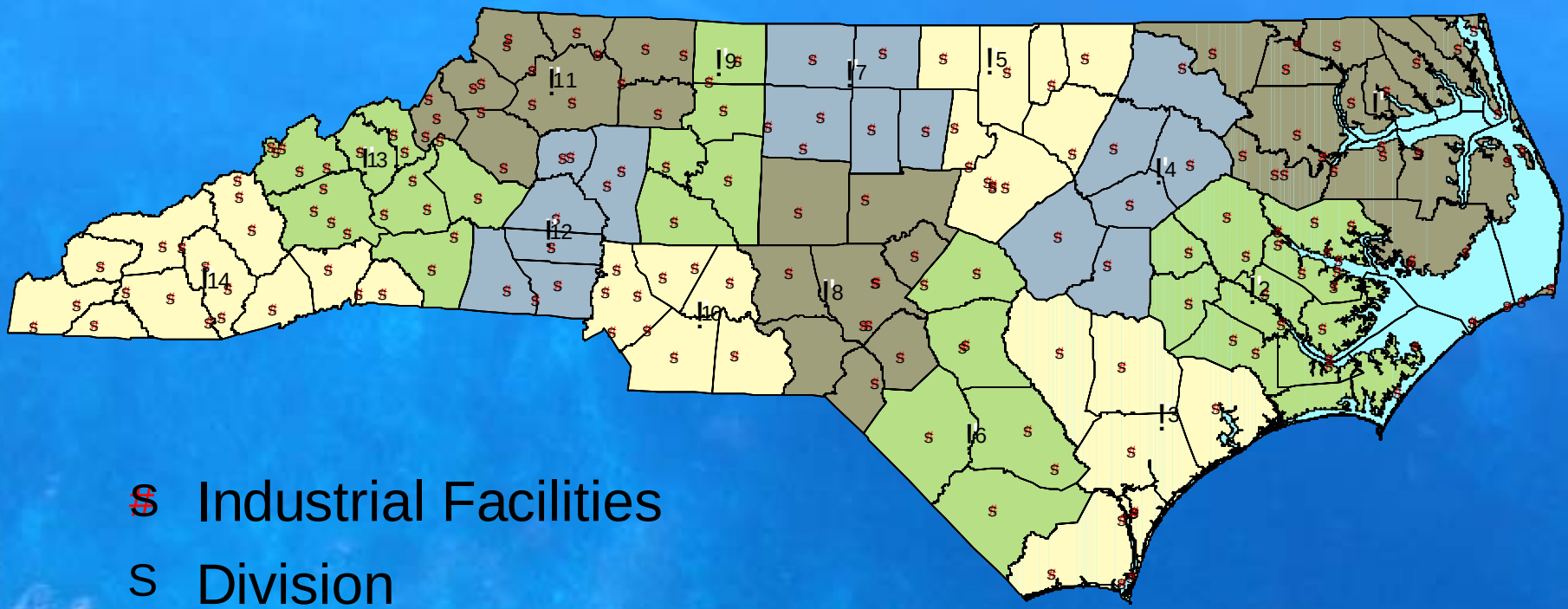
Stormwater Pollution Prevention Plans

Combination of Non-structural and Structural Practices to minimize impact to stormwater runoff.

Program Research:

Structural BMP Implementation

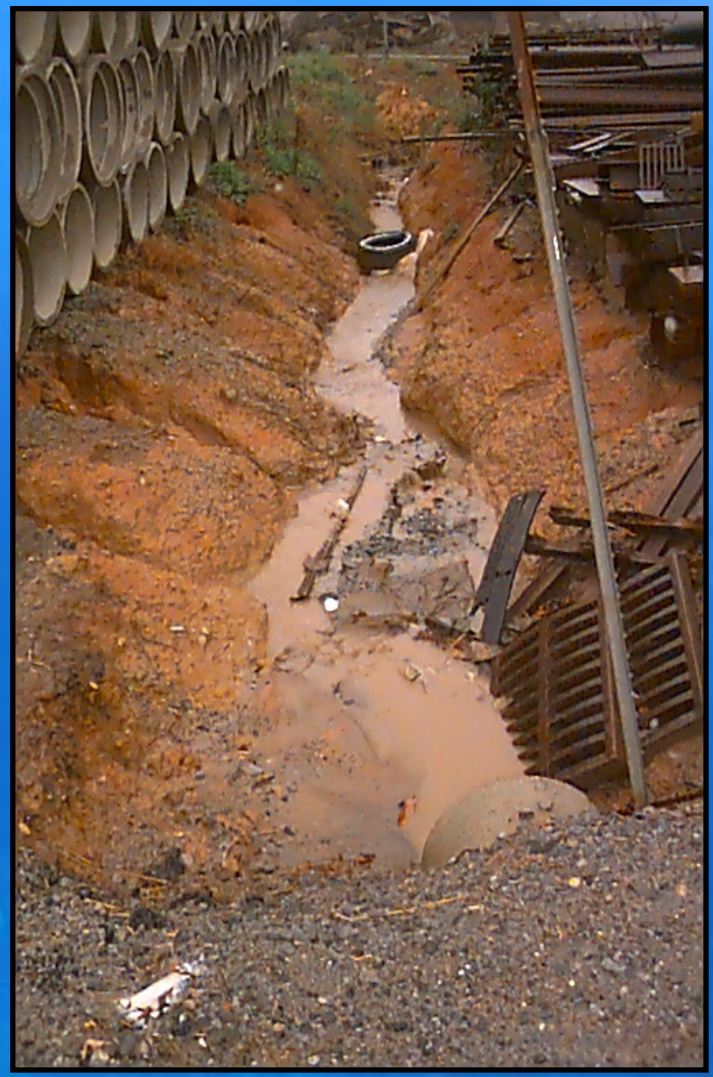
NCDOT Industrial Facilities



S Industrial Facilities

S Division

FHWA Midwestern Hydraulic Engineering Conference, August 28



FHWA Midwestern Hydraulic Engineering Conference, August 28

FHWA Midwestern Hydraulic Engineering Conference, August 28

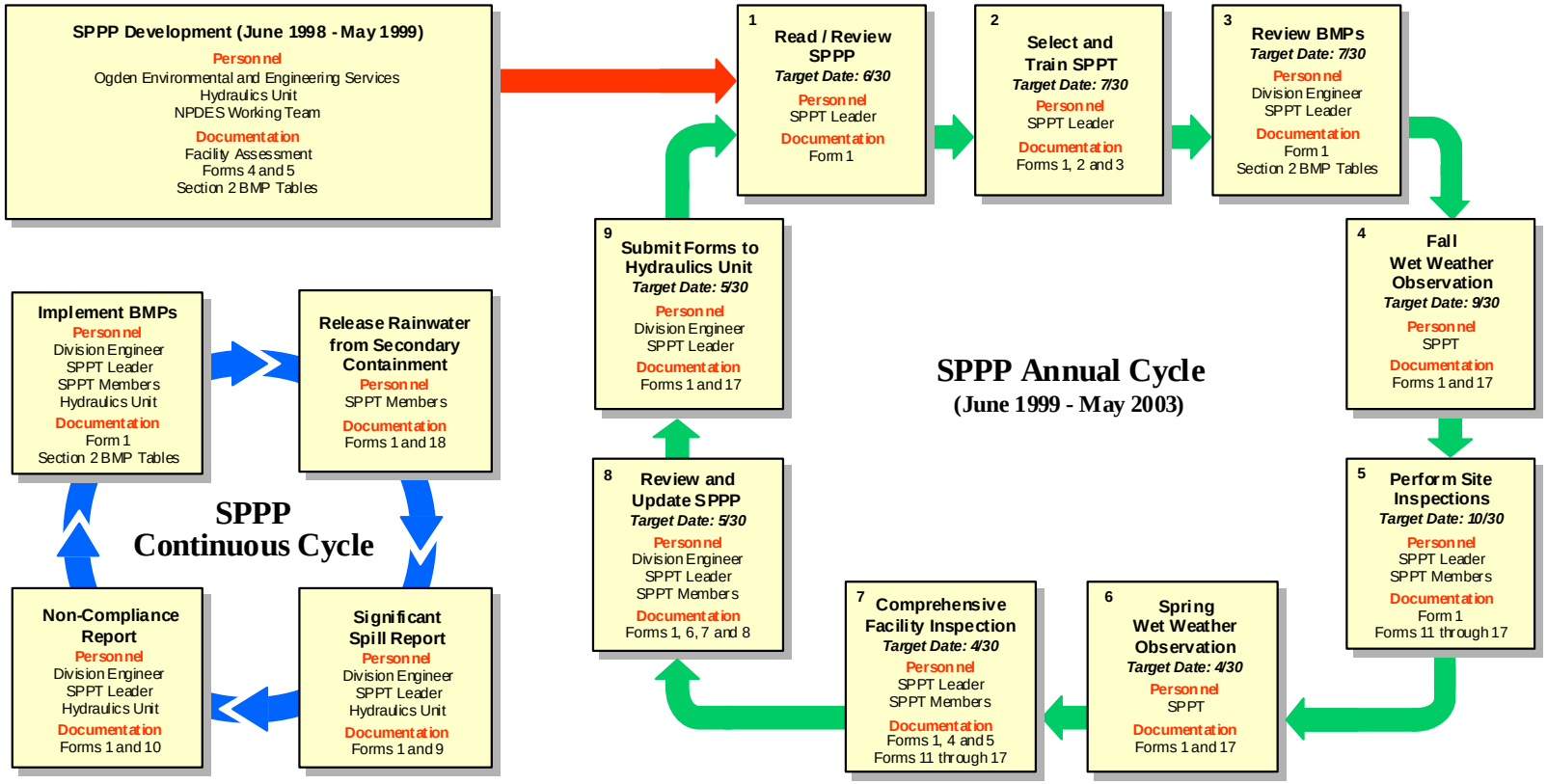
FHWA Midwestern Hydraulic Engineering Conference, August 28

Stormwater Pollution Prevention Plans (SPPP)

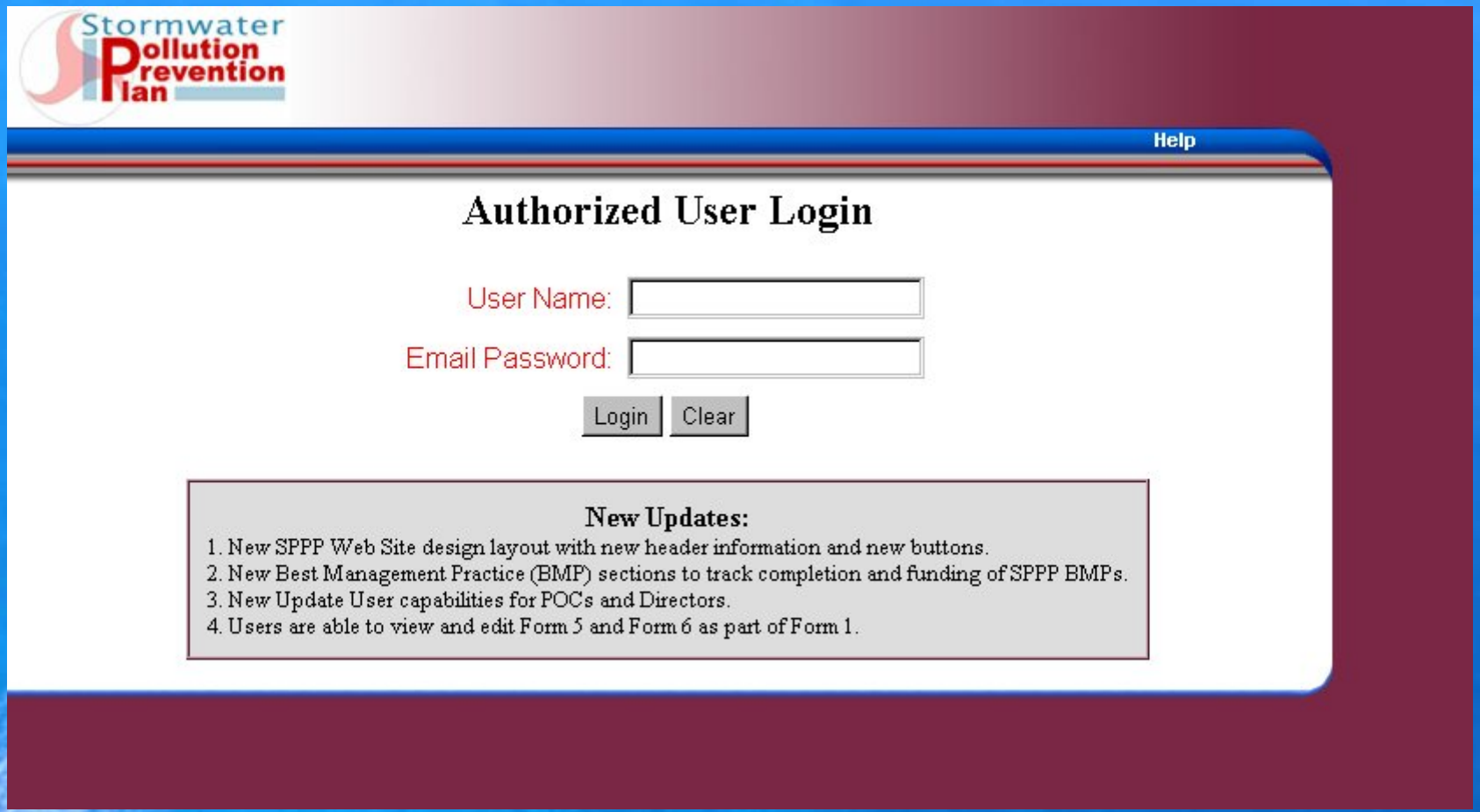
- Responsibilities
- Education
- BMPs
  - Programmatic
  - Operational
  - Structural
- Monitoring Requirements
- Reporting

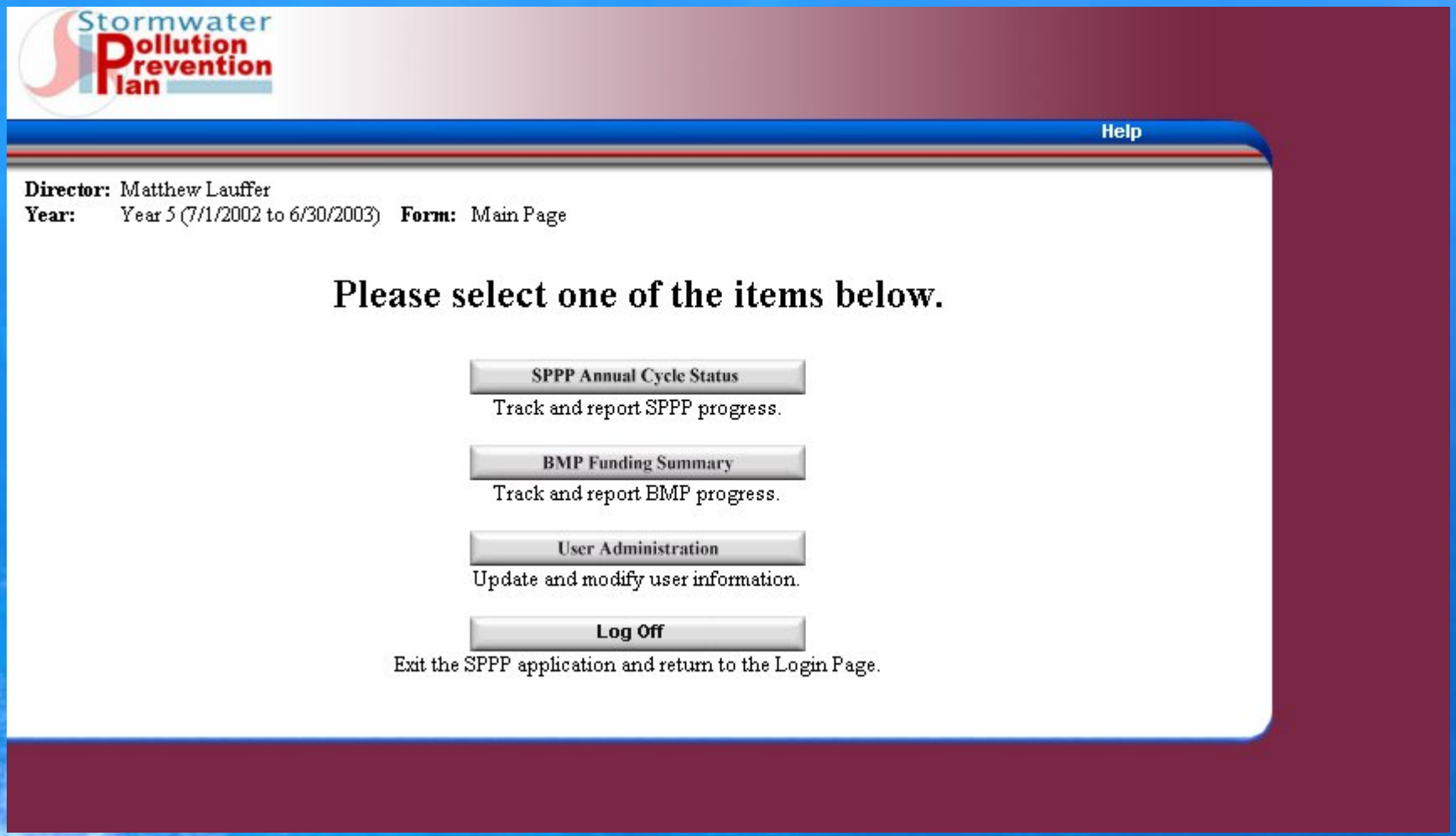
Figure 2

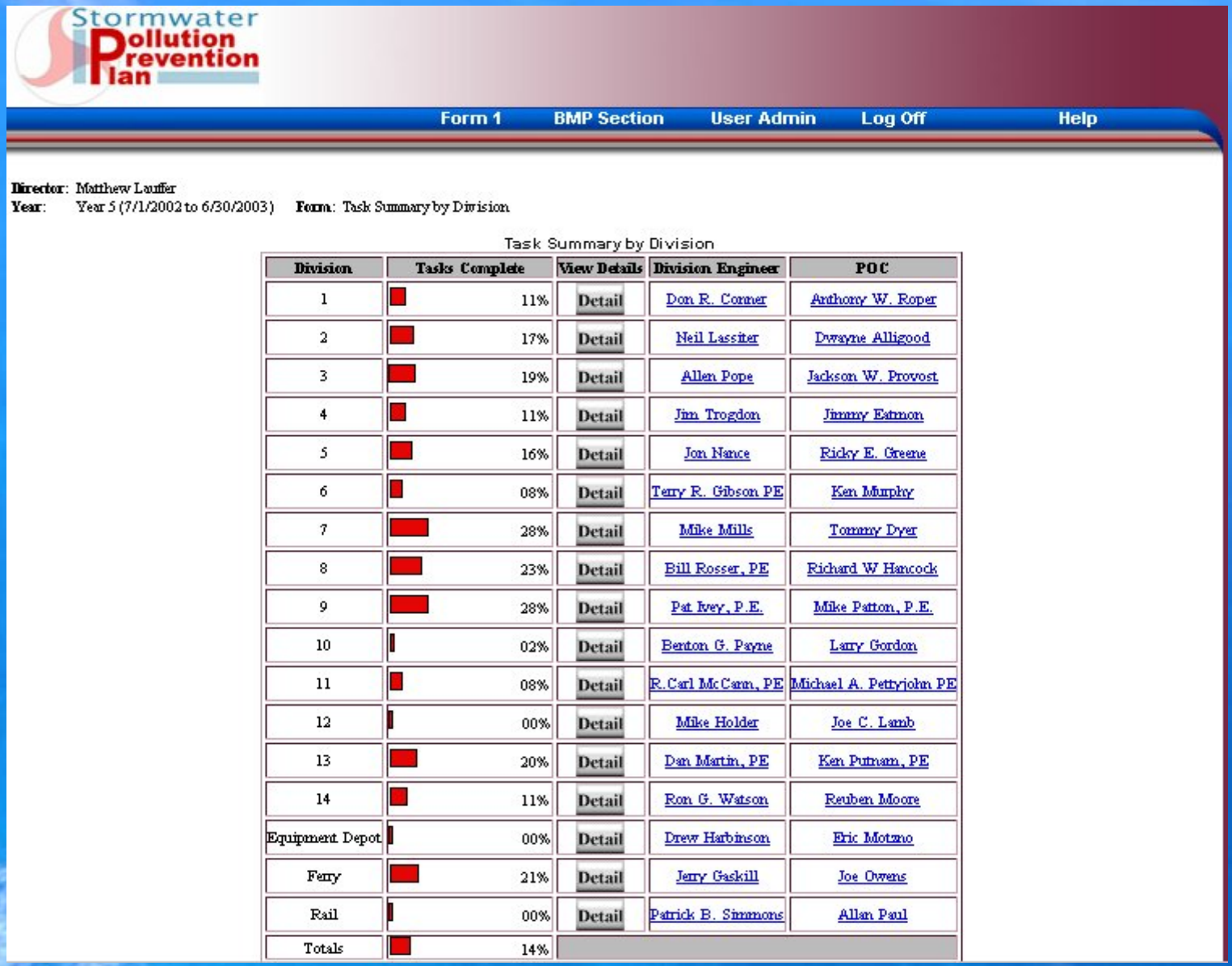
NCDOT Stormwater Pollution Prevention Plan (SPPP) Process Diagram

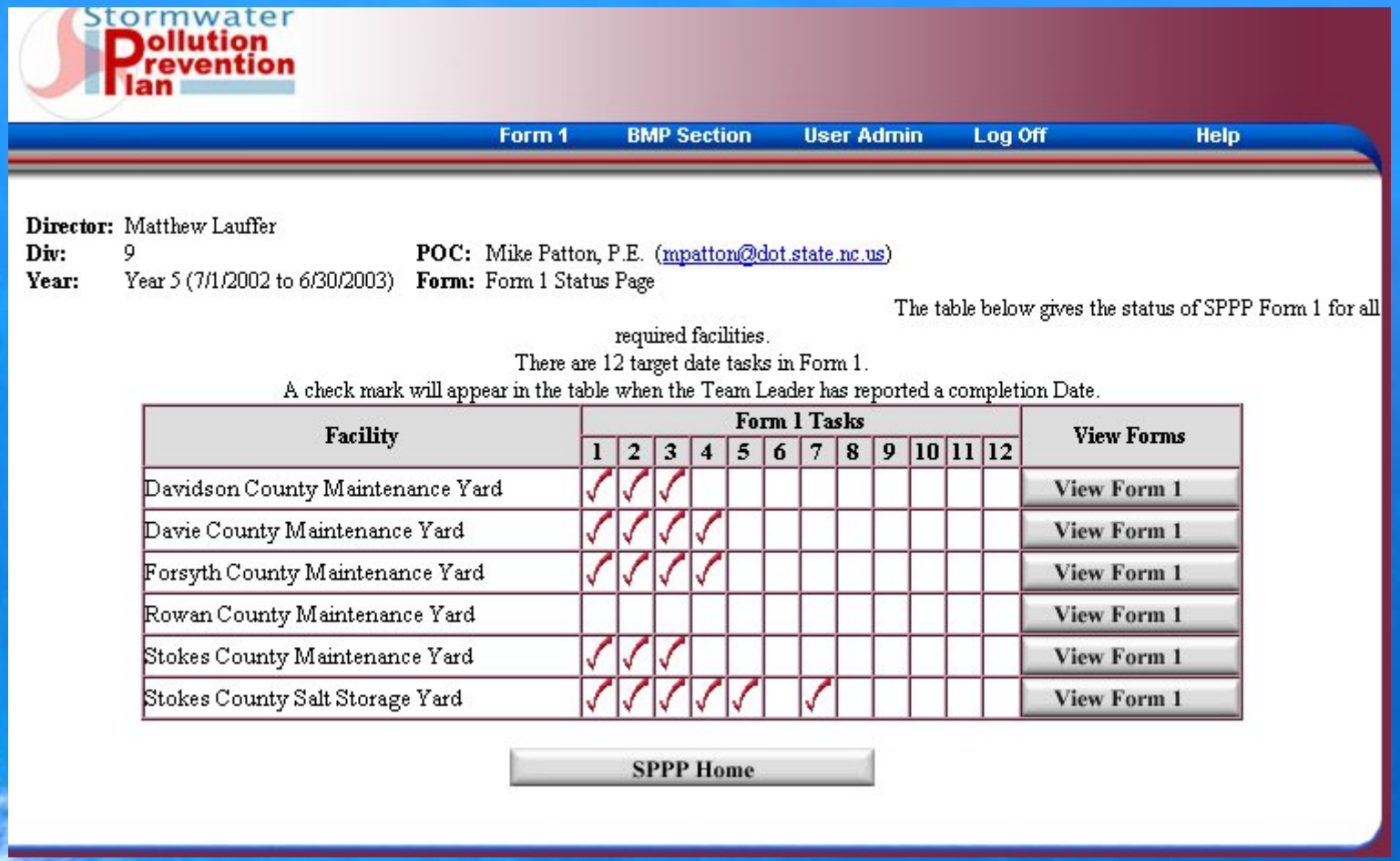


SPPP Information Management System




Stormwater Pollution Prevention Plan
Help
Director: Matthew Lauffer
Year: Year 5 (7/1/2002 to 6/30/2003) Form: Main Page
Please select one of the items below.
SPPP Annual Cycle Status
Track and report SPPP progress.
BMP Funding Summary
Track and report BMP progress.
User Administration
Update and modify user information.
Log Off
Exit the SPPP application and return to the Login Page.


Stormwater Pollution Prevention Plan
Form 1
BMP Section
User Admin
Log Off
Help
Director: Matthew Lauffer
Year: Year 5 (7/1/2002 to 6/30/2003)
Form: Task Summary by Division
Task Summary by Division
Division | Tasks Complete | View Details | Division Engineer | POC
1 | 11% | Detail | Don R. Conner | Anthony W. Roper
2 | 17% | Detail | Neil Lassiter | Dwayne Alligood
3 | 19% | Detail | Allen Pope | Jackson W. Provost
4 | 11% | Detail | Jim Trogdon | Jimmy Eatmon
5 | 16% | Detail | Jon Nance | Ricky E. Greene
6 | 08% | Detail | Terry R. Gibson PE | Ken Murphy
7 | 28% | Detail | Mike Mills | Tommy Dyer
8 | 23% | Detail | Bill Rosser, PE | Richard W Hancock
9 | 28% | Detail | Pat Ivey, P.E. | Mike Patton, P.E.
10 | 02% | Detail | Benton G. Payne | Larry Gordon
11 | 08% | Detail | R.Carl McCann, PE | Michael A. Pettyjohn PE
12 | 00% | Detail | Mike Holder | Joe C. Lamb
13 | 20% | Detail | Dan Martin, PE | Ken Putnam, PE
14 | 11% | Detail | Ron G. Watson | Reuben Moore
Equipment Depot | 00% | Detail | Drew Harbinson | Eric Motzno
Ferry | 21% | Detail | Jerry Gaskill | Joe Owens
Rail | 00% | Detail | Patrick B. Simmons | Allan Paul
Totals | 14%


Stormwater Pollution Prevention Plan
Form 1
BMP Section
User Admin
Log Off
Help
Director: Matthew Lauffer
Div: 9
POC: Mike Patton, P.E. (mpatton@dot.state.nc.us)
Year: Year 5 (7/1/2002 to 6/30/2003)
Form: Form 1 Status Page
The table below gives the status of SPPP Form 1 for all required facilities.
There are 12 target date tasks in Form 1.
A check mark will appear in the table when the Team Leader has reported a completion Date.
Facility
Form 1 Tasks
1 2 3 4 5 6 7 8 9 10 11 12
View Forms
Davidson County Maintenance Yard
Davie County Maintenance Yard
Forsyth County Maintenance Yard
Rowan County Maintenance Yard
Stokes County Maintenance Yard
Stokes County Salt Storage Yard
View Form 1
SPPP Home

Industrial Facilities Research/ Monitoring

Borrow/Waste Material Storage Areas

Equipment Rinsing

Facility

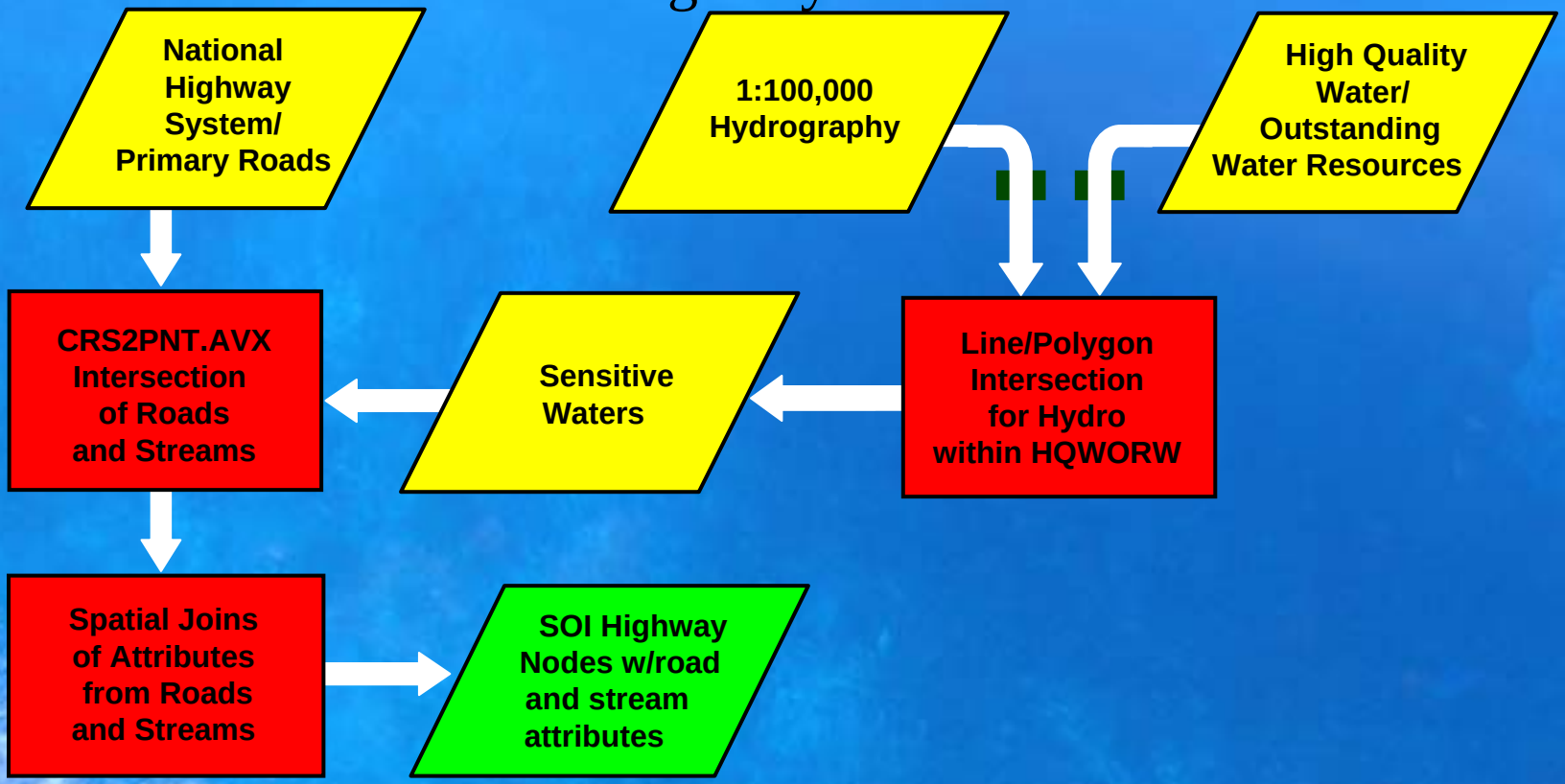
Alternative wastewater treatment for equipment washing not connected to sanitary

Stormwater Outfall Inventory

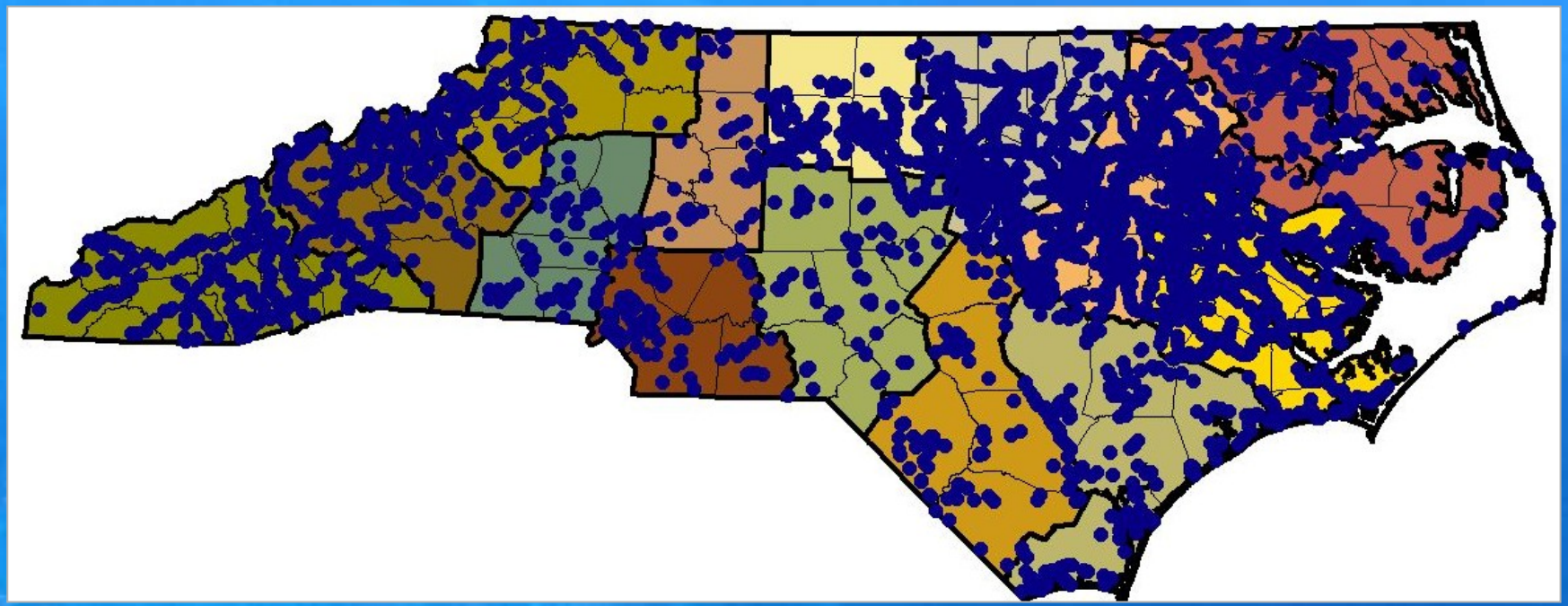
NCDOT shall inventory and characterize existing stormwater outfalls to sensitive waters. During the first two years of the permit term, the inventory shall focus on characterizing outfalls on roadways which cross and/or run parallel to sensitive waters and outfalls at all NCDOT industrial facilities which discharge directly to sensitive waters.

Stormwater Outfall Inventory Methodology

Highway Outfalls



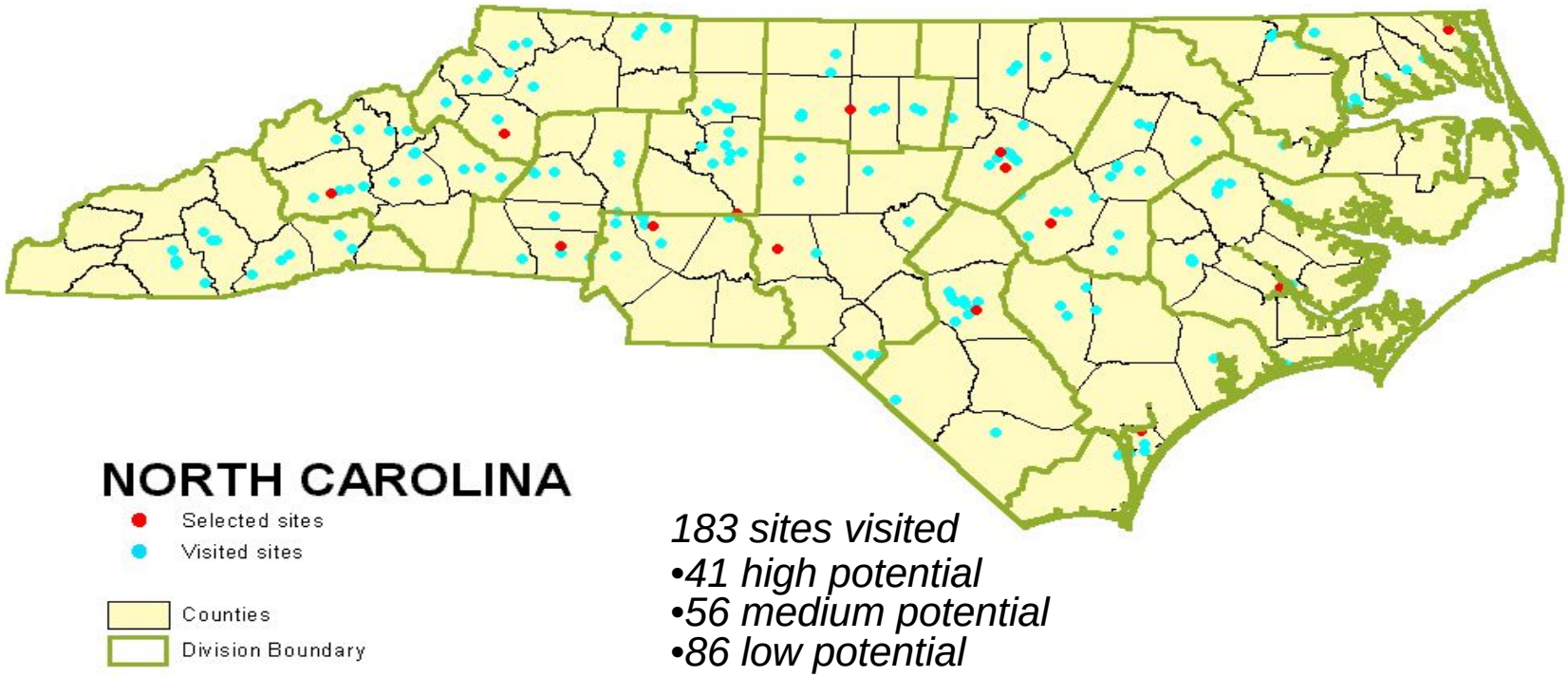
Sensitive Water Crossings for Primary Routes



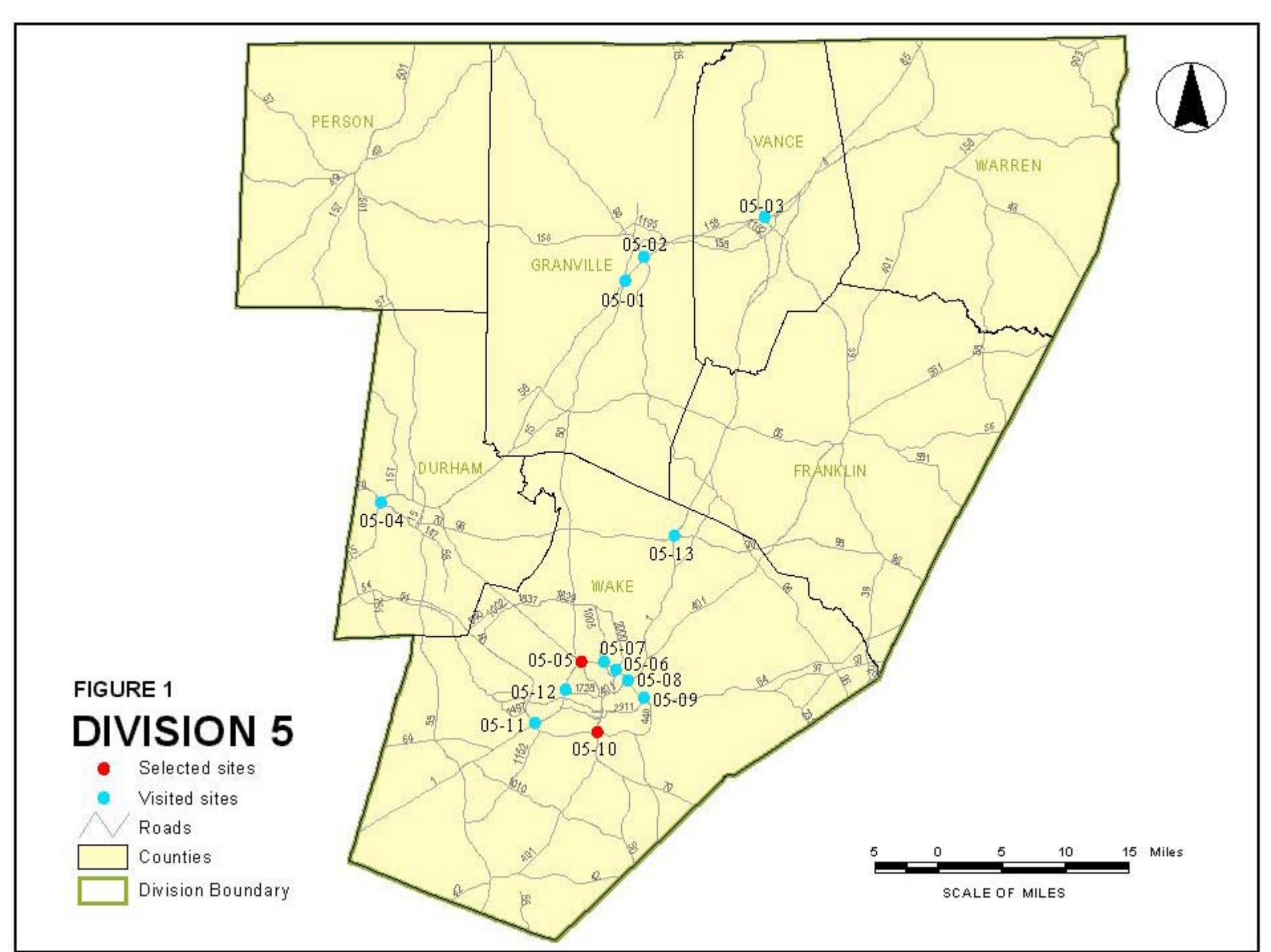
BMP Retrofit/Demonstration Program

During the last three years of the permit term, a minimum of one BMP retrofit per year shall be implemented in each of the fourteen NCDOT Divisions. The retrofits shall address the highest priority sites identified through the stormwater system inventory.

SITES VISITED/ SITES SELECTED
BMP RETROFIT PROJECT



183 sites visited
- *41 high potential*
- *56 medium potential*
- *86 low potential*


PERSON
VANCE
WARREN
GRANVILLE
DURHAM
FRANKLIN
WAKE
05-01
05-02
05-03
05-04
05-05
05-06
05-07
05-08
05-09
05-10
05-11
05-12
05-13
FIGURE 1
DIVISION 5
Selected sites
Visited sites
Roads
Counties
Division Boundary
5 0 5 10 15 Miles
SCALE OF MILES

Types of BMPs Considered:

- Wet Pond
- Extended Dry Detention Basin
- Stormwater Wetland
- Pocket Wetland
- Bioretention
- Infiltration Basin
- Grassed Swale
- Water Quality Channel
- Level Spreader
- Vegetated Filter Strip

Structural BMP Design
Water Quality Volume

- **The water that runs off the land during a 1-inch rainfall event**

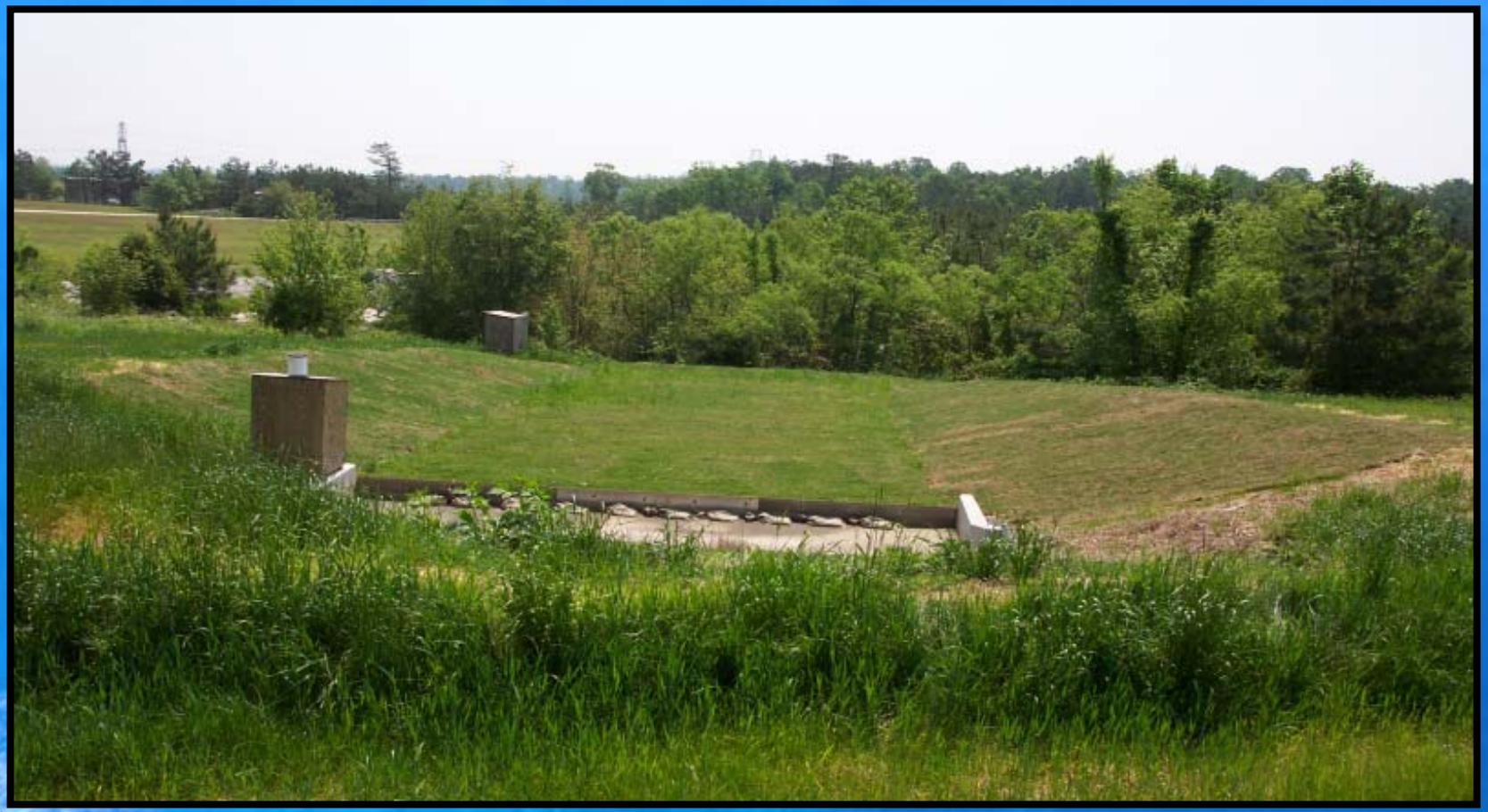
$$WQv = ((1.0) *(Rv)*(A))/12$$

Where:

1.0 = Depth of rainfall required to capture and treat approximately 80% of storm events

Rv = Volumetric Runoff Coefficient that is a function of impervious area

Division 4, Year 1: Level Spreader



Division 3, Year 2: Bio-Retention

FHWA Midwestern Hydraulic Engineering Conference, August 28

Division 2: Dry Water Quality Swale

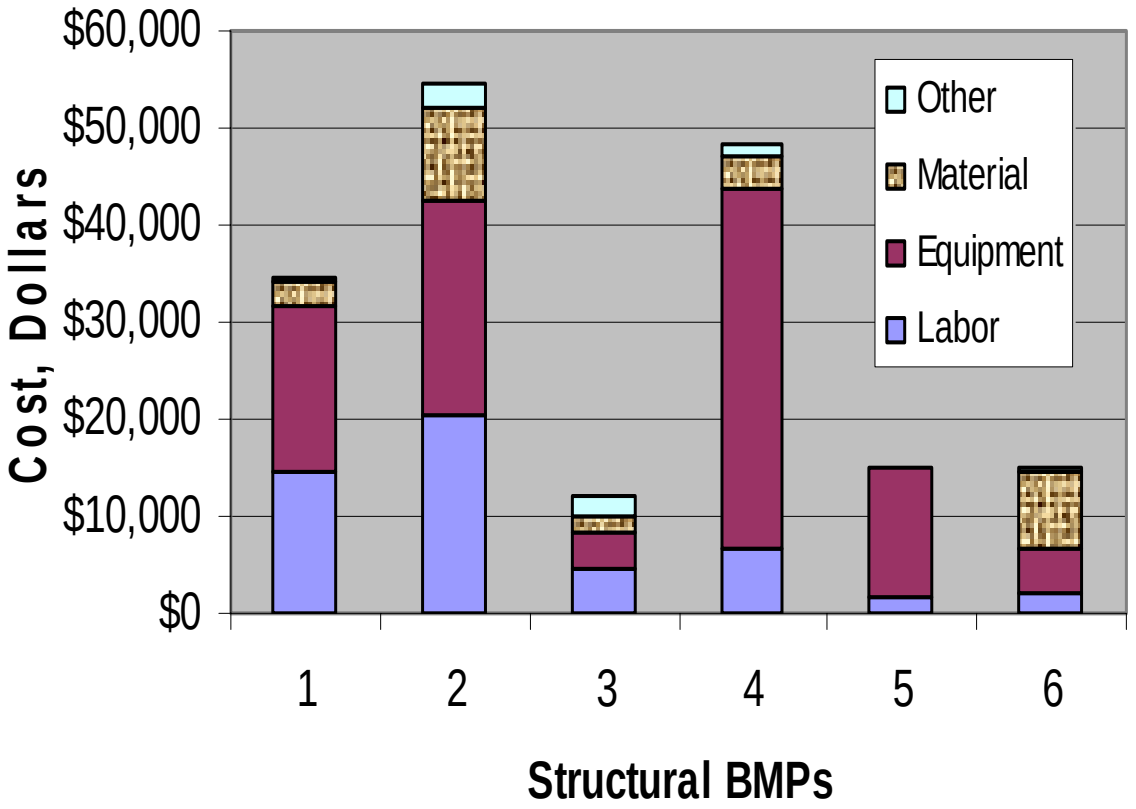
Bridge Drainage

Previous Outfall

Division 2, Year 2: Dry Water Quality Swale, Prior to Construction

FHWA Midwestern Hydraulic Engineering Conference, August 28

Division 2, Year 2: Dry Water Quality Swale, After Construction



1 Water Quality Swale

2. Bioretention

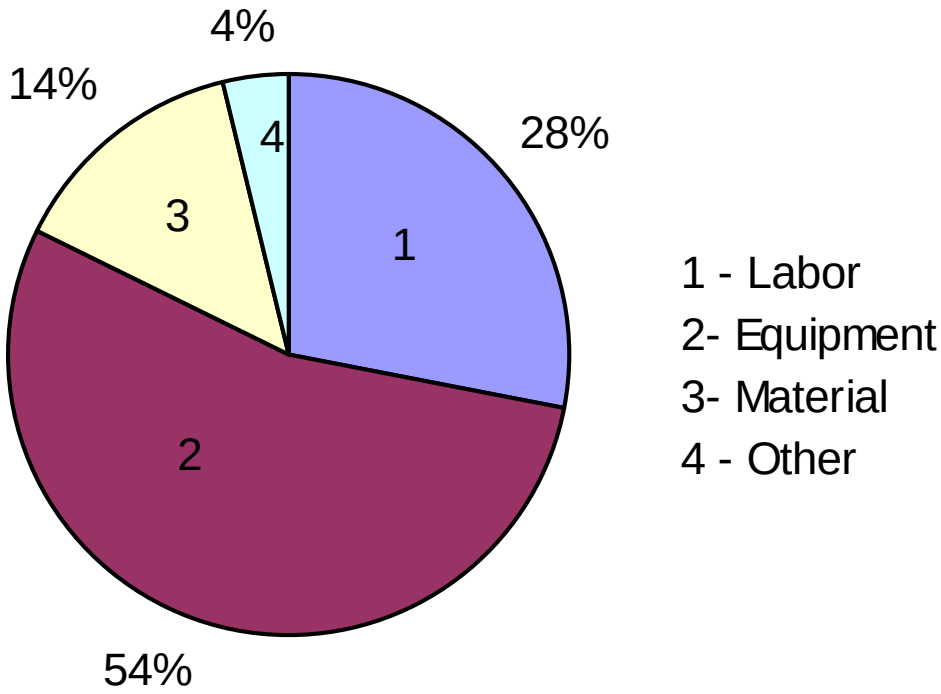
3. Dry Detention

4. Level Spreader w/ Filter Strip

5. Curb Cuts in Interchange

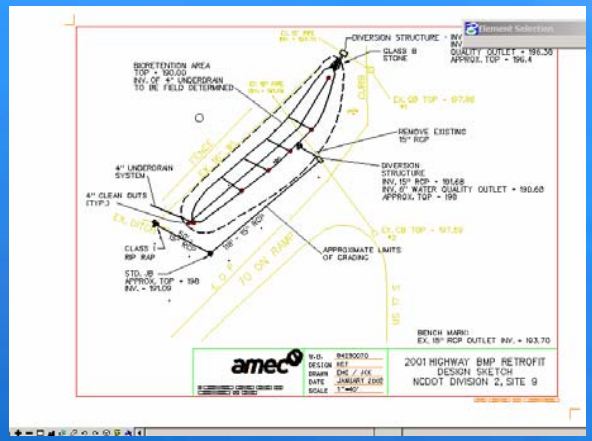
6. Manhole Inserts

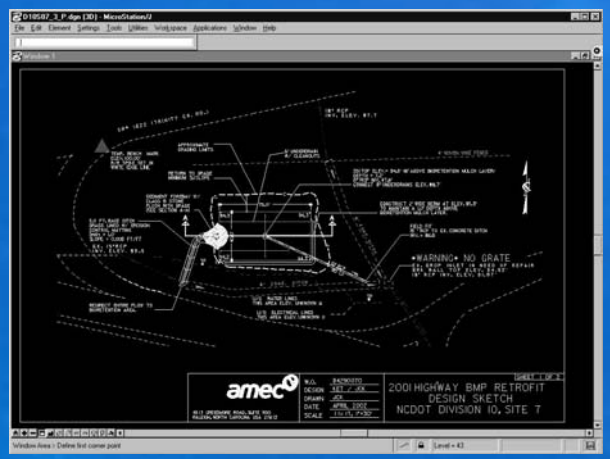
BMP Construction Cost Breakdown



Lessons Learned and Challenges of BMP Program

- Detailed Construction Drawings and Specifications.
- Meet with Construction Staff about Design and Function.
- Materials Should be on site Prior to Construction.
- Pre-Construction Meeting where responsibilities are outlined.
- Oversite during construction.
- Correct Materials and Processes





NPDES Phase II Negotiations:

Example of effective Non-Structural BMP

Second Permit Term Objectives:

1. Follow same guiding principles and policies.

2. Maintain and enhance programs from first permit term and implement new programs that are a result of Phase II requirements (Post Construction Runoff Controls).

3. Retain a toolbox of consultants with different specialties.

4. Integrate Structural BMPs into TIP Projects.

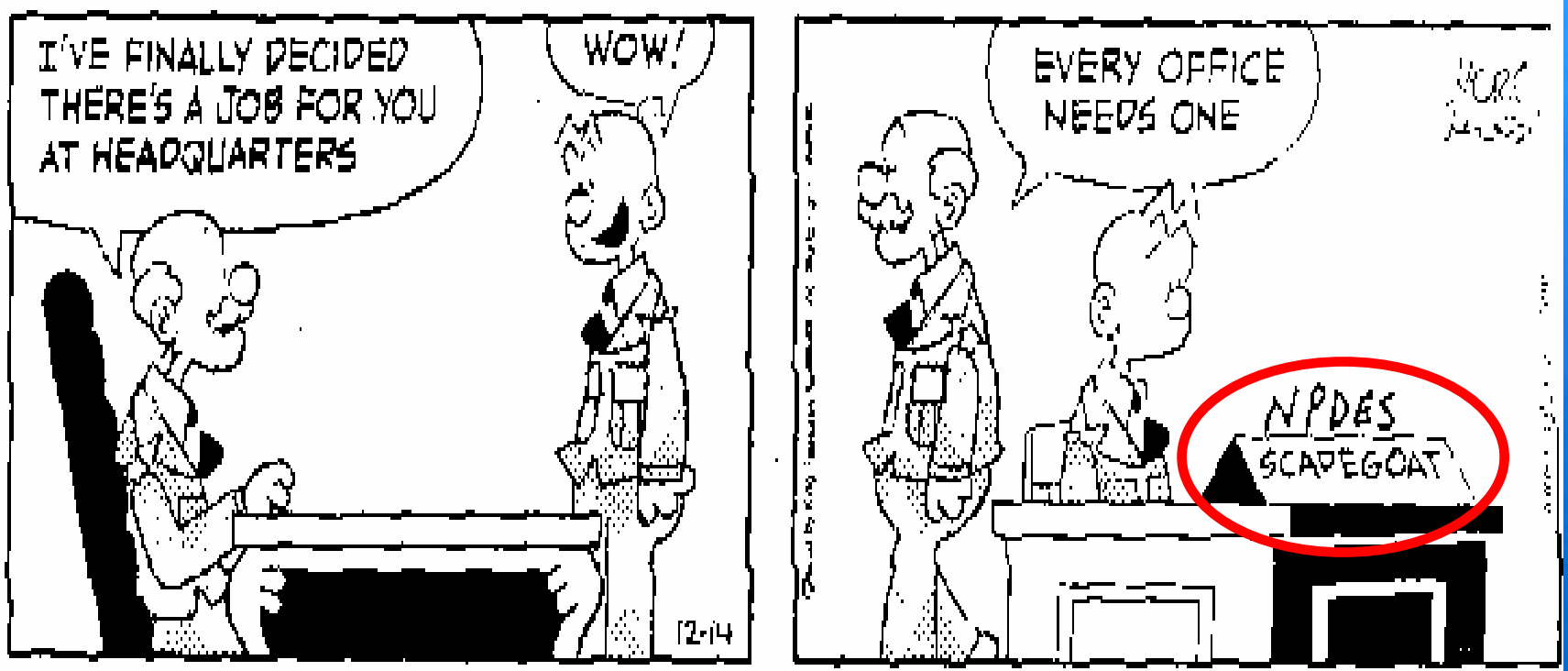
5. Build partnership demonstration projects that meet multifunctional needs.

6. Increase staffing and areas of expertise.

7. Develop NCDOT's impact on Priority Watersheds through modeling.

Closing Thoughts:

1) Have more than a hammer in your tool kit.
2) Build Partnerships
3) Be Proactive
4) Think Context Sensitive Solutions
5) Think Win-Win
6) Better Than Before


Beetle Bailey
I'VE FINALLY DECIDED THERE'S A JOB FOR YOU AT HEADQUARTERS
WOW!
12-14
EVERY OFFICE NEEDS ONE
NPDES SCAPEGOAT

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Drainage Area

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Original Outlet

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Cleared Site

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Initial Grading

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Placing of Fabric Layer 1

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Placing of Soil Over Fabric Layer 1

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Placing of Outlet and Overflow Boxes

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

View of Outlet and Overflow Boxes in Place

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Construction of Berm

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

View of Permeable Pipe placed over Fabric Layer 2

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Placing of Stone Over Permeable Pipe and Fabric Layer 2

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Placing of Engineered Soil Over Fabric Layer 3

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Fine Grading of Engineered Soil

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Placing of Matting

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

View of Swale After Fine Grading and Placement of Matting

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Formation of Sediment Forebay

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Placement of Inlet Boxes

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

View of Berm and Paving Around Inlets

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

View of Drainage Area with Berm and Inlets

BMP RETROFIT PROGRAM

DRY WATER QUALITY SWALE

Div. 2, Craven Co.

Roadside Environmental Placing Sodding

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

View of Swale with Sodding

BMP RETROFIT PROGRAM
DRY WATER QUALITY SWALE

Div. 2, Craven Co.

View of Finished Swale

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

View of Undisturbed Site Looking Towards Car Parking Area

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

View of Undisturbed Site Looking Towards Truck Parking Area and Exit

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Beginning of Earth Excavation

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Installation of Diversion into Bio-Retention Basin

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Construction of Berm at Outflow of Bio-Retention Basin

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Placement of Outflow Box

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Fine Grading of Bio-Retention Basin Subgrade

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Placement of Subgrade Fabric Layer 1

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Floor of Bio-Retention Basin Covered with Fabric Layer 1

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Placement of Perforated Pipe on Subgrade of Bio-Retention Basin

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

View of Bio-Retention Basin Floor with Fabric Layer 1 and Drainage Pipe

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Placement of Stone around Drainage Pipe

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

View of Graded Stone Covering Drainage Pipe

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

View of Fabric Layer 2 Covering Graded Stone

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Mixing of Engineered Soil

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Placing of Engineered Soil on Fabric Layer 2

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Sediment Forebay

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

View of Bio-Retention Basin Prior to Mulching and Seeding

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

View of Bio-Retention Basin after Mulching and Seeding

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Placement of Plants by Roadside Environmental Before Planting

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Careful Attention to Detail to Insure Plant Growth

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Our Finished Product, Bio-Retention Basin

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

Bio-Retention Basin with Flowers in Bloom

BMP RETROFIT PROGRAM
BIO-RETENTION BASIN

Div. 12, Catawba Co.

A Happy and Clean Outcome