The Alabama DOT MS4 Program

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Alabama DOT

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Some MS4 Basics

- **Municipal Separate Storm Sewer System**
- “MS4” can refer to:
  - the entire stormwater conveyance system itself
  - the public entity responsible for the system
- NPDES permits to regulate MS4 stormwater discharges in urban areas:
  - More potential pollutants in potentially greater amounts
  - More people potentially affected
- “MS4 Area”:
  - Area eligible for MS4 regulation under an NPDES permit
Large/Medium MS4 (Phase I)
- Five (5) individual permits for major urban areas
- ALDOT was a co-permittee under each permit
- First issued in 1995/96

Small MS4 (Phase II)
- One (1) statewide general permit
- ALDOT was covered under the general permit
- Permit requirements applied to “Urbanized Areas” defined by the decennial U.S. Census
- First issued in 2003
Alabama MS4 Areas

As of March 2013

(ADEM has modified some regulation-eligible areas since)
# State DOT as an MS4: Square Peg, Round Hole

<table>
<thead>
<tr>
<th>Typical MS4 (Municipality)</th>
<th>Typical State DOT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>non-linear</strong> areas</td>
<td>mostly <strong>linear</strong> facilities</td>
</tr>
<tr>
<td>spatially <strong>focused</strong> and <strong>connected</strong></td>
<td><strong>widely spread</strong> network of roadways</td>
</tr>
<tr>
<td><strong>more space</strong> for appropriate BMPs</td>
<td><strong>narrow strands of property</strong> constrain space for BMPs</td>
</tr>
<tr>
<td><strong>multiple land uses</strong>: industrial, commercial, residential, etc.</td>
<td><strong>mostly roads</strong> of similar characteristics &amp; a few “support facilities”</td>
</tr>
<tr>
<td><strong>large influence</strong> on watershed</td>
<td><strong>small contributor</strong> to total watershed drainage</td>
</tr>
<tr>
<td><strong>legal authority</strong> to regulate activity conducted by various types of entities</td>
<td><strong>limited</strong> legal authority to regulate non-DOT activity</td>
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</tbody>
</table>
The Current ALDOT MS4 Permit

- Current permit issued by ADEM on 21 March 2013; became effective 1 April 2013
- Five-year permit term ends 31 March 2018
- Better accounts for ALDOT’s unique characteristics & challenges
  - ALDOT, ADEM, & environmental advocacy groups were all in favor of specific permit
- Applies to ALDOT facilities in areas regulated by MS4 Phase I & Phase II permits issued to other entities
- Permit requirements do not distinguish between Phase I-regulated & Phase II-regulated areas
ALDOT Facilities & MS4 Areas

- **Transportation Facilities**
  - 2,700+ miles of roadways
    - <25% of all ALDOT roadways
  - No rest areas

- **Support Facilities**
  - Central Office
  - 17 Field Offices
    - 5 Area Offices
    - 11 District Offices
    - Tunnel Office (Mobile)
ALDOT MS4-Participating Parties

- Construction Bureau
- Design Bureau
- Equipment, Procurement, & Services Bureau
- Maintenance Bureau
- Materials & Tests Bureau
- Media & Community Relations Bureau
- Regions (5 total)
  - North, East Central, West Central, Southeast, Southwest
- Research & Development Bureau
- Training Bureau
The MS4-Applicable ALDOT Organization

Each of the 5 Regions is comprised of 2 Areas (10 Areas total)

Each Area has an organizational structure similar to that of the whole ALDOT organization with groups devoted to roadway design, roadway construction, roadway maintenance, employee training, etc.

Each Area is comprised of 3-6 Districts
More Accurate ALDOT Organization for MS4

- Functional internal coordination is necessary...

![Diagram showing organizational structure with nodes labeled MC, EQ, MT, DB, TR, RD, MB, CN, and RG connected by lines.]
ALDOT Office of Environmental Coordination

- Provides connectivity among ALDOT parties
  - Finds common ground among the stormwater management objectives & activities of individual ALDOT parties
  - Facilitates & moderates discussions between parties
  - Acts as a mediator to resolve conflicts between parties

- Frequent point-of-contact with which external parties interface regarding environmental matters
  - Regulators (e.g., ADEM, EPA)
  - Environmental advocates
  - Innovators (e.g., academia)
  - Public-at-large
Stormwater Management Program Plan

- SWMPP details activities ALDOT performs to meet MS4 permit requirements
- Information provided
  - Activities associated with permit requirements
  - ALDOT parties associated with activities
  - Permit term goals
  - Implementation timeframes
- Evolves as needed throughout permit term
  - New technologies & research findings
  - ALDOT trial-&-error
  - Emerging situations in the field
- Annual reports describe implementation progress & give rationale for modifications

Current version of SWMPP online at http://www.dot.state.al.us/dsweb/div_ped/Stormwater/pdf/MS4SWMPP.pdf

Most recent annual report online at http://www.dot.state.al.us/dsweb/div_ped/Stormwater/pdf/MS4%20Annual%20Report%20-%20FY%202015.pdf
MS4 Program Activities & Accomplishments

- SWMPP Components
  - Control Measures
    - Public Education & Public Involvement
    - Illicit Discharge Detection & Elimination
    - Construction Site Runoff Control
    - Post-Construction Stormwater Management (& Structural Controls Operation)
    - Pollution Prevention / Good Housekeeping
  - MS4 Monitoring

- 2016 ADEM audit
  - ALDOT waiting on official audit rating
  - Verbal feedback from ADEM after audit completion implies rating will be “satisfactory” or better
Public Education & Public Involvement (1)

- Supporting & implementing anti-litter programs

Litter awareness campaigns

Alabama PALS

Community litter pickup events

Keep Alabama Beautiful
Public Education & Public Involvement (2)

- Broader environmental awareness for citizens

Youth education activities

Collaboration with many partners
Public Education & Public Involvement (3)

- Involvement with local communities

Stream restoration projects

Community outreach groups

One Clean Mobile

ACES (E. Brantley)
Public Education & Public Involvement (4)

- Online outreach to the general public

http://www.dot.state.al.us/

http://www.betterbeltline.org
Public Education & Public Involvement (5)

- Supporting contributions to the body of knowledge

**Development of Silt Fence Tieback Design Methodology for Highway Construction Installations**

Wesley G. Zech, Jared L. Helvetson, and T. Preibehak Clement

This research effort focuses on improved installation and construction practices of silt fence tiebacks. The Department of Transportation is concerned with the use of effective and efficient installation practices that reduce sediment runoff. The primary objective of this research is to develop an effective system for installing and maintaining silt fence tiebacks. This system will use a combination of traditional and new technologies to improve the overall effectiveness of silt fence tiebacks. The study is funded by the Alabama Department of Transportation (ALDOT), and the research team includes members from Auburn University and Mississippi State University. The study is expected to provide valuable information for the design and construction of silt fence tiebacks, which can be used to reduce sediment runoff and improve road safety.


“Energy dissipation w/ 5 oz. FF choker”

“Total Suspended Solids I: 10% Slope”

“Strip channel EQL ~ 0.0192x + 1.7991”

“Average EQL (0)”

“Energy dissipation w/ 8 oz. FF choker”

“Control EQL (H)”

“Control WSL (H)”
Major outfall inventory

Completed so far:
- Dothan
- Auburn/Opelika
- Montgomery
- Tuscaloosa
- Decatur
- Mobile
- Baldwin Co.
- Quad Cities

(>150 major outfalls)
Illicit Discharge Detection & Elimination (2)

- Major outfall screening
Illicit Discharge Detection & Elimination (3)

- Addressing reported possible illicit discharges
Construction Site Runoff Control (1)

- Traditional erosion & sediment control practices
Innovative erosion & sediment control practices

- Step pool, Birmingham Northern Beltline
- Five Pillars of Construction Stormwater Management
- Communication
- Work
- Water
- Erosion
- Sediment

Traditional

Alternate

I-20/59 widening, Tuscaloosa (99% sediment yield reduction)
Construction Site Runoff Control (3)

- Guidance & reviews for design & construction
Construction Site Runoff Control (4)

- Erosion & Sediment Control Training (QCI Training)

ALDOT-facilitated recertification course:
> 700 trainees/year
Post-Construction Stormwater Management (1)

- Policy to encourage mimicking of pre-development hydrology

ALABAMA
DEPARTMENT OF TRANSPORTATION
GUIDELINES FOR OPERATION

SUBJECT: POST-DEVELOPMENT STORMWATER RUNOFF MANAGEMENT

The following guidelines should be followed during drainage design on all ALDOT projects requiring new development and re-development let to contract after April 1, 2013.

Designers must provide features and practices that cause post-development hydrology to mimic pre-development hydrology of the site to the maximum extent practicable, working within the constraints of the project, at all locations of discharge. The basis for design to meet this requirement shall be small, frequent rain events up to and including the 95th percentile rain event for the site.

While working toward this design goal, initial consideration should be the use of decentralized practices and features near the source of the runoff. Design elements that utilize natural materials and processes will be considered whenever possible.

- Small, frequent rain events are those storm events with rainfall depths up to and including the 95th percentile event for a specific county.
- Pre-development and Post-development hydrology include both peak discharge and runoff volume.
- Pre-development hydrology is the existing hydrological condition of the site just prior to construction of the planned development or re-development.
- New Development describes the creation of a new transportation facility or a new support facility that causes a ground disturbance of greater than one acre.
- Re-Development with respect to transportation facilities describes non-maintenance work performed to or on an existing transportation facility that provides for an increased number of thru lanes of travel, and causes a ground disturbance of greater than one acre. Work on an existing road that does not result in an additional thru lane does not constitute re-development.
- Re-Development with respect to support facilities describes non-maintenance work performed to or on an existing support facility that causes a ground disturbance of more than one acre.

The Chief Engineer may approve exceptions to this policy so long as downstream property will not be significantly impacted, and the bed and bank structure of receiving stream channels will not be significantly degraded by the increased stormwater discharge. Justification for an exception will be described and quantified in a written request to the Chief Engineer, including a description of the analysis and conclusions regarding downstream impacts.
Design guidance development

POST-DEVELOPMENT STORMWATER RISK ASSESSMENT

This document provides the rationale and sequential procedures for assessing risk of impacts from post-development stormwater discharge.

DETERMINING RUNOFF FOR SMALL STORM EVENTS

1. Introduction

The following calculations guidance should be used during drainage design on all ALDOT projects requiring new development and re-development, as defined in the Guidance for Operation (GFO 3-73) (ALDOT 2014).

As stated in the GFO 3-73, designers should attempt to provide features and practices that cause post-development hydrology to mimic pre-development hydrology of the site to the maximum extent practicable for all small, frequent rain events, working within the constraints of the project, at all locations of discharge. While working toward this goal, consideration should first be given to the use of decentralized practices and features near the source of the runoff. Design elements that utilize natural materials and processes will be considered whenever possible (ALDOT 2014).

The purpose of this document is to provide calculation guidance for drainage designs using small frequently occurring storms. The 95th percentile rainfall event will be used for calculating runoff volume and peak discharge. Runoff volume (in inches) is calculated using the 95th percentile rainfall event and a volumetric runoff coefficient. Peak discharge is calculated using the rainfall, basin area, modified curve number, and rate of concentration. The modified curve number is determined using the rainfall and runoff volume. Peak discharge can be calculated by hand or through the use of various computer programs. Sample calculations for determining runoff and peak discharge have been included.

2. Design Storm

2.1 Design Storm

Small, frequently occurring storms account for a large proportion of the annual precipitation volume, and runoff from those storm events also significantly alter the discharge frequency, rate and temperature of the runoff (USEPA 2009). As indicated in the GFO 3-73, ALDOT will consider storm events with rainfall depths up to and including the 95th percentile rainfall event, as defined by USEPA (2009), for a specific location as being such small storms. In turn, for stormwater runoff calculation, the design storm to be used in the analysis will be the 95th percentile rainfall event.

2.2 95th Percentile Rainfall Depths in Alabama

Estimation of the 95th percentile rainfall depths for all locations throughout the State was performed by the ALDOT Design Bureau according to the approach detailed in the NS4 Stormwater Management Program Plan. Figure 1 is the hydroclinal map for the 95th percentile rainfall depths in Alabama generated using that approach.
Pollution Prevention / Good Housekeeping (1)

- Material storage, handling, transportation, & disposal at support facilities

FY 2015 inspection findings:
No deficiencies found at 8 of 18 facilities
Many observed deficiencies minor
• Support facility employee good housekeeping training

**SPCC Plan**

- The Spill Prevention Control and Countermeasures (SPCC) Plan is governed under the requirements of 40 CFR part 112.

**HCS PICTOGRAMS & HAZARDS**

- **Health Hazard**
  - Carcinogen
  - Mutagenic
  - Reproductive Toxicity
  - Respiratory Sensitizers
  - Target Organ Toxicity
  - Hematological Toxicity

- **Flame**
  - Flammable
  - Pyrophoric
  - Self-Heating
  - Extinguishes Flammable Gas
  - Self-Reactions
  - Organic Peroxides

- **Explosion Mark**
  - Inert (not an eye)
  - Skin Sufficient
  - Acute Toxicity (Inhalation)
  - Aerosol Effects
  - Respiratory Tract Irritant
  - Hazardous or Dope, Lary (Non-Mandatory)

**Batteries**

- Rule applies to all batteries: alkaline, Ni-Cd, lead acid
- Main hazards are from lead, cadmium, and mercury (heavy metals)
- Store damaged batteries within containment
- All batteries or battery containers need to be labeled as “Universal Waste Batteries”, “Waste Batteries”, or “Used Batteries.”
- Accumulate for no more than one year
  - Label each battery with the date it was placed in the accumulation area or label the accumulation area with the date the first battery was placed there. This meets the requirements for providing proof of accumulation time.

**Is this box labeled correctly?**

**Spill Response Actions**

- Non-ALDOT spills, unidentified containers, and suspicious activities on DOT right-of-way
  - Hazard unknown
    - Chemicals/materials are unfamiliar to ALDOT employees
    - ALDOT employees not trained in spill response

- ALDOT spills
  - Hazard known
    - Employees familiar with material and necessary safety precautions
    - Employees should be knowledgeable in spill response

**Fluorescent light disposal**

**20' U.S. Military Disposal**

**🐊**
Pollution Prevention / Good Housekeeping (3)

- Maintenance methods for transportation facilities

Salt brine for snow & ice control

Statewide Average - All Road Classes - 3 Year Trends

<table>
<thead>
<tr>
<th>Group</th>
<th>Feature</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage</td>
<td>Unpaved Ditches</td>
<td>B-</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Erosion Control - Front Slopes</td>
<td>B</td>
<td>A+</td>
<td>B+</td>
</tr>
<tr>
<td></td>
<td>Erosion Control - Back Slopes</td>
<td>B-</td>
<td>B+</td>
<td>B-</td>
</tr>
<tr>
<td>Roadside</td>
<td>Mowing</td>
<td>A</td>
<td>A-</td>
<td>A-</td>
</tr>
<tr>
<td></td>
<td>Undesirable Vegetation</td>
<td>C</td>
<td>C+</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>Litter Control</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

Efficient herbicide application

Herbicide surveillance:
- Started in June 2012
- No adverse incident found so far

Annual roadway condition assessments
Vegetation Management Training

Annual course: 200-400 trainees/year

Newsletter
MS4 Monitoring (1)

- In-stream, continuous monitoring approach
MS4 Monitoring (2)

- Analysis of collected data

So far, no conclusive evidence of significant ALDOT pollution contribution at any monitoring location.
Pursuing “win-win” scenarios
- Stormwater management benefit
- Cost-effectiveness for ALDOT (i.e., the taxpayer)

Communication is key (internally & externally)
- ADEM understanding ALDOT’s resource challenges led to an MS4 permit feasible to implement
- Resources focused to effectively address concerns communicated by regulators & the public
- Coordinating among ALDOT parties reduces redundancies in activities conducted

“If it ain’t broke, don’t fix it”
- Many MS4 program activities were established prior to the current MS4 permit, but were rebranded as part of the MS4 program in the SWMPP
- No need for costly BMPs if current practices are sufficient
MS4 Program Economics (2)

- “An ounce of prevention....” – source control
  - Motivating the public to not litter vs. deploying maintenance crews to remove litter
  - Minimizing the potential for erosion vs. removing sediment from runoff

- “The best things in life are free” (or almost free)
  - Online education & outreach
  - Use of existing vegetation as a BMP

- Letting others do what they do well
  - Encouraging the public to report possible illicit discharges instead of relying on ALDOT major outfall screening to be lucky enough to find them
  - Illicit discharge investigations & follow-up are usually conducted by neighbor MS4s
  - MS4 Monitoring data sharing with the City of Daphne
Preparing for the future

- When fiscally reasonable, an MS4-related policy may be effective statewide instead of being only for MS4 Areas
  - If MS4 Areas are modified in the future, no need to revise policies
  - Policies are more straightforward to implement

- Many "minor" outfalls are being inventoried during "major" outfall inventory effort
  - Minor outfalls will already be on record if in the future major outfall criteria broaden to include smaller outfalls
The Alabama DOT MS4 Program

Acknowledgment
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