


 June 19 - 20, 2025  
 Hollywood, FL






## FDOT Implementation Plan to Meet the New Stormwater Rule

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Transportation Symposium Website



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## 2024 Changes to the ERP Program

- **AH Volume 1, Part I – Procedures**
  - Section 3.1.2 – Grandfathering Provisions
- **AH Volume 1, Part II – Criteria for Evaluation**
  - Sections 8 and 9 - Water Quality Standards
- **AH Volume 1, Part IV – Erosion & Sediment Control**
  - Section 11 - Temporary E&SC
- **AH Volume 1, Part V – Operations & Maintenance Requirements**
  - Section 12 - O&M Plan, Cost Estimate, Inspections & Reporting

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## Outline - Path to Implementation

### • Complete & Available Now

- Temporary E&SC Plan Narrative
- Comprehensive O&M Plan and Cost Estimate Forms
- 2025 DM Chapter 5
- Drainage Website

### • In Development

- DDG Chapter 9 updates
- WATERSS Success Stories
- Developmental Standard Plans
- Standard RAI Responses



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## Regulatory Awareness

### • ERP Program

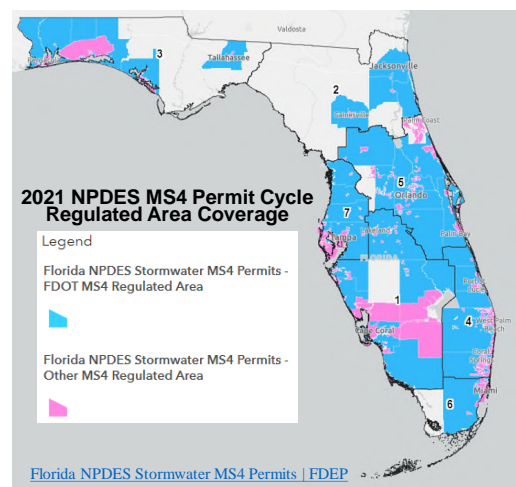
- Covers the entire State of Florida
- Federal 401 Certification (CWA)

### • NPDES Program

- Municipal Separate Storm Sewer System Permit (MS4)
- Construction Generic Permit (CGP)

### • FDOT Statewide Consistency

- FDOT Specifications and O&M Program centered around NPDES Program



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# Temporary Erosion and Sediment Control

## • ERP applications

- Temporary E&SC Plan Narrative (Form 251-A)

## • Plan Review Submittals (*Ph. III & IV*)

- SWPPP Template (Form 251-B)
- Stormwater Runoff Control Concept (SRCC)

Applicant Handbook Vol. I (effective 6/28/2024) Description/Requirement	FDOT Standard Specification	NPDES CGP 62421.300-610 F.A.C. (effective 02/2015)
<b>Section 11.2 Development of an Erosion and Sediment Control Plan</b>		
Identify location, relative timing, and specifications for E&SC and stabilization measures that will be implemented as part of the project's construction.	104-3 through 104-7	4.7 Part 5
Compliance with terms and schedule of implementing the proposed project, beginning with initiation of construction activities.	8-3, 104-5 through 104-7	4.7
<b>Section 11.2.1 Erosion and Sediment Control Principles that Must be Considered</b>		
Plan the development to fit topography, soils, drainage patterns, and natural vegetation of the site	104-5 104-6	4.7 5.3, 5.4, 5.5
Minimize both the extent of area exposed at one time and the duration of exposure	104-6	4.7 5.2, 5.3 6.2
Apply erosion control practices to minimize erosion from disturbed areas	104-6	4.3, 4.7 5.1, 5.3 6.2
Apply perimeter controls to protect disturbed areas from off-site runoff and to trap eroded material on-site to prevent sedimentation in downstream areas	104-5 104-6	4.3, 4.7 5.3, 5.5 6.2
Reduce runoff velocities and retain runoff on-site	104-6	1.2, Part 3 5.2, 5.3, 5.5, 5.7

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# Operation and Maintenance Plan

- Comprehensive approach via standard form
- Applicable Statewide for FDOT ponds
- Individual pond/project O&M plans are not required for FDOT ponds
- Ponds to be maintained by others will require additional coordination with maintaining entity

Florida Department of Transportation  
Operation & Maintenance (O&M) Plan

Project Name: \_\_\_\_\_  
 FDOT Project Number: \_\_\_\_\_  
 FDEP/MS4 Permit/Application Number: \_\_\_\_\_

**O&M Letter of Intent**

Pursuant to Section 12.1.1 AH Vol. 1, an acceptable operation and maintenance (O&M) entity shall have the financial, administrative, and legal capability to access, monitor, operate, and maintain its permitted projects. As a state agency, the Florida Department of Transportation (FDOT) is identified under Section 12.1.1(1), AH Vol. 1, as an acceptable entity for ensuring that an activity will be operated and maintained in compliance with the requirements of Section 373.416(2), F.S., and Chapter 62.300, F.A.C. Per Section 12.1.2, AH Vol. 1, FDOT provides this document as its letter of intent to accept responsibility for the operation and maintenance of the entire stormwater management system(s) associated with the above referenced permit number.

**Comprehensive O&M Program**

Section 12.4.1 AH Vol. 1 requires preparation of an operation and maintenance (O&M) plan to describe the O&M activities necessary to ensure the stormwater management system's perpetual performance. Municipal Separate Storm-Sewer System (MS4) permittees subject to Chapter 62.300, F.A.C. (MS4 Entity) are not required to submit a separate O&M Plan but shall instead conduct operation and maintenance of the LID-permitted stormwater management systems in accordance with their MS4 permit requirements and any associated stormwater management program requirements.

FDOT is an MS4 Entity throughout most of the state and has developed a comprehensive stormwater management program which includes inspection and maintenance activities to ensure perpetual operation and maintenance of the FDOT permitted stormwater management systems. This comprehensive O&M program is consistent with the MS4 stormwater management program and is applicable within those areas where FDOT is an MS4 Entity. For those EDP projects which extend outside of permitted MS4 areas (i.e., non-regulated MS4 areas), FDOT is implementing the same consistent and comprehensive statewide O&M Program as described herein.

To meet the requirements of Section 12.4.1 AH Vol. 1, FDOT, in coordination with FDEP, has agreed to apply this comprehensive O&M Program on a statewide basis. The FDEP and FDOT therefore have agreed that separate or individual O&M Plan submittals are not required as the O&M activities for the above referenced project will be implemented pursuant to FDOT's statewide Comprehensive O&M Program.

\_\_\_\_\_  
 "FDOT" herein refers to both the Florida Department of Transportation and the Florida Turnpike Enterprise.

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# New FDEP Form 62-330.301(26)

**SAMPLE FOR FDOT PROJECTS**

**Certification Of Financial Capability  
For Perpetual Operations And Maintenance Entities**

Permit No. 62000000 Application No. 62000000 Date Issued (if modification) \_\_\_\_\_

Identification or Name of Stormwater Management System: SR # from Here to There

Phase of Stormwater Management System (if applicable) \_\_\_\_\_

Name of Operation and Maintenance Entity: Florida Department of Transportation

Address of Operation and Maintenance Entity: Address  
City, State, Zip

☒ Cost estimate attached **Check box and fill out FDOT Cost Estimate Document**

Total annual operating expenses, including maintenance costs, for the estimated remaining useful life of the system accounting for annualized capital or replacement costs or deferred maintenance expenses for the system, including those components where maintenance or replacement frequencies are less frequent than once per year, for each BMP in the stormwater management system and any associated infrastructure, in current year dollars.  
**Enter project total from FDOT Cost Estimate Document in this field.**

Operation and Maintenance Entity (Select All That Apply)

☒ Local, state, or federal government agencies; municipal service other special taxing units, water control or drainage districts; community development, special assessment, or water management districts **Check box**

☐ Communication, water, sewer, stormwater, electrical, or other public utility

☐ Construction permittee (see Section 12, Volume I)

☐ Non-profit corporations, including homeowners' associations, property owners' associations, condominium owners' or master associations

☐ Other (Describe the Other Operation and Maintenance Entity below) \_\_\_\_\_

**Certification Of Financial Capability  
For Perpetual Operations And Maintenance Entities**

**Certification by Operation and Maintenance Entity:**

Certification Provisions for the Operation and Maintenance Entity (Select All That Apply):

☐ Municipal Separate Storm Sewer System (MS4) permittee subject to Chapter 62-424, F.A.C. (Identify the applicable Florida Department of Environmental MS4 permit below.)  
**If within an MS4 regulated area – check box and add permit number(s) in this field**

☐ Non-profit corporation subject to the Homeowners' Association Act under Chapter 720, Florida Statutes

☐ Construction permittee that will not be the Operation and Maintenance Entity. (Identify the intended Operation and Maintenance Entity below.) \_\_\_\_\_

☐ Other: Operation and Maintenance Entity not otherwise selected for this section. Describe the Other Operation and Maintenance Entity below, such as State or federal agency, Property Owners' Association, etc.  
**If outside an MS4 regulated area – check box and type "State Agency – FDOT" in this field**

The below Permittee or Operation and Maintenance Entity certifies that this form is true, accurate, and complete, and that it has the financial capability to operate and maintain the system in perpetuity including costs of inspections, operation, repair, and replacement of the system once the system meets its expected life. The signee below will be responsible for all maintenance, operation, and repair costs for the stormwater system of the above permit in perpetuity, until such time the system is properly abandoned, or the permit is transferred to a new operation and maintenance entity.

Name of Permittee or Operation and Maintenance Entity: Florida Department of Transportation

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**The District ERP Applicant Contact Person listed in Application Section A Part 3A can sign and date this form.**

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## FDOT Cost Estimate Form

- Approved cost estimate approach for the new FDEP form
- Creates Cost Estimate Tool for statewide consistency
- Only applicable when FDOT is the maintaining entity

Florida Department of Transportation  
Cost Estimate for FDEP Form 62-330.301(26)

Project Name: \_\_\_\_\_

FPIID Project Number: \_\_\_\_\_

FDEP/WMD Permit/Application Number: \_\_\_\_\_

As directed by the Florida Legislature, the Florida Department of Transportation's (FDOT) prevailing principles include the preservation of its infrastructure investment and Florida's natural resources [Section 334.046(4), Florida Statutes (F.S.)]. As a state agency, FDOT is funded annually by the Florida Legislature and receives a multi-billion-dollar budget. Consistent with its charge to ensure that 100 percent of the acceptable maintenance standards are met on the state highway system, FDOT first budgets for operation and maintenance (O&M) costs of approximately one billion dollars per year, which includes stormwater infrastructure O&M.

FDOT must follow Chapters 287 and 337, F.S., and adopted rules for competitive solicitation to obtain commodities and contractual services, which includes the maintenance of the State Highway System. Pursuant to Section 337.168, F.S., FDOT project specific cost estimates in development are exempt from Public Records Requests under Section 119.07, F.S., which includes contracting for stormwater management systems along the State Highway System.

Development of the official confidential cost estimate must follow defined procedures and associated scope of work for the forecasted tentative work program. The FDOT Office of Maintenance compiles these estimates to determine the Maintenance Program's total budget for the State Transportation Trust Fund (STTF) Work Program and Legislative Budget Request [Section 339.135, F.S.].

The budgeted stormwater O&M activities account for annual operating expenses, including inspection costs, and maintenance costs for the estimated remaining useful life of the system, accounting for replacement costs or deferred maintenance expenses for non-annual expenditures, for all components of the stormwater management system, including for each BMP in the stormwater management system.

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# FDOT O&M Cost Estimator Tool

## FDOT O&M Cost Estimator Tool\*

STTF Tentative Work Program Financial Plan				Above Referenced Project	
6-year Total Maintenance Expenditures <sup>1</sup>	Average Annual Maintenance Expenditures	FDOT Centerline (CL) Miles <sup>2</sup>	Average Annual O&M Budget per CL Mile <sup>3</sup>	Project Length (miles)	Estimated Average Annual O&M Budget for the Project
\$ 5,645,100,000	\$ 940,850,000	12,157	\$ 77,391.63		

- Source: [FDOT State Transportation Trust Fund \(STTF\) Tentative Work Program Financial Plan](#) (FY 2024/25 through FY 2028/29)
- Source: [Florida Transportation Fast Facts](#) by FDOT's Systems Forecasting and Trends Office (May 2024). Centerline Miles account for all roads that are maintained by FDOT.
- Assumes a uniform distribution of the budget. Includes all aspects of maintaining the State Highway System – e.g. pavement, signage, lighting, roadside safety, and associated stormwater management features. O&M activities include routine and periodic maintenance during the useful life of the system.

\* Note: This tool and its estimated results are not to be used to make FDOT financial or contractual decisions. This cost estimate is provided solely to comply with Chapter 62-330, F.A.C., and Section 12.3.5, AH Vol. 1, subject to the limitations of Chapter 337, F.S., and the prevailing principles specified under Section 334.046, F.S. Actual maintenance needs and expenditures are based on factors such as, but not limited to, site-specific conditions and unexpected non-annual expenses, contract negotiations, location, year, scoping, complexity, staffing, and selected means and methods.

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# FDOT Drainage Manual – Chapter 5

- Drainage Manual Forms
- WNAS impairment categories
- List of Transportation Stormwater BMPs

## Drainage Manual Forms

Form	Description
<a href="#">FDM Form 251-A</a>	Erosion and Sediment Control Plan Narrative for FDOT Project ERP application
<a href="#">FDM Form 251-B</a>	NPDES CGP SWPPP Template for FDOT Projects
<a href="#">O&amp;M Plan</a>	ERP Operations and Maintenance Plan Form
<a href="#">O&amp;M Cost Estimate</a>	ERP Operations and Maintenance Cost Estimate Form - FY 2024/25 - 2028/29
<a href="#">Intake Form - Internal</a>	Drainage Manual Revision Request Intake Form - FDOT Users
<a href="#">Intake Form - External</a>	Drainage Manual Revision Request Intake Form - External Users

Topic No. 625-040-002  
Drainage Manual

Effective: January 2021

Table 5-1: Structural Stormwater Treatment BMP Options

Location	BMP <sup>(1)</sup>	Maintenance <sup>(2)</sup>
Roadside Collection and Conveyance (small or linear drainage areas, initial treatments)	Vegetated Filter Strips	Low
	Bioswales (ditches, swales with/without blocks/control structures, linear ponds)	Low
	Retention with filtration	Medium
	Bioretention Systems (landscaped areas or planters, rain gardens, stormwater trees)	Low
	Retention with filtration	Medium
	Exfiltration, Trench/ trench Drain Systems	Medium
Attenuation Storage (larger drainage areas, secondary treatments)	Pollution Control Boxes (baffle boxes, hydrodynamic separators, catch basin inserts/ inlet filter cleanouts, up-flow filters)	High
	Retention Pond	Low
Pond Add-Ons	Detention Pond	Low
	Littoral Zone (Wet detention ponds)	Medium
	Floating Managed Aquatic Plant Systems (MAPS)	High
Outfalls	Underdrains or Side Bank Filters	Medium
	Vegetated Natural Buffers (sheet flow within riparian/forested buffers)	Low

- Any BMP not listed herein must be approved by the District Drainage Engineer and consulted with the District Maintenance Office prior to implementation in design plans.
- High Maintenance activities must have District Maintenance Office consultation prior to proposing for permitting.

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# Water Quality Criteria

## Transition of the Presumptive Criteria

- First Flush Design and Performance Standards (*old criteria*)
  - Volumetric calculation with percent reductions or increases for retention vs. detention, on-line vs. off-line, OFWs, or impaired waters (varied by WMD)
  - **Upfront treatment volume**
- Nutrient Reduction Design and Performance Standards (*new criteria*)
  - Statewide consistency to connect project to downstream impaired waterbodies & OFWs within USGS HUC12 sub-watersheds
  - **Variable treatment volume**

*Both performance standards provide the presumption that discharge from the development will not cause or contribute to violations of applicable state water quality standards as stated in Section 373.4131(3)(b), F.S.*

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# Water Quality Criteria

## Greater Nutrient Reduction Rate:

- Post TN/TP Loading  $\leq$  Pre TN/TP Loading (*Section 9.3, AH Vol. 1*)
- Minimum TN/TP Reduction Rate Standards (*Sect. 8.3, AH Vol. 1*)

### *Typical Projects*

Site Location's Downstream Ambient Waters in HUC12	Minimum Nutrient Reduction Rate Standards	
	TN	TP
Development Sites	55%	80%
OFW	80%	90%
Impaired	80%	80%
Impaired + OFW	95%	95%

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# Water Quality Criteria

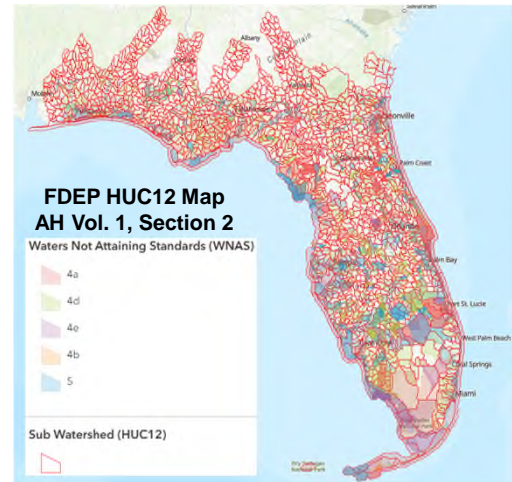
## HUC12 sub-watersheds (USGS)

- Project's downstream Waters of the State
- Review any impaired WBIDs or OFWs

## WNAS Database (FDEP DEAR)

Assessment Category	Defined
4a	TMDL Adopted
4b	RAP Adopted
<del>4c</del>	<del>Natural Impairment</del>
<del>4d</del>	<del>Study List</del>
<del>4e</del>	<del>Alternative Restoration Plan</del>
5	Verified Impaired

*BMAP & RAP boundary not basis for impairment classification.*



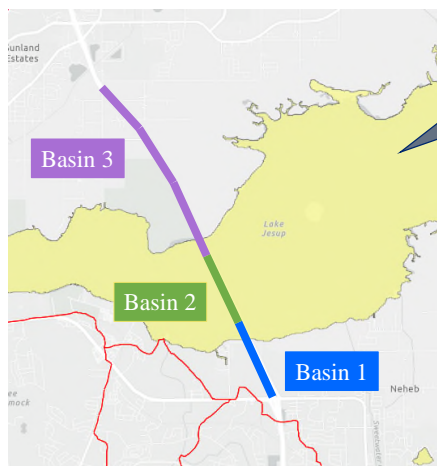
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# Water Quality Criteria

## Compensatory Treatment (*Section 9.7, AH Vol. 1*)



Lake Jesup Impaired with TMDL for TN/TP  
Required Nutrient Reduction Rate = 80% TN & TP

	Basin 1	Basin 2	Basin 3
Contributed Loading to Lake Jesup	22%	12%	66%
Treatment Train Efficiency	82%	0%	94%
Provided Overall Nutrient Reduction to Lake Jesup	80.1%		

*Theoretical Project*

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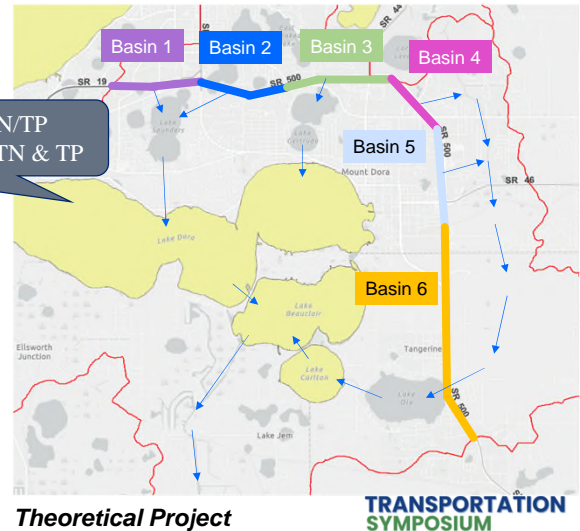
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# Water Quality Criteria

## Compensatory Treatment (Section 9.7, AH Vol. 1)

Lake Dora Impaired with TMDL for TN/TP  
Required Nutrient Reduction Rate = 80% TN & TP

	Contributed Load	Treatment Train Efficiency	Overall Treatment Contribution
Basin 1	10%	45%	5%
Basin 2	12%	75%	9%
Basin 3	15%	75%	11%
Basin 4	10%	45%	5%
Basin 5	20%	95%	19%
Basin 6	33%	95%	31%
SR 500 Overall Treatment Efficiency to Lake Dora			80%



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# Stormwater BMPs

- **AH Volume 1, Appendix O**
  - Nutrient Reduction Efficiencies
- **FDOT Drainage Manual**
  - Transportation BMPs
- **FDOT Statewide Stormwater Management Plan (SWWMP)**
  - Understand design's impact on FDOT O&M program

2024 AH Volume 1, Appendix O: Traditional BMP Treatment Efficiencies

Table 1: of BMP Efficiencies			
BMP	TP Reduction	TN Reduction	Data Source
Retention Pond and Retention Systems	Based on percent reduction using project's percent directly connected impervious area (DCIA), non-DCIA curve number (CN), and rainfall zone	Based on percent reduction using project's percent directly connected impervious area (DCIA), non-DCIA curve number (CN), and rainfall zone	Evaluation of current stormwater design criteria within the state of Florida, Harper and Baker 2007
Wet detention ponds	Formula based on Average Annual Residence Time for Removal Efficiency of Total Phosphorus	Formula based on Average Annual Residence Time Removal Efficiency of Total Nitrogen	Evaluation of current stormwater design criteria within the state of Florida, Harper and Baker 2007
Baffle boxes (gravity-based separators)—First generation	2.30%	0.50%	Final report, Contract S0236, Effectiveness of baffle boxes plus media filter, by GPI Southeast 2010; Demonstration bio media for ultra-urban stormwater treatment, by University of Central Florida (UCF) for Florida Department of Transportation (FDOT); and Final report, Contract S0497, Baffle box with media filtration installation and effectiveness evaluation by City of Casselberry.
Baffle boxes (gravity-based separators)—Second generation	15.50%	19.05%	
Baffle boxes (gravity-based separators)—Second generation plus media filter	Media Mix Efficiency	Media Mix Efficiency	

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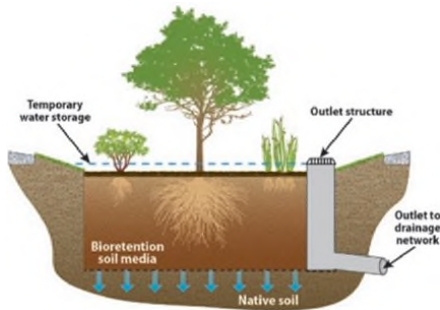
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# Stormwater BMPs

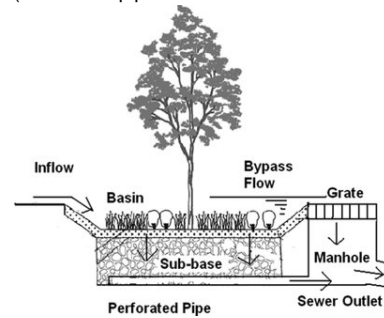
## Retention

Loss of runoff volume  
(Infiltration/evapotranspiration)



## Detention with Filtration

Nutrients sequestered by soil column  
(Perforated pipes/orifice at bottom of BMP)



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# Stormwater BMPs

- Retention Treatment Efficiency
  - Directly from AH Volume 1 Appendix O tables
- Detention with Filtration Treatment Efficiency
  - Retention Efficiency x Soil Media's Nutrient Sequestration
  - Standard Plans 440-001 Underdrain Media = 34% TN & 81% TP Sequestration

Zone 2		Annual Capture Retention Tables (AH Volume 1, Appendix O)																			
1.00-inches		DCIA Percentage																			
Non-DCIA	CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	30	98.5	98.8	98.5	97.9	96.5	95.6	94.1	92.3	90.4	88.4	86.3	84.2	82.1	80	77.9	75.9	74	72.2	70.3	68.6
	35	97.5	96.2	96	97.4	96.5	95.3	93.7	92	90.2	88.2	86.2	84.1	82	79.9	77.9	75.9	74	72.2	70.3	68.6
	40	96.4	97.3	97.2	96.8	95.9	94.8	93.3	91.7	89.9	87.9	85.9	83.9	81.8	79.8	77.8	75.8	73.9	72.1	70.3	68.6
	45	94.8	96.1	95.3	95	95.2	94.1	92.7	91.2	89.4	87.6	85.6	83.6	81.6	79.6	77.7	75.8	73.9	72.1	70.3	68.6
	50	93	94.8	95.2	94.9	94.3	93.3	92	90.5	88.9	87.1	85.3	83.3	81.4	79.5	77.5	75.6	73.8	72	70.3	68.6
	55	91	93.2	93.7	93.6	93.1	92.3	91.1	89.8	88.2	86.6	84.8	82.9	81.1	79.2	77.3	75.5	73.7	72	70.2	68.6
	60	88.8	91.2	92	92	91.7	91	90	88.8	87.4	85.9	84.2	82.4	80.7	78.9	77.1	75.3	73.6	71.9	70.2	68.6
	65	86.2	88.9	89.9	90.2	90	89.5	88.7	87.6	86.4	85	83.4	81.8	80.2	78.5	76.8	75.1	73.4	71.8	70.2	68.6
	70	83.6	86.4	87.5	88	88	87.6	86.9	86.1	85.1	83.8	82.5	81	79.5	77.9	76.4	74.8	73.2	71.6	70.1	68.6
	75	81	83.6	84.9	85.5	85.6	85.3	84.9	84.2	83.4	82.4	81.2	80	78.6	77.2	75.8	74.3	72.9	71.5	70	68.6
	80	78.6	80.8	82	82.5	82.8	82.7	82.4	81.9	81.3	80.5	79.6	78.5	77.4	76.3	75	73.8	72.5	71.2	69.9	68.6
	85	76.1	77.7	78.7	79.3	79.6	79.7	79.5	79.2	78.8	78.2	77.5	76.7	75.9	74.9	74	72.9	71.8	70.8	69.7	68.6
	90	73.9	74.8	75.5	75.9	76.1	76.2	76.2	76	75.7	75.3	74.9	74.4	73.8	73.2	72.5	71.8	71	70.3	69.4	68.6
	95	71.5	71.8	72	72.1	72.2	72.2	72.2	72.1	72	71.9	71.7	71.4	71.2	70.9	70.6	70.2	69.9	69.5	69	68.6
	98	70.2	70.2	70.2	70.2	70.1	70.1	70.1	70	69.9	69.8	69.7	69.7	69.6	69.4	69.3	69.2	69	68.9	68.8	68.6

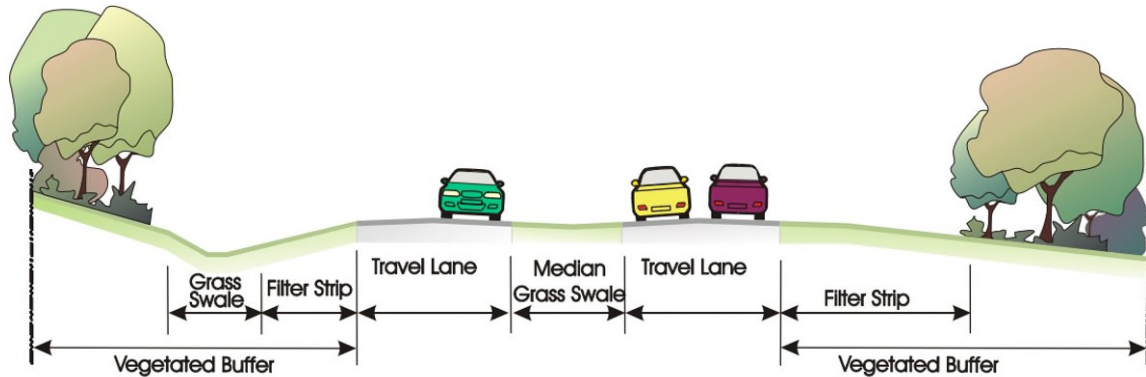
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# Stormwater BMPs

## Flush Shoulder Typical Section Roadside BMPs



NCHRP 25-25 (53): Stormwater Treatment with Vegetated Buffers  
AASHTO, Standing Committee on Environment

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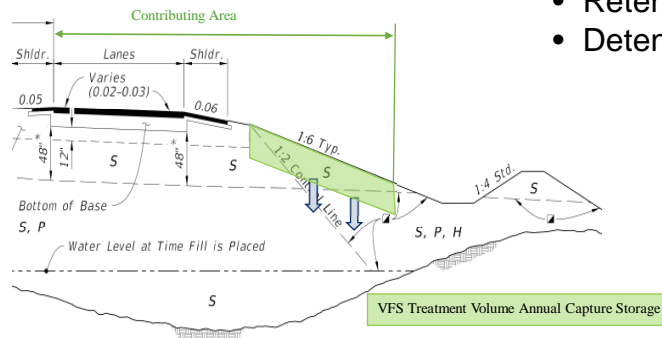
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# Stormwater BMPs

## Flush Shoulder Typical Section Roadside BMPs

### Vegetated Filter Strips

- Standard roadway front slope
- Retention BMP
- Detention with Filtration BMP (underdrain)



### VFS Retention BMP Efficiencies:

C1/C2	2-3 Lanes	80% - 95%
C2T/C3/C4	2-3 Lanes	68% - 88%
LA R/W	2-3 Lanes	75% - 91%
LA R/W	4-5 Lanes	64% - 81%

Meteorological Zone 1

Minimum 10-ft wide or end of Clear Zone

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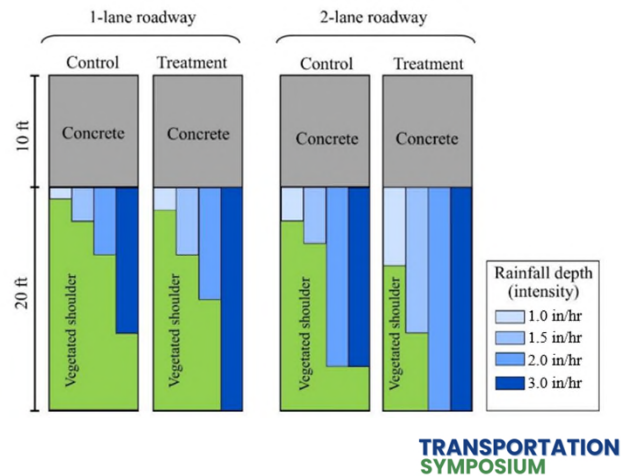
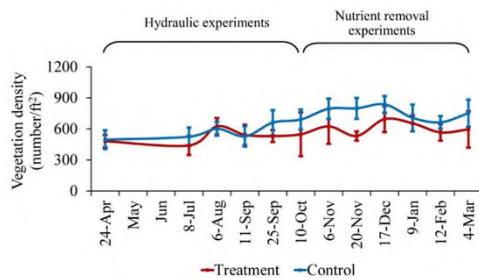
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# Stormwater BMPs

## Flush Shoulder Typical Section Roadside BMPs

### Vegetated Filter Strips

- FDOT 2020 Research BDV24-977-25
- In-situ & select soils outperformed BAM for Retention VFS BMP functions.
  - Vegetative coverage
  - Infiltration capacity



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# Stormwater BMPs

## Flush Shoulder Typical Section Roadside BMPs

### Vegetated Filter Strips

BMP Trains 2020 v4.3.5

Vegetated Filter Strip Worksheet Analysis: BMP Analysis

VFS Width (10 - 30 ft): 24  
 VFS Length (ft): 1  
 VFS Depth (1 - 2 ft): 2  
 Width of DCIA (ft): 36  
 VFS Storage Capacity (in/in): 0.2  
 VFS Slope (2 - 20%): 16.67

Note: VFS Contributing Area must equal the Catchment Area

Project: 001  
 Date: 6/4/2025

Vegetated Filter Strip with media Design

VFS Width (ft)	24.000
VFS Length (ft)	1.000
VFS Depth (ft)	2.000
Width of Area Feeding Buffer (ft)	36.000
Water storage capacity of soil (in/in)	0.200
Slope of VFS (< 20%)	16.670
Annual Capture Percentage	85

Media:

Calculate:  Cost:  Print:  Plot:  Copy:

BMP Trains 2020

#### Welcome to EMD Trains Version: 4.3.5

This program is a product of the Stormwater Management Academy of the University of Central Florida

Analysis by: Dr. Marty Waniak  
 Program by: Dr. Ron Eaglin

1) This program version (2020), released December 2021 is used to calculate the average annual removal effectiveness of stormwater Best Management Practices either as stand alone BMPs or as BMPs in series or in parallel.

2) There is a users manual to help navigate this program.

3) The State Department of Transportation provided guidance and resources to develop this program. The Stormwater Management Academy is responsible for the content of this program.

Disclaimer: The user is responsible for all input data and an understanding of the program details in the User Manual.



Continue

Retention Treatment Efficiency

Tables in AH Vol. 1 Appendix O

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# Stormwater BMPs

## Flush Shoulder Typical Section Roadside BMPs

### Bioswales

#### Conveyance Swales



#### Retention Swales



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# Stormwater BMPs

## Flush Shoulder Typical Section Roadside BMPs

### Bioswales

2016 FDOT EMC Study by FDOT NPDES



Grass Bottom



Ditch Lining  
Riprap Bottom

- Standard roadside swale (with or without ditch blocks)
- Retention BMP
- Detention with Filtration BMP (underdrain)
- **Do not contribute to springshed impairments**

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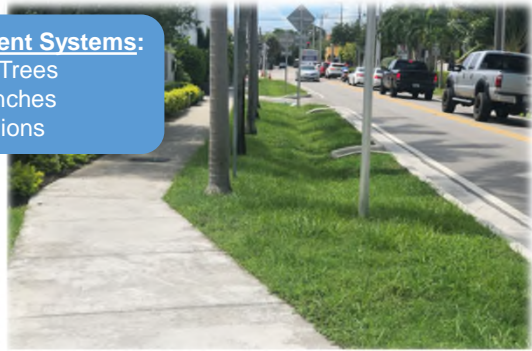
# Stormwater BMPs

## Curb & Gutter Typical Section Roadside BMPs Bioretention Systems



### Linear Treatment Systems:

- Stormwater Trees
- Planters/trenches
- Curb Extensions



- Retention BMPs
- Detention with Filtration BMPs (underdrains)

US EPA's *Green Streets Handbook* (EPA 841-B-18-001), *Bioretention Fact Sheet* (EPA 832-F-21-031L), & *Bioretention Design Handbook* (EPA 841-B-23-002)

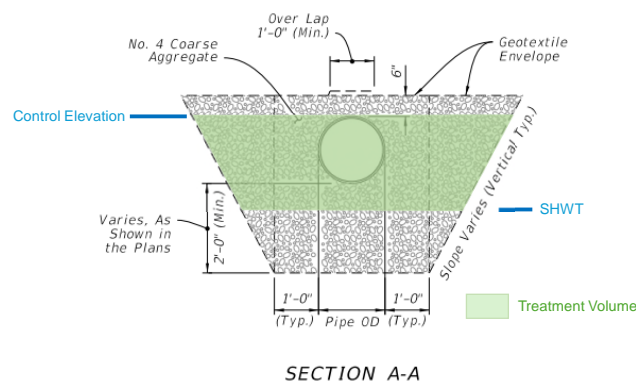
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# Stormwater BMPs

## Curb & Gutter Typical Section Roadside BMPs Exfiltration Trench Systems



- Standard exfiltration trench Standard Plans Indices 443-001 & 443-002
- Retention BMP

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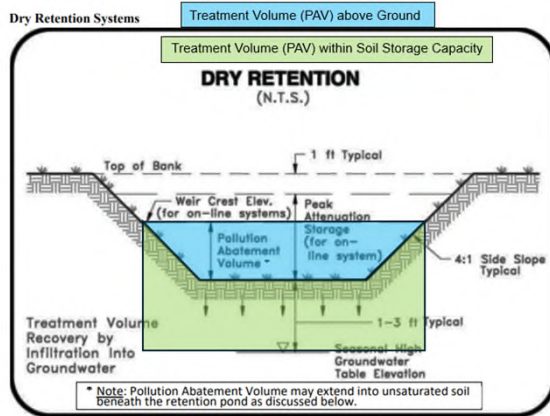
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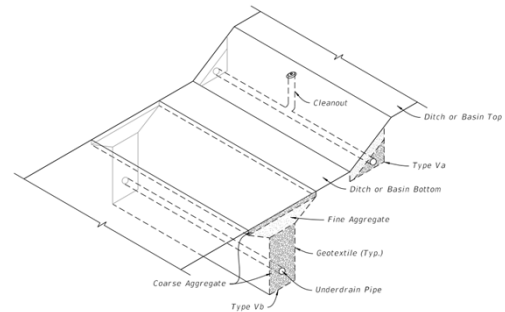
# Stormwater BMPs

## Stormwater Management Facilities BMPs

### Dry Retention Ponds



### Detention with Filtration Ponds



FDOT Standard Plans 440-001

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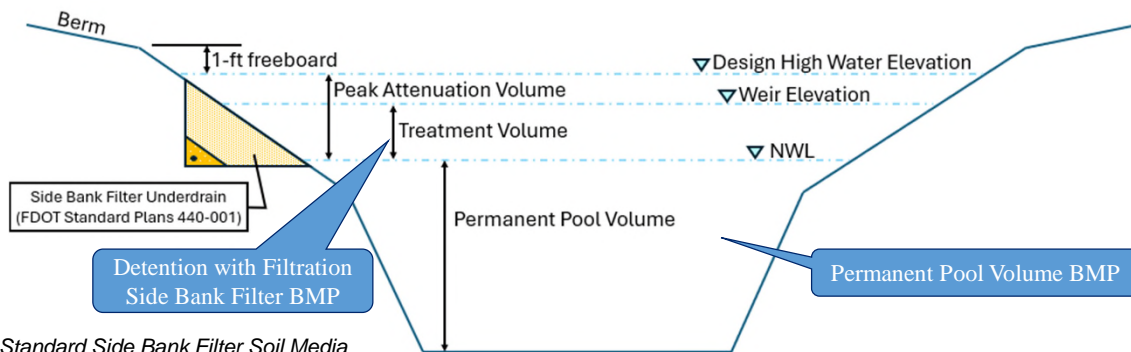
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# Stormwater BMPs

## Stormwater Management Facilities BMPs

### Wet Detention Ponds

- Treatment Train of PPV & SBF BMPs
- Overall Treatment Efficiency can meet the 55% TN & 80% TP



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# Stormwater BMPs

## DDG Chapter 9 Sneak Peak

### Section 9.3 Water Quality Updates

- Determination of applicable Minimum Nutrient Reduction Rate in Section 8.3
- Compensatory Treatment Example
- Overall Treatment Efficiency for:
  - Parallel Systems
  - Systems in Series (Treatment Train)
- Step-by-Step calculations for Transportation Stormwater BMPs

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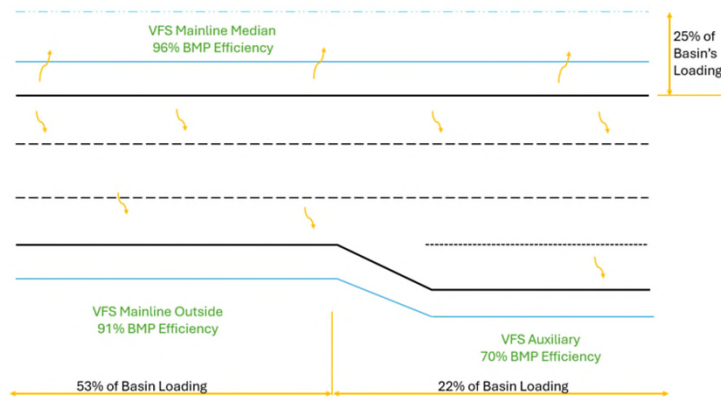
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# Stormwater BMPs

## DDG Chapter 9 Sneak Peak

### Stormwater BMPs in Parallel



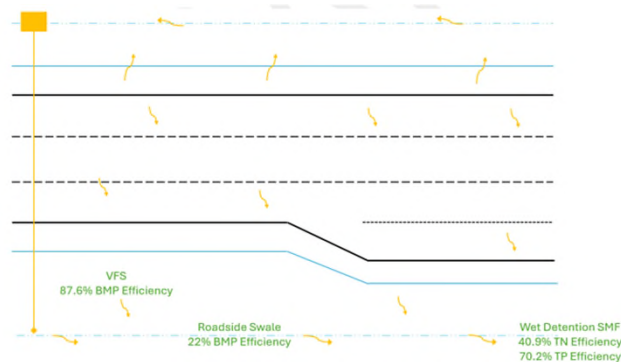
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# Stormwater BMPs

## DDG Chapter 9 Sneak Peak Stormwater BMPs In Series



Thus, Basin 1's overall treatment train will be calculated as follows:

$$\text{Overall TN BMP Efficiency} = 1 - ((1 - 87.6\%) * (1 - 22\%) * (1 - 40.9\%)) = 94.3\%$$

$$\text{Overall TP BMP Efficiency} = 1 - ((1 - 87.6\%) * (1 - 22\%) * (1 - 70.2\%)) = 97.1\%$$

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# Stormwater BMPs

## Summary

- **Retention BMPs**
  - Treatment efficiency from tables in AH Volume 1, Appendix O
  - Highest BMP treatment efficiencies
  - New BMPs opportunities: VFS, conveyance swales, bioretention areas
- **Detention with Filtration BMPs (BMP with underdrains)**
  - Retention Treatment Efficiency x Soil Media's Nutrient Sequestration
  - Standard Underdrains (440-001) Media = 34% TN & 81% TP sequestration
  - Additional soils research ongoing
- **Wet Detention SMF**
  - PPV treatment equations (max residence time = 200 days)
  - No littoral zones or floating wetlands

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# Stormwater BMPs

## Summary

- **Innovative Stormwater BMPs**
  - FCA to function as Vegetated Buffer BMP (requires sheetflow)
  - Split BMPs – one pond site divided into wet and dry areas
- **Proprietary Products**
  - High O&M inspection frequencies and replacement/repair costs
  - Unique pay items, sole source product approvals, technical specs, BABA

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# Special Considerations

- **BMAP with FDOT as listed Stakeholder**
  - Coordinate with NPDES Coordinator for documentation for STAR Database
- **WATERSS regional or watershed level water quality credits**
- **Flexibility for linear transportation projects**
  - *Section 373.413(6), F.S.*
  - Coordinate with FDOT District Drainage Engineer

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## FDOT Drainage Website

### • Frequently Asked Questions

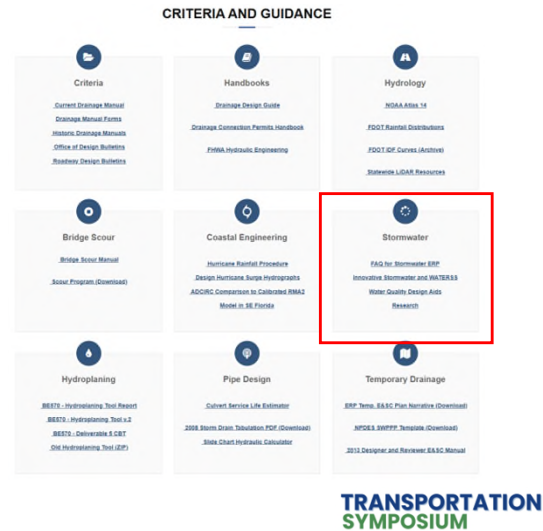
- Grandfathering
- Permit modifications
- Conceptual permits

### • Design Aids

- EPA Fact sheets
- FDOT EMC data
- Research

### • **\*\*Coming Soon\*\***

- Standard RAI Responses



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## Key Points to Remember

### • Float

### • Understand the new rule

- Applicants Handbook Vol. 1 Sections 8, 9, and Appendices N, M, and O
- Drainage Design Guide Updates

### • Requests for Additional Information (RAI) and Permit Conditions

- Review for applicability
- Coordinate with District Environmental Permits Coordinator & District Drainage Engineer
- Reach out to Central Office, if needed

### • Projects to be maintained by others will require additional coordination and documentation from the maintaining agency

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## Safety Message

*Don't Drive Into the Unknown.....*



*.....Stay Away from Flooded Streets!*

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## Contact Us

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 June 19 - 20, 2025  
 Hollywood, FL

 **TRANSPORTATION SYMPOSIUM**



Please be sure to **certify your attendance** before leaving this event or no later than **Monday, June 30**, in order to receive PDH/CEC. Detailed instructions are available on the Transportation Symposium website.

Transportation Symposium Website  
  
SCAN ME

