

# Transportation *integrated* Stormwater Management (TriSWM)

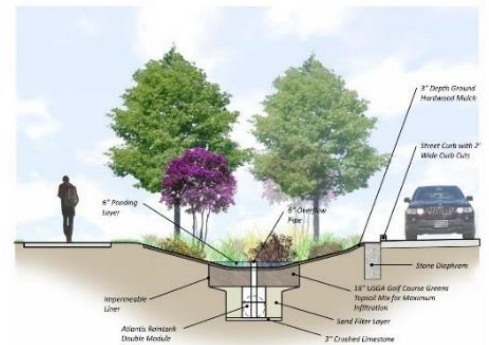
The Transportation *integrated* Stormwater Management (TriSWM) Appendix of the *integrated* Stormwater Management (iSWM) Criteria Manual for Site Development and Construction is available for use by cities, counties, engineers, private developers, contractors and transportation agencies in the planning and design of stormwater management for streets, roads, and highways.

The purpose of TriSWM is to provide planning and design guidance and a framework for incorporating effective and environmentally sensitive stormwater management practices into the street and roadway project development process and to encourage a greater uniformity in developing plans for stormwater management systems that meet the following goals:

- Provide safe driving conditions
- Minimize downstream flood risk to people and properties
- Minimize downstream bank and channel erosion
- Reduce pollutants in stormwater runoff to protect water quality

TriSWM discusses strategies to aid local governments and the private sector to:

- Design roads and highways with stormwater impacts in mind
- Address and mitigate the adverse impacts of development on runoff
- Implement stormwater controls to meet the TriSWM planning and design approach



Source: Freese & Nichols

## Why TriSWM?

- Runoff from streets and highways may contain pollutants that can impact streams and lakes and must be addressed under state regulations
- Streets create a significant amount of impervious area and additional runoff
- To create common stormwater management criteria across the region



Source: Wikimedia Commons, Michael Pereckas

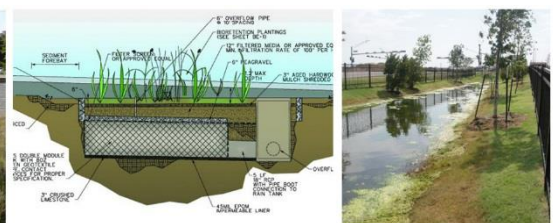


Pollutant	Primary Sources of Pollutants in Street and Highway Runoff
Particulates	Pavement wear, vehicles, atmosphere, maintenance, snow/ice abrasives, sediment disturbance
Nitrogen, Phosphorus	Atmosphere, roadside fertilizer use, sediments
Metals	Gasoline, diesel, tire wear, lubricating oil and grease, bearing wear, atmospheric fallout, auto body rust, brake linings wear, engine parts wear
Sodium, Calcium	De-icing salts, grease
Chloride	De-icing salts
Sulphate	Roadway beds, fuel, de-icing salts
Petroleum	Spills, leaks, blow-by motor lubricants, antifreeze, hydraulic fluids, asphalt surface leachate
Pathogenic bacteria	Soil litter, bird droppings, trucks hauling livestock/stockyard waste

Adapted from Kobringer, N. 1984. Sources and Migration of Highway Runoff Pollutants – Executive Summary. FHWA/RD-84/057. Federal Highway Administration.



Source: Dunaway Associates



Source: Freese & Nichols

# TriSWM Water Quality Criteria

Traffic Volume - Vehicles per Day (VPD)	Receiving Water/Riparian Area Susceptibility		
	Minimal	Moderate	High
Low (<30,000 VPD)	Level I	Level II	Level II
High (>30,000 VPD)	Level I	Level II	Level III

## Water Quality Treatment Levels and Practices

### Level I

- Program of scheduled pollution prevention practices (street sweeping, storm drain inlet cleaning, etc.)
- Off-site practices (regional detention, etc.)
- Grass channels
- Filter strips
- Gravity (oil-grit) separator
- Proprietary structure controls
- Porous concrete / Modular porous paver systems



Source: Wikimedia Commons, Greg Goebel

### Level II

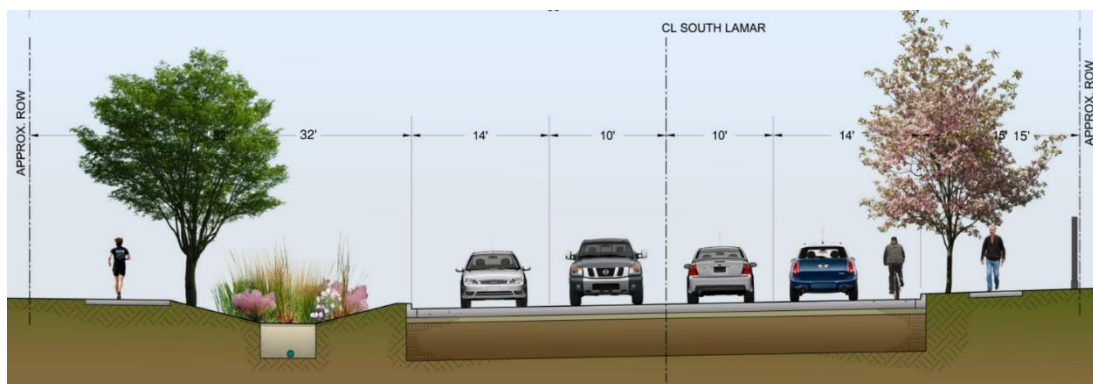
- Enhanced swales
- Bioretention areas
- Dry detention / Extended detention dry basins
- Supplement with any practices identified in Level I



Source: Freese & Nichols

### Level III

- Organic filter
- Sand filter, Underground sand filter
- Infiltration trenches
- Stormwater (wet) ponds
- Stormwater wetlands
- Alum treatment systems (used as pretreatment with wet pond)
- Supplement with any practices identified in Levels I and II



Source: Freese & Nichols

For more information, please visit <http://iswm.nctcog.org/triswm>.



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