Pretreatment: Vegetated Buffer Strips and Flow-Through Structures

MIDS Work Group

April 19, 2013

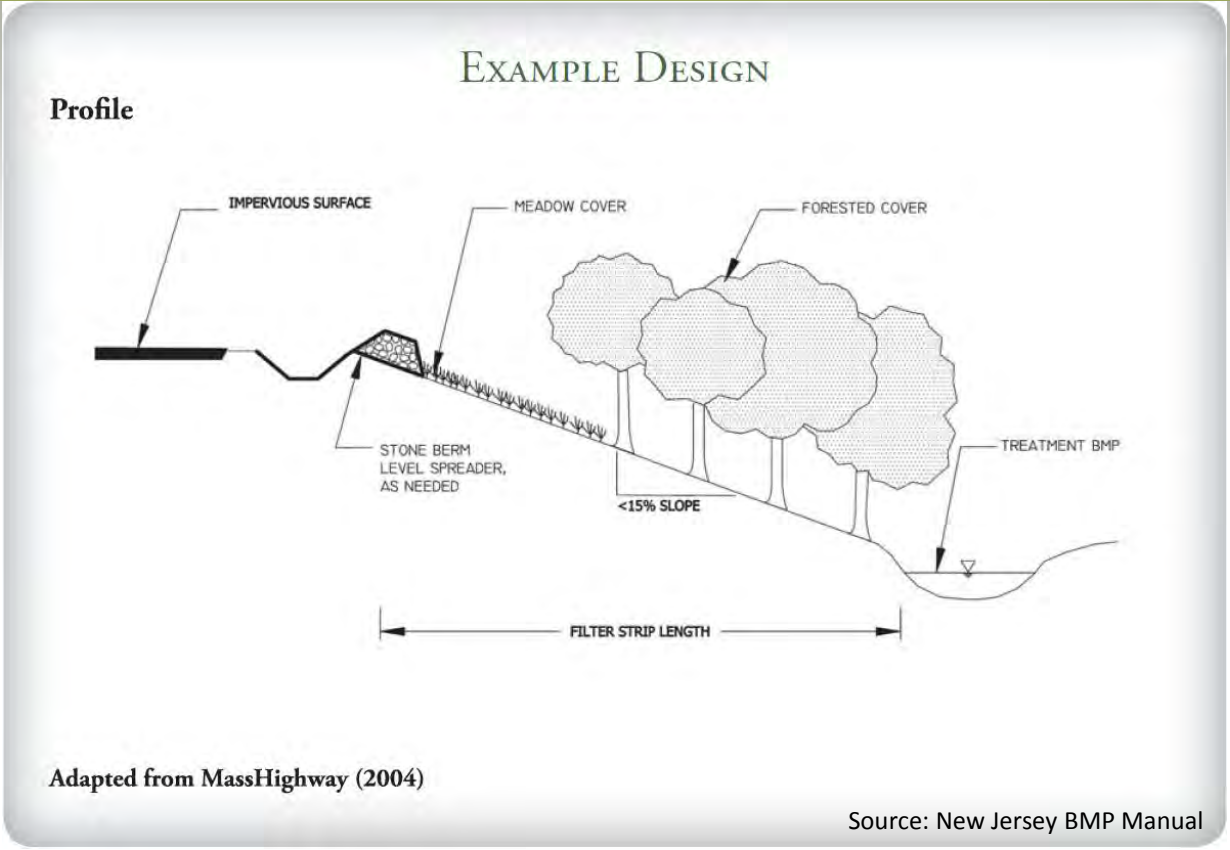
p-gen3-15f

Objectives

- Research and assess following BMPs:
  - Vegetated Filter Strips
  - Flow-Through Structures
- Prepare summary of each BMP, including:
  - Overview
  - Design Considerations
  - Construction
  - Maintenance
  - Limited BMP Performance Assessment

Vegetated Filter Strips: What are they?

- Pretreatment buffer
- Range of vegetation types (grass, woody species)



Source: New Jersey BMP Manual

Vegetated Filter Strips: What are they?

- Commonly treat runoff from:
  - Parking lots
  - Roads
  - Roof downspouts
- Benefits:
  - Filter solids
  - Limited volume reduction
  - Benefits limited in winter


Source: Stormwaterpartners.com

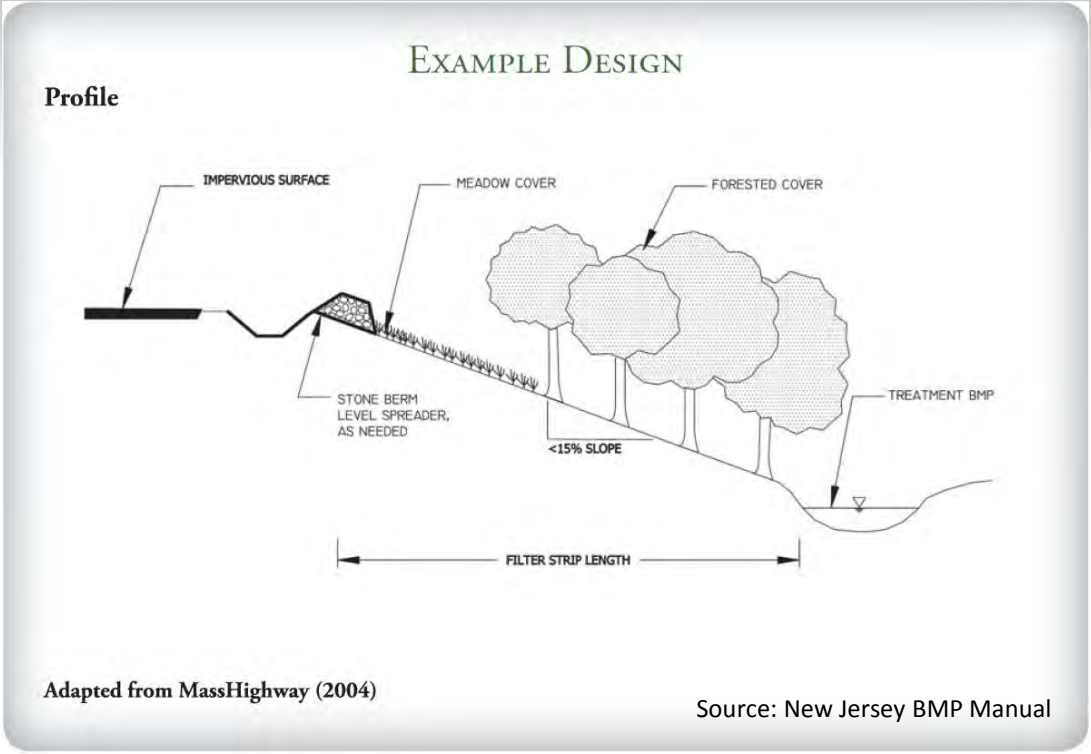

Source: Clemson University

Vegetated Filter Strips: Design

- Design components:
  - Contributing Drainage Area
  - Type of Vegetation
  - Filter Strip Length
  - Filter Strip Slope
  - Filter Strip Soils
- Designed for 1- to 2-year event

Vegetated Filter Strips: Design

- Concentrated flow reduces effectiveness of filter strip
- Max Flow Length Leading TO Filter Strip:
  - Impervious surfaces: 75 feet
  - Pervious surfaces: 150 feet



Source: New Jersey BMP Manual

Vegetated Filter Strips: Design

- From MN Stormwater Manual

Table 12.BIO.9 Guidelines for Filter Strip Pre-treatment Sizing								
Parameter	Impervious Parking Lots				Residential Lawns			
Maximum Inflow Approach Length (ft)	35		75		75		150	
Filter Strip Slope	≤2%	>2%	≤2%	>2%	≤2%	>2%	≤2%	>2%
Filter Strip Minimum Length	10’	15’	20’	25’	10’	12’	15’	18’

Vegetated Filter Strips: Construction

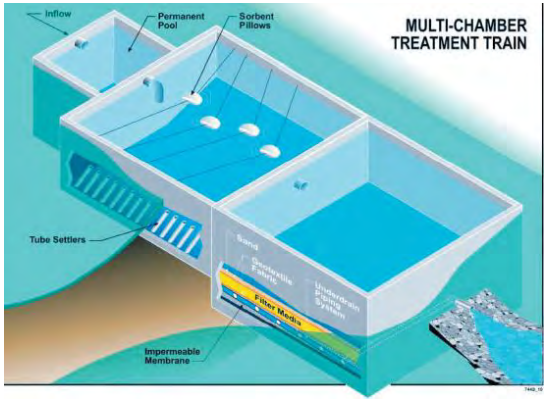
- Avoid soil compaction
  - Allows for infiltration
  - Allows healthy plant growth

Vegetated Filter Strips: Maintenance

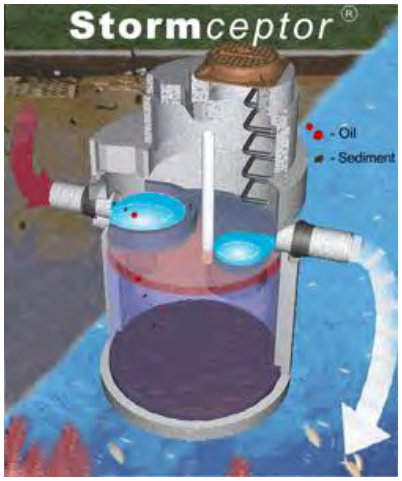
- Periodic sediment and debris removal
- Monitor for preferential flowpath development
- Plant maintenance (mowing, trimming, burning, etc.)

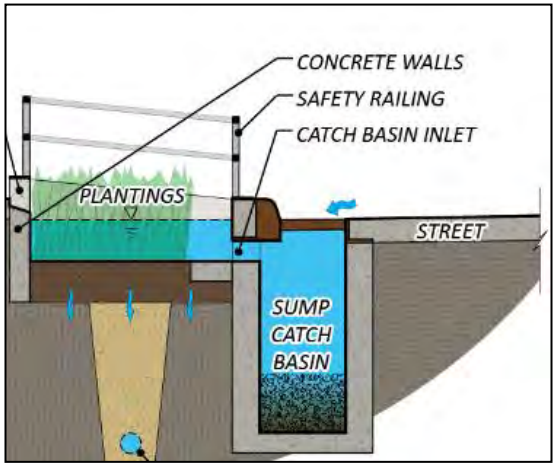
Flow-Through Structures: What are they?

- Three general categories:
  - Underground Storage Structures
  - Hydrodynamic Separators
  - Sump Catch Basins or Manholes



Source: Caltrans





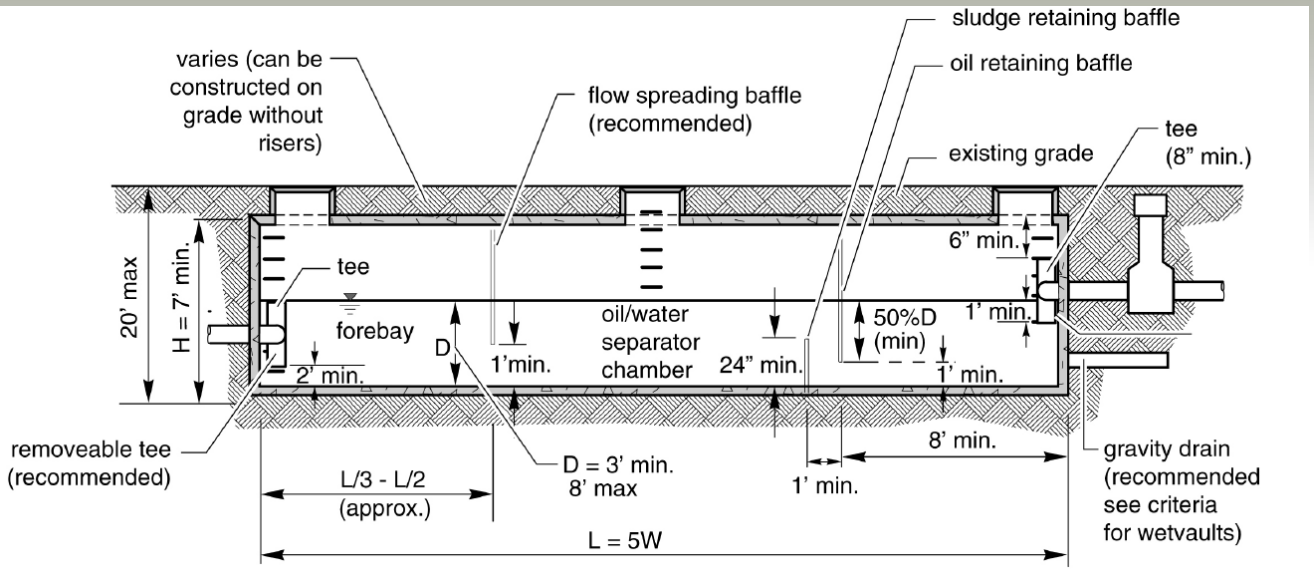
Source: CRWD/Barr

Flow-Through Structures: What are they?

- Common Applications:
  - Small, impervious watersheds
  - Retrofits
- Benefits:
  - Settle sands and large silts
  - No volume reduction
  - Benefits **not** limited in winter

Flow-Through Structures: What are they?

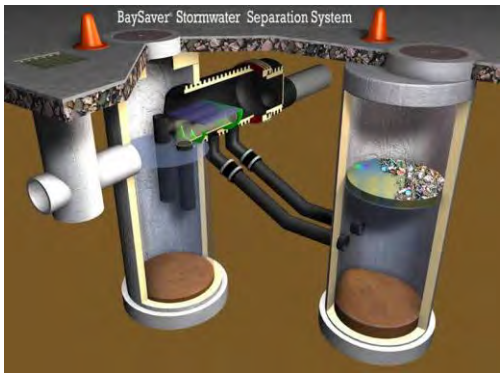
- Underground Storage Structures
  - Up to 3 chambers
  - Underground Ponds
  - Skimming and Settling
  - Permanent Pool of 400 CF/AC impervious

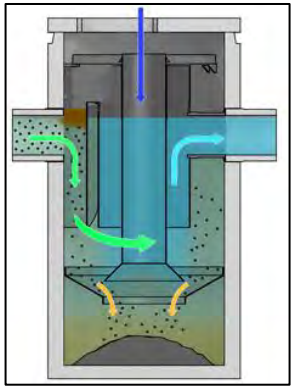


Source: Washington Department of Ecology

Flow-Through Structures: What are they?

- Hydrodynamic Separators
  - Typically smaller footprint than Underground Storage Structures
  - Many proprietary systems
  - Permanent pool for settling
  - Skimming provided

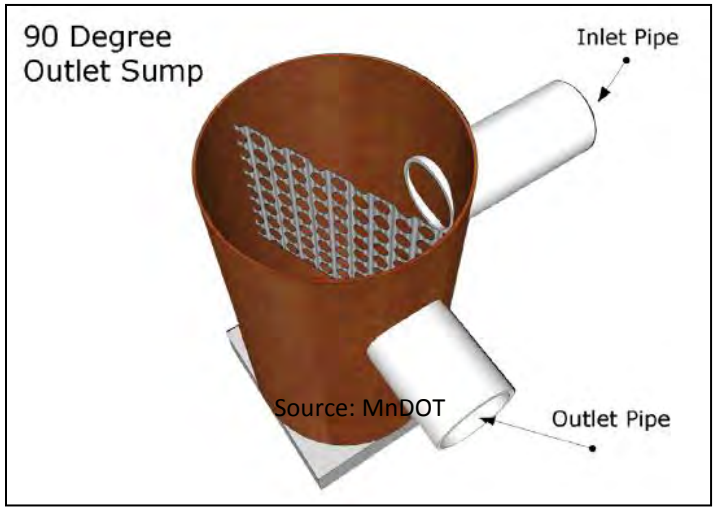


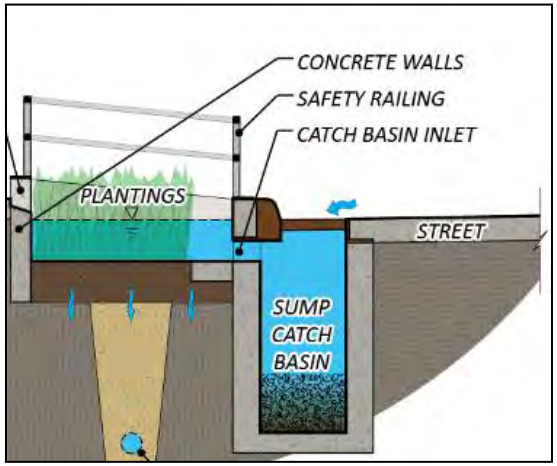


Downstream Defender

Flow-Through Structures: What are they?

- Sump Catch Basins or Manholes
  - Small footprint, low cost
  - Skimming can be provided
  - Easily retrofitted with SAFL Baffle to limit washout

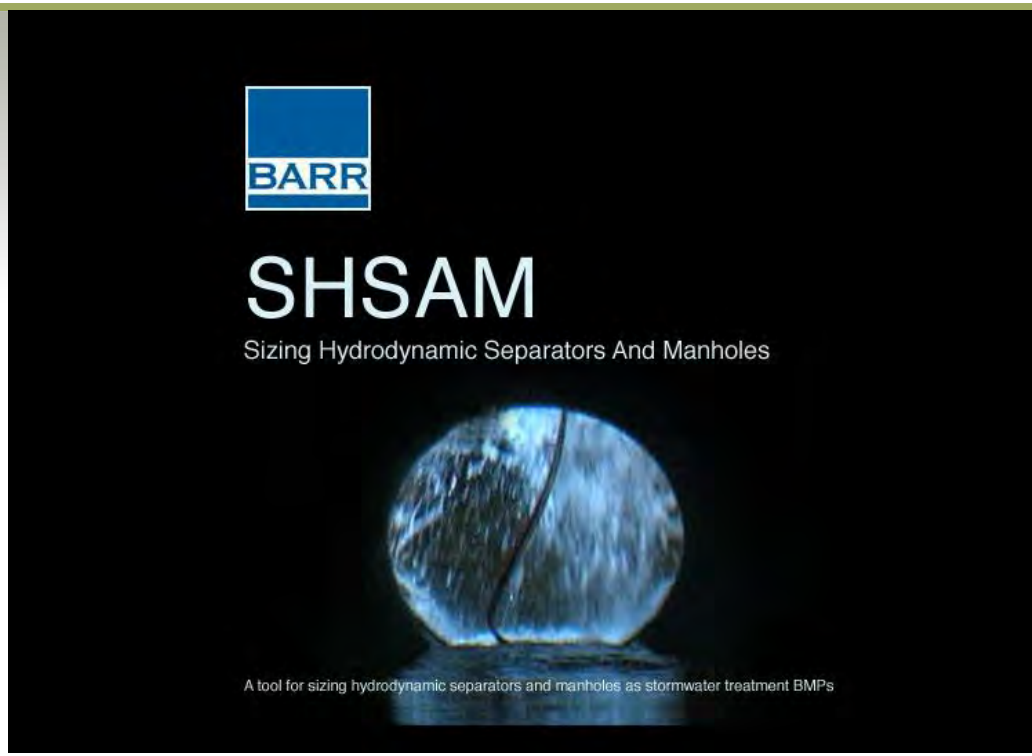




Source: CRWD/Barr

Flow-Through Structures: Design

- Design components:
  - Contributing drainage area
  - Sediment loading
  - Washout considerations
- SHSAM software can aid design
- Sump depth minimum of three feet



Flow-Through Structures: Maintenance

- Maintenance essential to limit washout
  - Ideal frequency: after EACH rain event
  - Cleanout minimum ONCE per year in fall
- SHSAM or manufacturer may suggest more frequent maintenance
- Through inspection, maintenance intervals should be adjusted

Source: Paris, Kentucky website

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