Bioretention System

Hydroseeding and erosion control matting protect this system after installation [center]. Native species were planted along the installed system's [left] forebay and bioretention cell. Vegetation and appropriate soil media combine for effective water quality treatment [right].

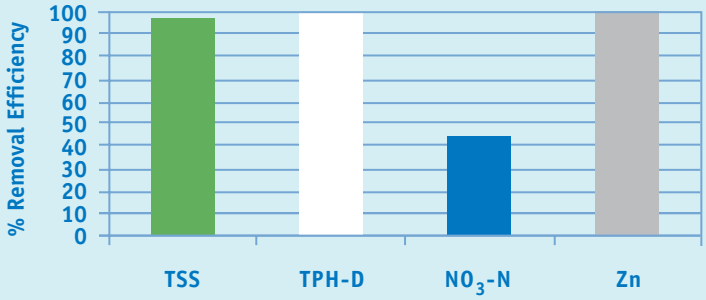
This bioretention system is the most common Low Impact Development (LID) stormwater treatment strategy. Like other infiltration/filtration systems, it has a tremendous capacity to reduce peak flow.

It is comprised of a sedimentation forebay and a bioretention basin. The filter media, also known as bioretention soil mix (BSM), typically ranges from two-and-one-half to five feet in thickness, and consists of sand, compost, and native soils. The treatment is well vegetated to provide a thick root mat for contaminant removal.

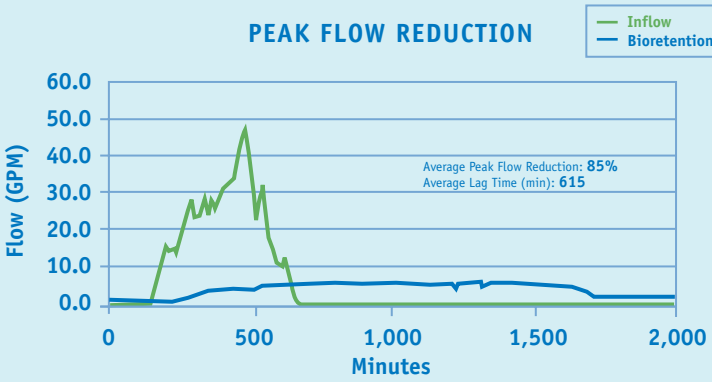
The forebay holds 25 percent of the water quality volume (WQV), and drains slowly through a standpipe into the bioretention basin, which holds the remaining 75 percent of the WQV. When forebay capacity is reached, overflow spills across a weir into the basin. The basin's filter media is designed to accommodate a moderately high infiltration rate of one cubic foot per day. The system allows for eight inches of above-ground ponding. The BSM and the vegetation remove nutrients and pollutants. Vegetation also reduces stormwater volume through evapotranspiration.

Maintenance involves the periodic mowing and replacement of vegetation, as needed.

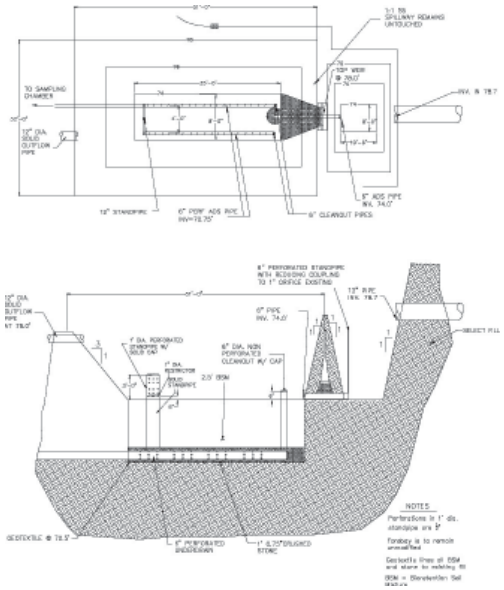
WATER QUALITY PERFORMANCE



PEAK FLOW REDUCTION



Water Quality Treatment Process



A recent innovation in stormwater management, this system removes pollutants, attenuates peak flow, and reduces flow volume through evapotranspiration and infiltration.

Biological treatment occurs through the uptake of pollutants by vegetation and soil microorganisms. Physical and chemical treatment, which occur in the soil media, includes filtering and adsorption with organic matter and mineral complexes.

Water quality treatment performance is high, however, the treatment's hydraulic efficiency and tendency to fail by clogging may be problematic. Early designs with bioretention soil mix (BSM) clay content as high as five percent, and geotextile filter fabrics between the BSM and subdrains, would fail prematurely due to "blinding," or filter fabric clogging. Modern designs have clay contents of less than one percent and do not use fabric beneath the unit, or between the BSM and the subdrain. This reduces clogging and maintains high water quality treatment efficiency.

Category Type
Filtration

BMP Type
Low Impact Development Design

Design Source
New York State Stormwater Management Design Manual

Basic Dimensions
Bioretention Cell: 67 ft L X 35 ft W
Forebay Top Width: 71 ft L X 46 ft W
Total Area: 4,100 sf

Specifications
Catchment Area: 1 acre
Peak Flow: 1 cfs
Treatment Volume: 3,264 cf

Treatment Function
Physical, Chemical, Biological

Cost Per Acre
$25,104

Maintenance Data
Maintenance Sensitivity: High
Inspections: High
Sediment Removal: High

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