

Stormwater Management and Stormwater Quality for Green Infrastructure Linear Roadways and LID Parking Lots

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Specifications Engineer

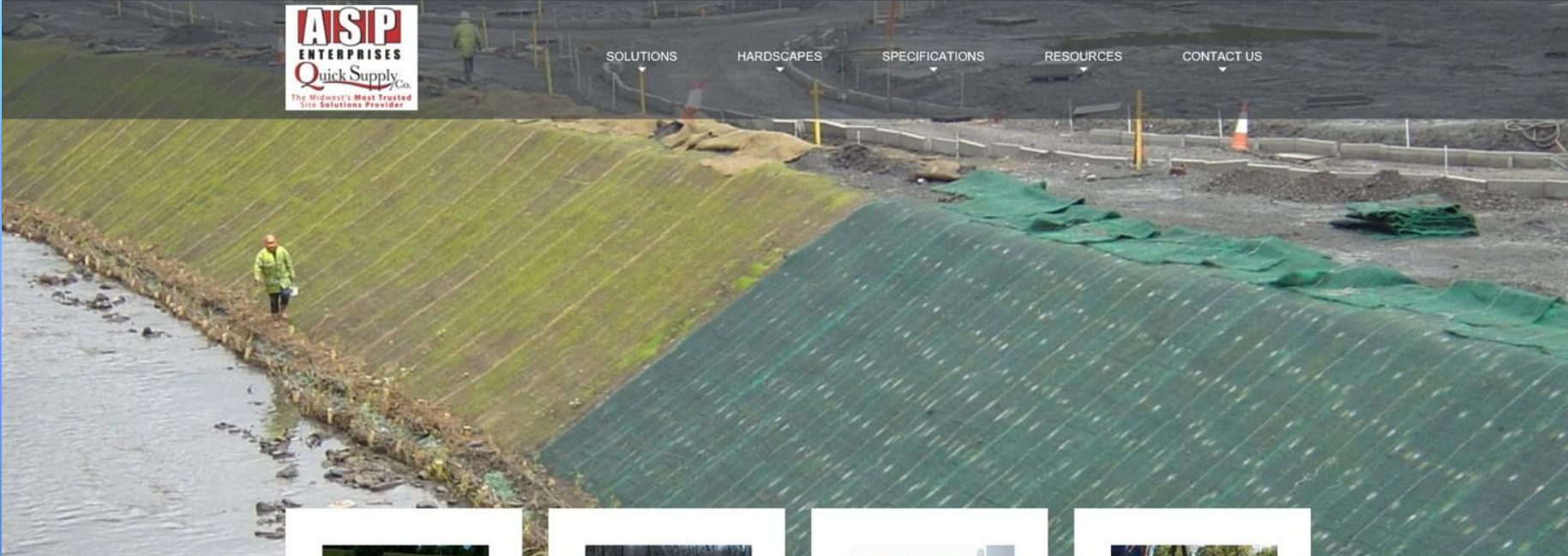
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EROSION & SEDIMENT CONTROL
STOP EROSION & KEEP THE SOIL IN PLACE & CAPTURING SEDIMENT SUSPENDED IN STORM WATER RUNOFF

GEOSYNTHETICS SOLUTIONS
SUB-GRADE IMPROVEMENT, RETAINING STRUCTURES, FILTER FABRICS, EROSION CONTROL, CONTAINMENT, ETC

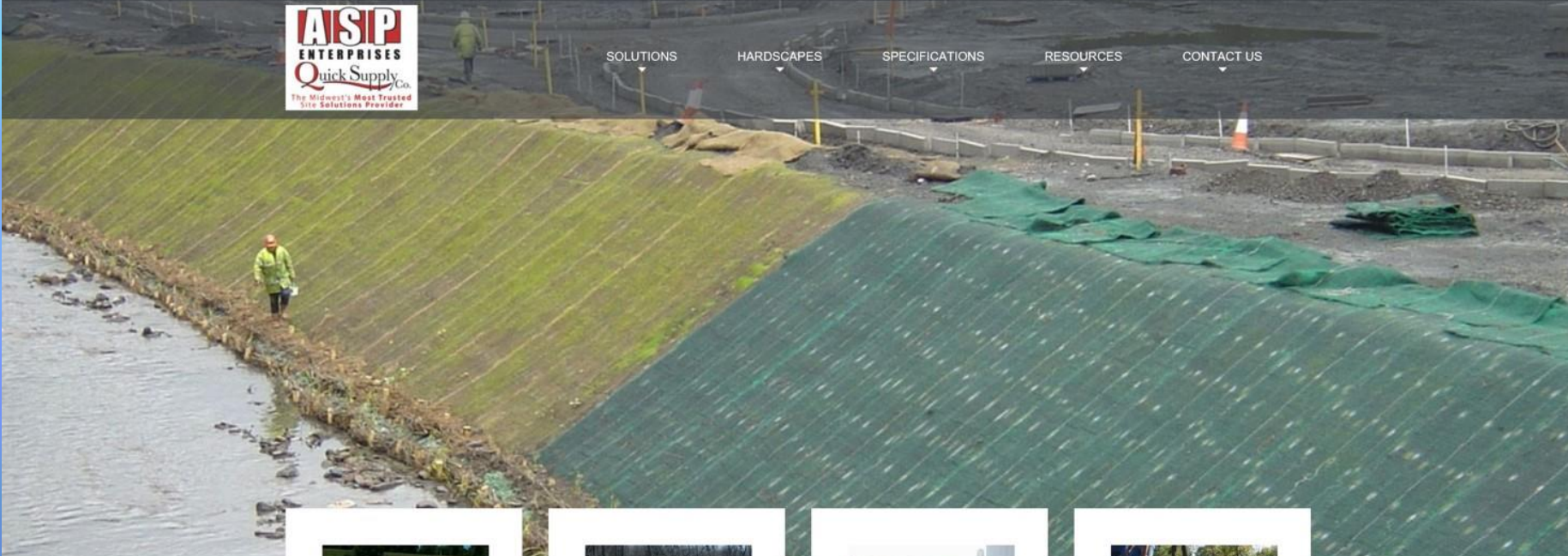
STORMWATER MANAGEMENT
REDUCING AND MANAGING NEGATIVE STORM WATER IMPACTS AND IMPROVING OVERALL WATER QUALITY.

HARDSCAPES & OUTDOOR LIVING
ST LOUIS HARDSCAPES - LANDSCAPE PRODUCTS, RETAINING WALL BLOCK, AND LANDSCAPE PAVERS


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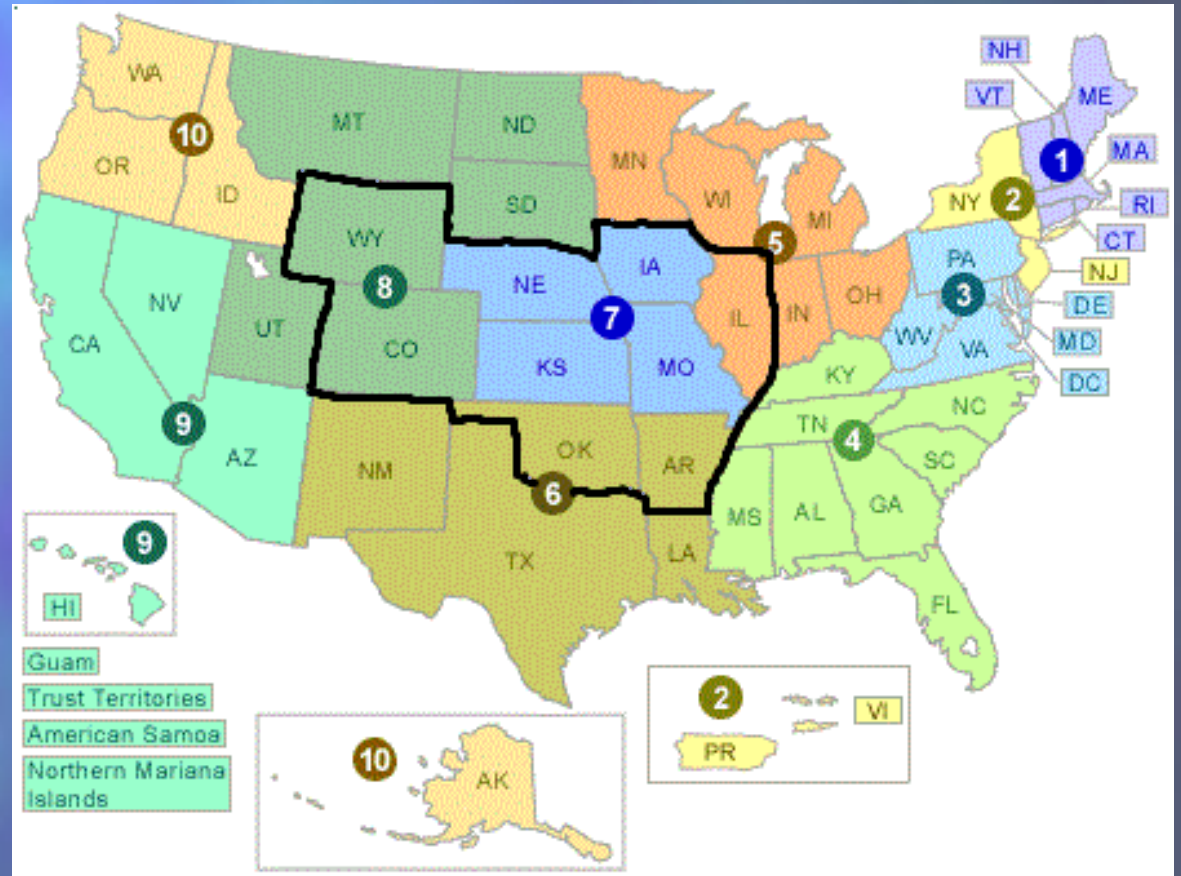


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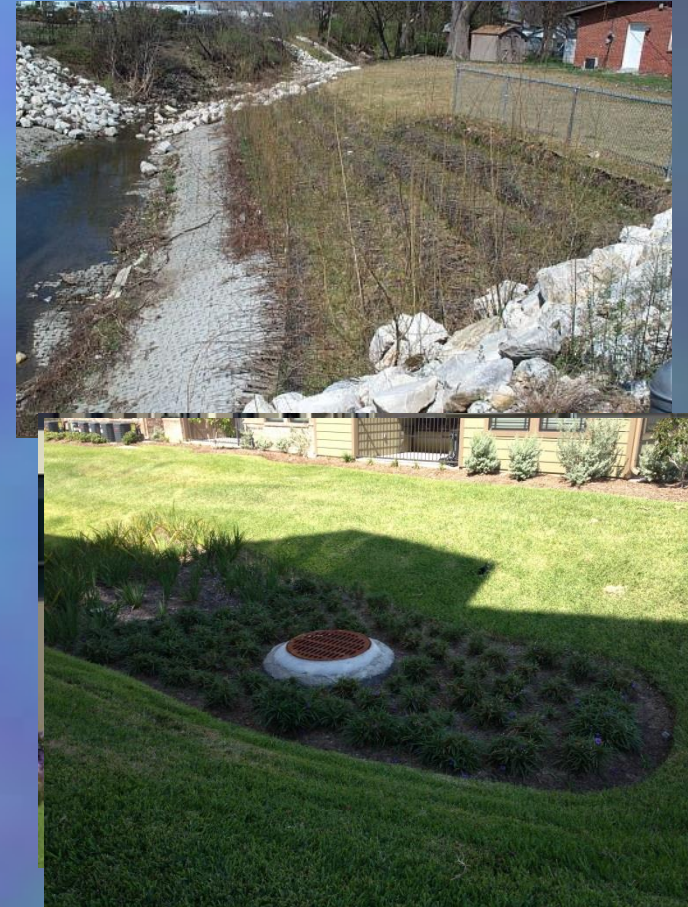
ASP Enterprises/Quick Supply Co./Bowman Construction Supply

- 30+ Years in Business-much of it “Green”
- Des Moines, St. Louis, Kansas City, Omaha, Denver, Wichita
- Many CPESC’s on staff
- Civil Engineer on staff
- Horticulturalist on staff
- Many Sales Reps capable of
Specification assistance and support



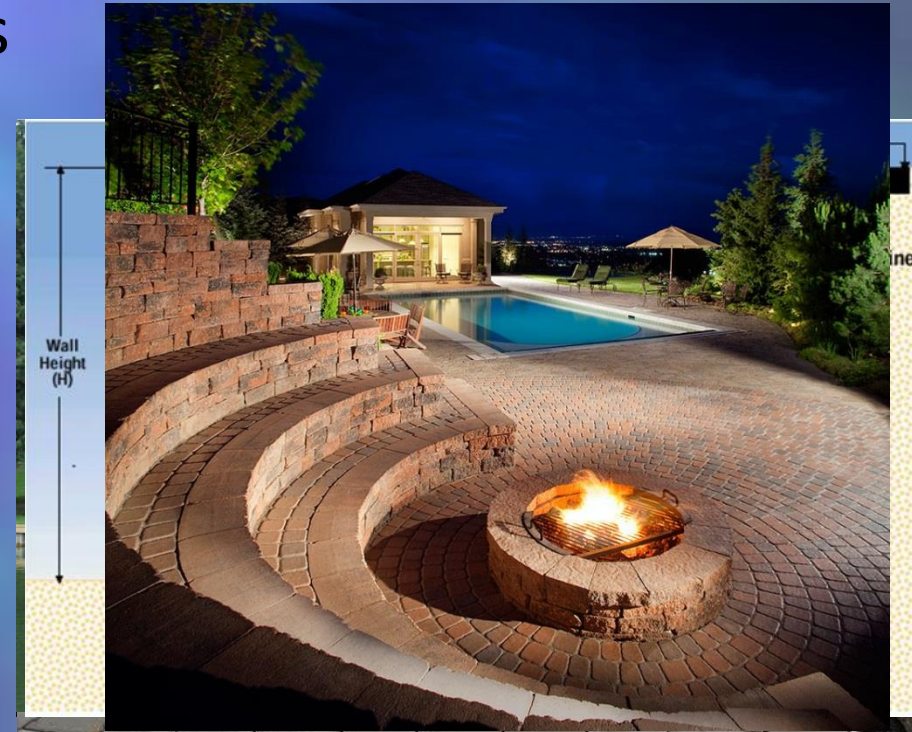
Applications of Products:

- Road Base Stabilization
- Subgrade Improvement
- MSE Walls and Slopes
- Pond Liners, Secondary Containment
- Erosion Control Problems/Solutions
- Sediment Control Problems/Solutions
- Channel Rehabilitation and Stabilization
- Stormwater and Drainage Products



Applications of Products(cont.):

- Grass Paving Systems
- Permeable Paving Systems
- Sheet Pile Walls-Lake Edges
- Retaining Walls
- Pavers and Outdoor Living



Stormwater Management & Stormwater Quality

Green Infrastructure Linear Roadways



LID Parking Lots



Green Infrastructure

EPA intends the term "green infrastructure" to generally refer to:

- systems and practices that use or mimic natural processes to infiltrate, evapotranspiration (the return of water to the atmosphere either through evaporation or by plants)
- reuse stormwater or runoff on the site where it is generated.

Green infrastructure can be used in place of, or in addition to, more traditional stormwater control elements to support the principles of LID.

4.8.2000


Principles of LID

LID employs principles such as:

1. preserving and recreating natural landscape features
2. minimizing effective imperviousness to create functional and appealing site drainage
3. treating stormwater as a resource rather than a waste product.



Water: Low Impact Development

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Low Impact Development (LID)

[Fact Sheets and Reports](#) | [Design/Guidance Manuals](#) | [Information Resources and Centers](#) | [Videos and Other Multi-Media](#)

LID is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product. There are many practices that have been used to adhere to these principles such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions. LID has been characterized as a sustainable stormwater practice by the Water Environment Research Foundation and others.

NPS Categories

- [Abandoned Mine Drainage](#)
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- [Wetland & Riparian](#)

LID can maintain or restore a watershed's hydrologic and ecological functions.

Green Infrastructure/LID Objectives

- Reduce imperviousness
- Preserve & recreate natural landscape features
- Stormwater volume control
- Reduce Pollutants

Water Quality Feature	Streets	Parking Lots
Permeable Paving	Yes	Yes
Pre-treatment BMPs	Yes	Yes
Stormwater Detention	Yes	Yes
Biofiltration (Pollutant Removal)	Yes	Yes

Reduce Imperviousness

Permeable Paving Options



Permeable Paving Systems

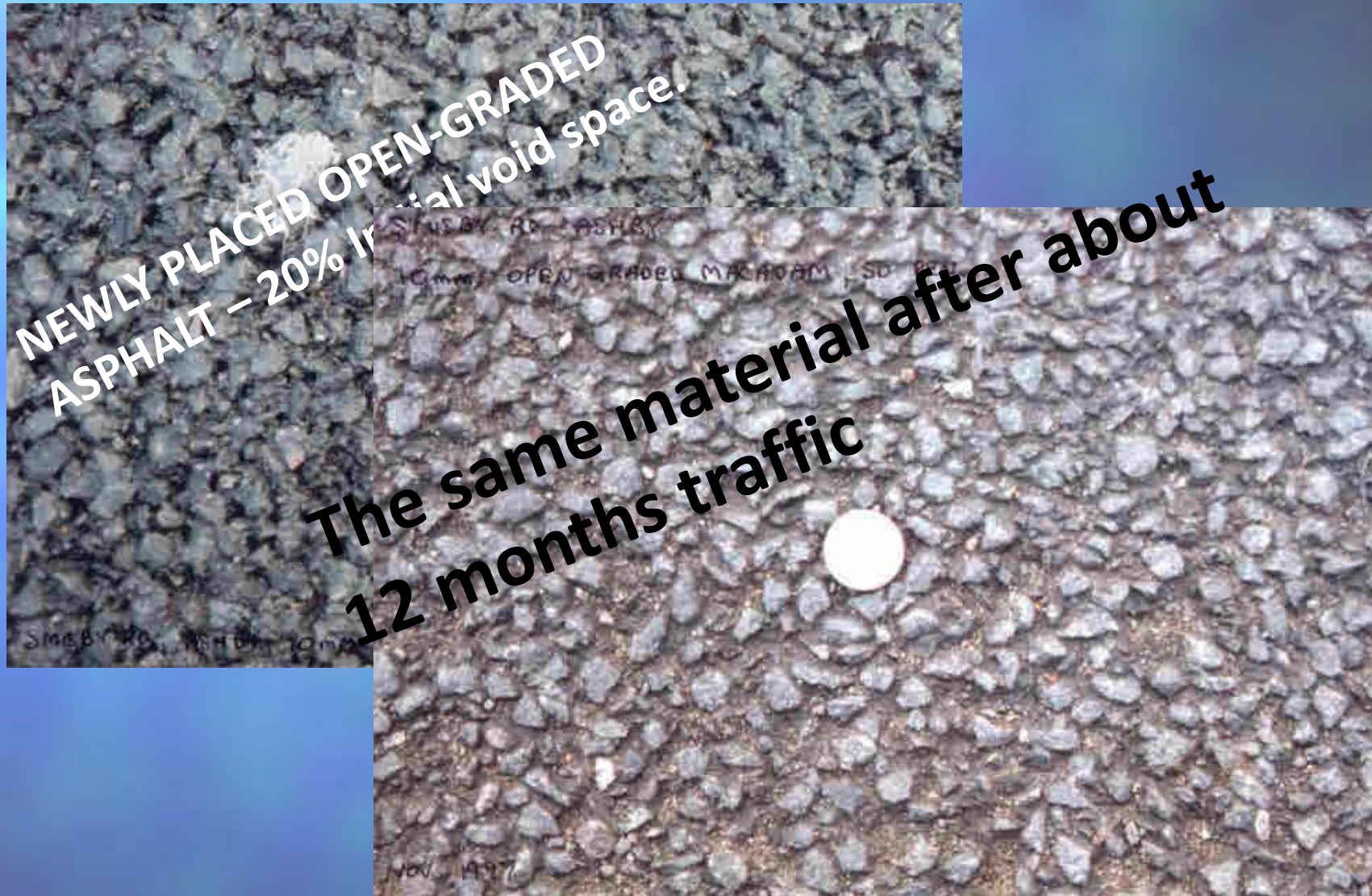
- ☐ Pervious Asphalt
- ☐ Pervious Concrete
- ☐ Permeable Pavers
- ☐ Next Generation Permeable
Paving
- ☐ Others

Permeable Paving Systems

☐ Others



Pervious Asphalt

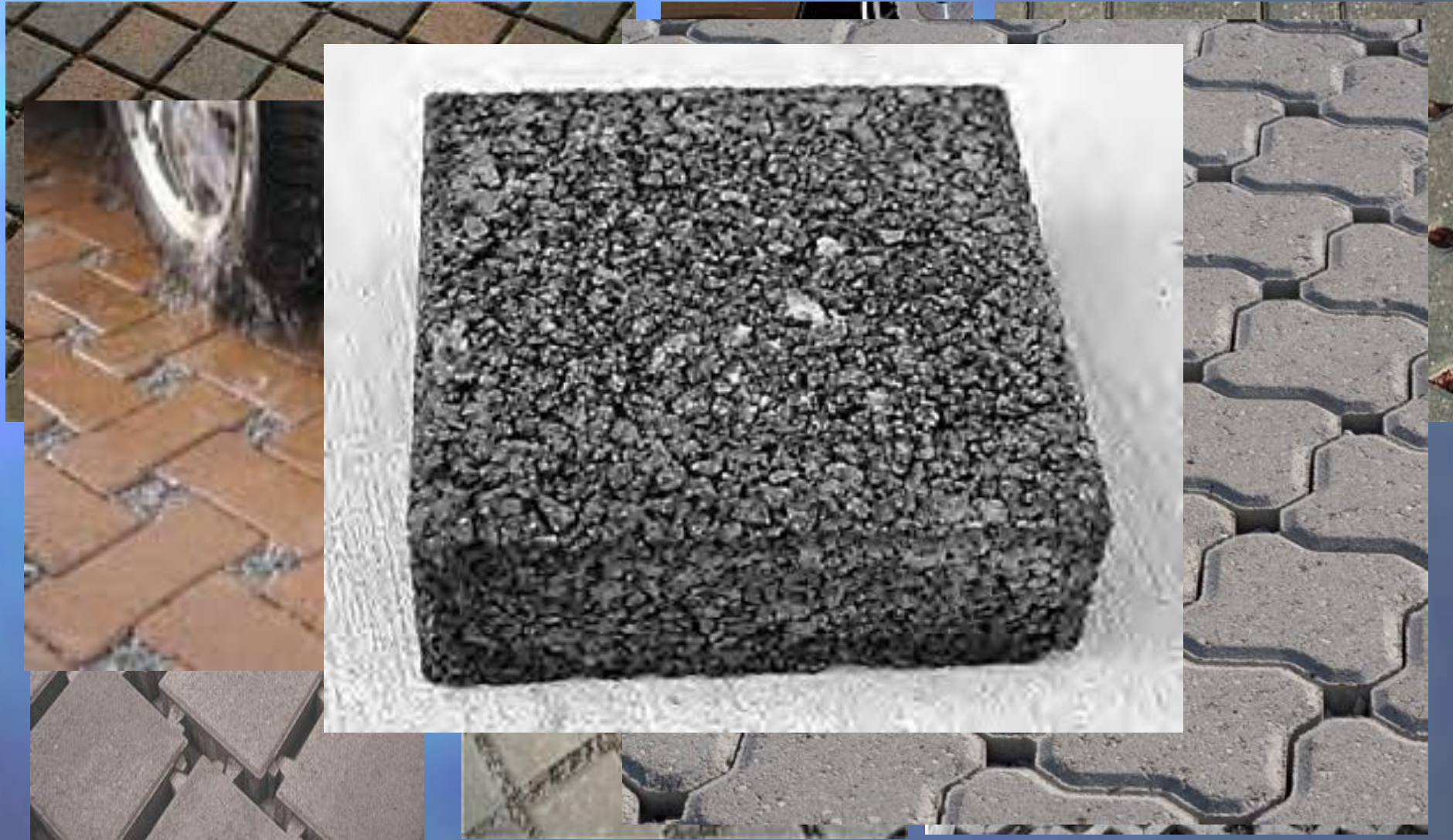


Reduced infiltration capacity within 1st yr.

Pervious Concrete (or permeable asphalt)



Permeable Interlocking Concrete Pavers (PICP)



Permeable Pavers



Paver Characteristics...



Regular paver



Permeable Paver Joint Material. Vibrating pulverizes aggregate

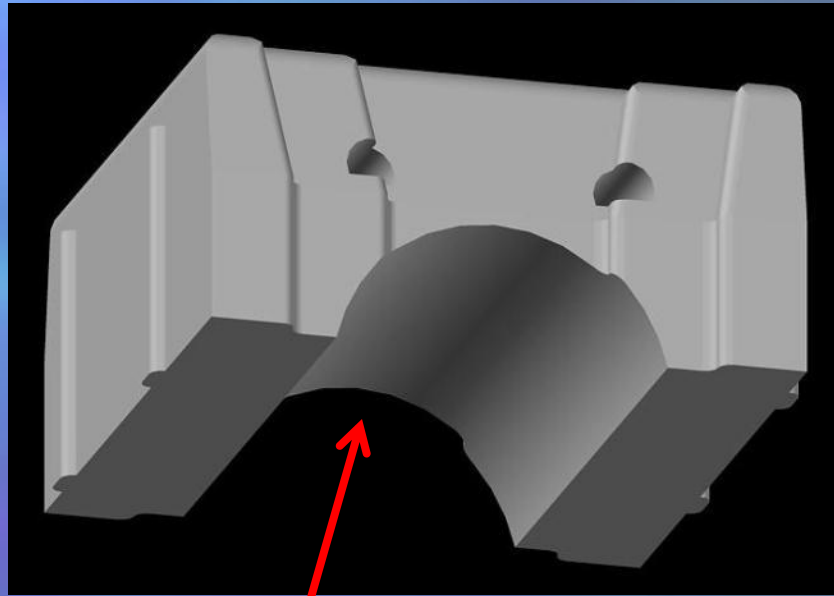
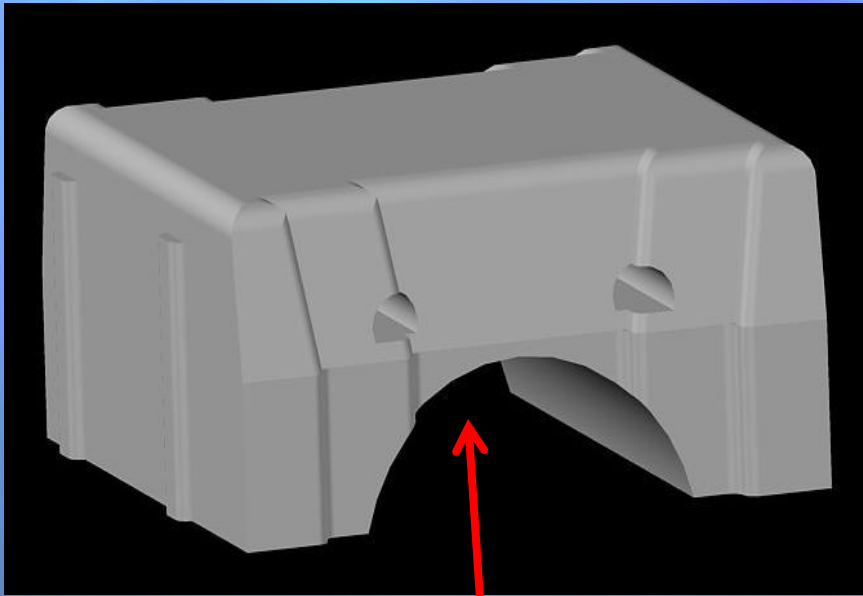
Next Generation LID Permeable Paver



**PICP 2 months
after installation**

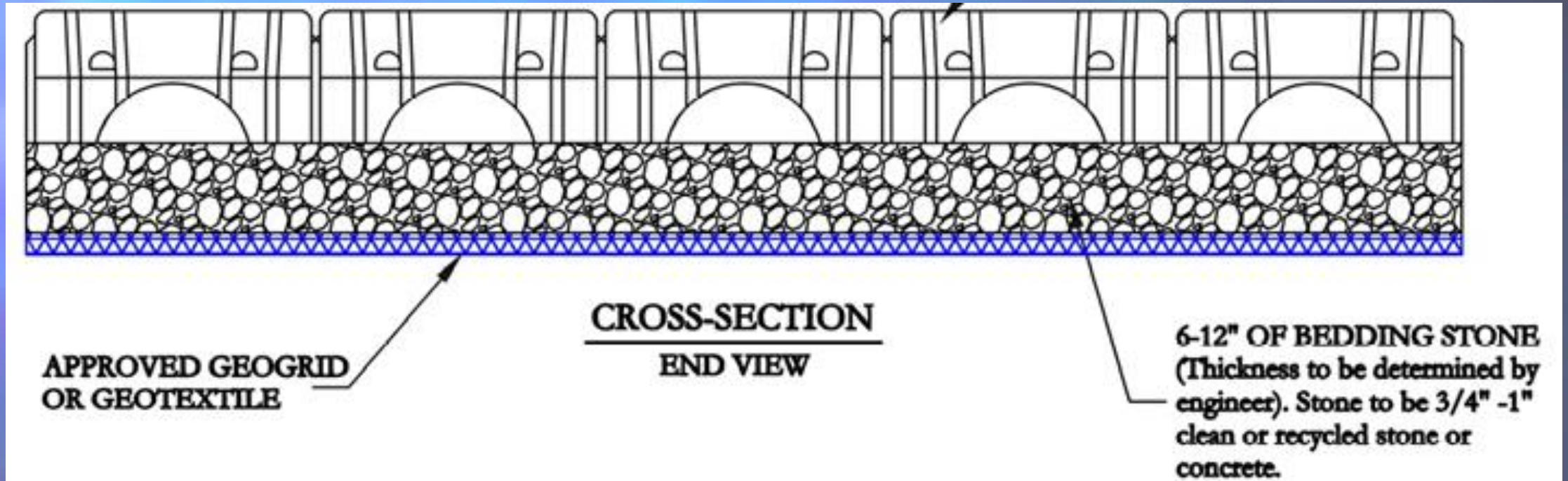


*THE PAVEDRAIN® SYSTEM SERVES THREE PURPOSES, PAVING,
DRAINING AND STORING!*



***PATENTED INTERNAL STORAGE
CHAMBER!!***

Typical PaveDrain Cross- Section



Dover Court (public street); Davenport, IA



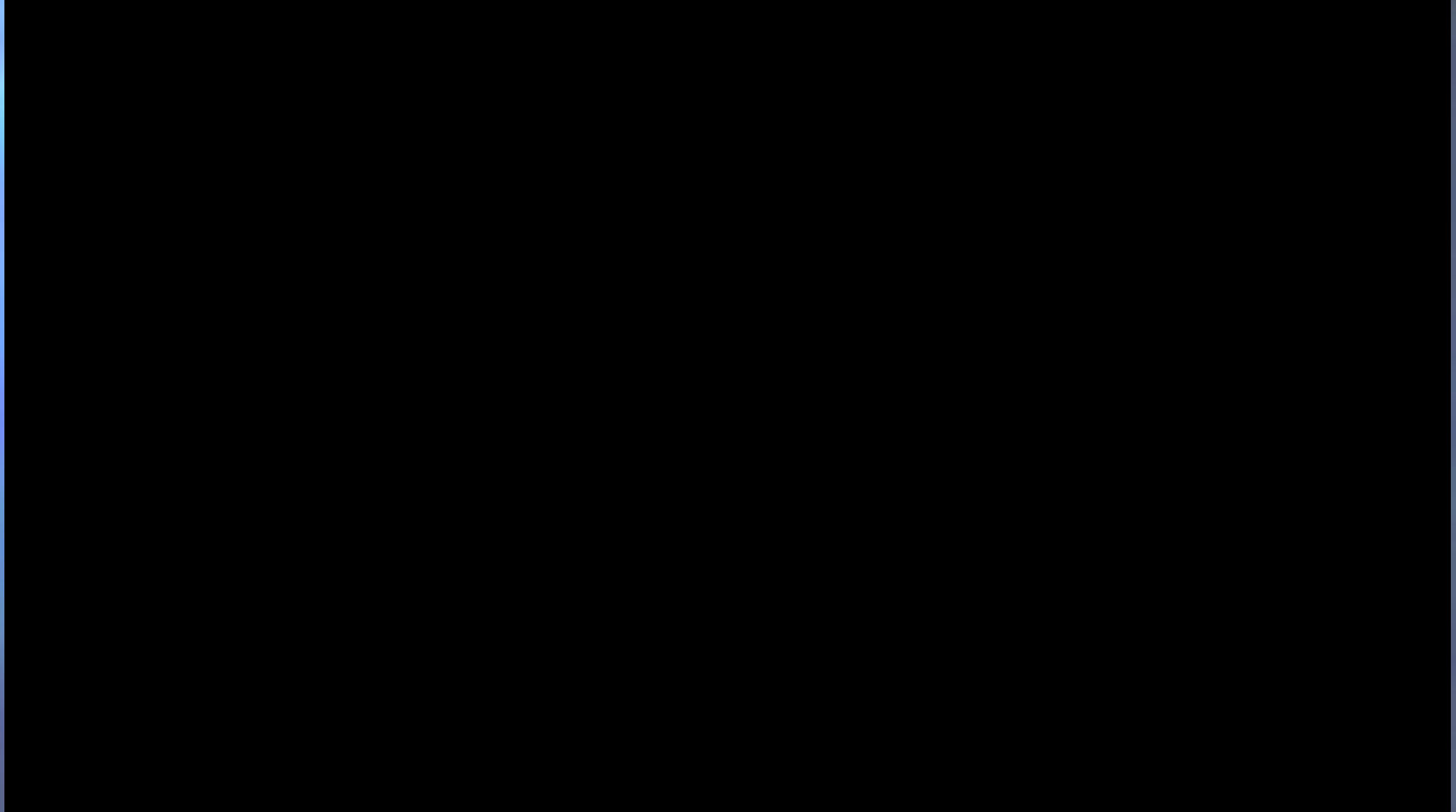
Next Gen. Permeable Paver parking lots & alleys



PaveDrain installed with Probst machine



ASP STL branch – Parkway High School



Combination Sewer Vac Trucks and the PaveDrain Vac Head



VACUUM Truck – Louisville Demonstration



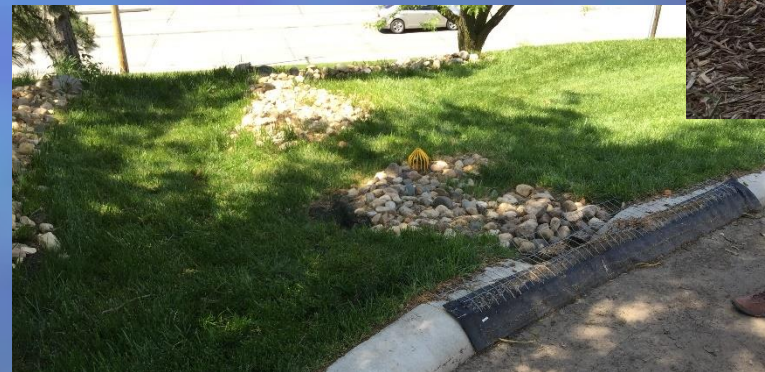
**Washington Street
First Pass**



**Washington Street Post-
Cleaning**

Preserve or Recreate Natural Landscape Features

BMPs: natural or manufactured



Natural Landscape: Grass Swales

Sustain pre-development hydrology

Infiltration

Filtering

Storage

Evaporation



Mimic nature with manufactured solutions

Repair eroded areas



Capture sediment, protect waterway



Pre-treatment:

ounce of prevention vs pound of cure

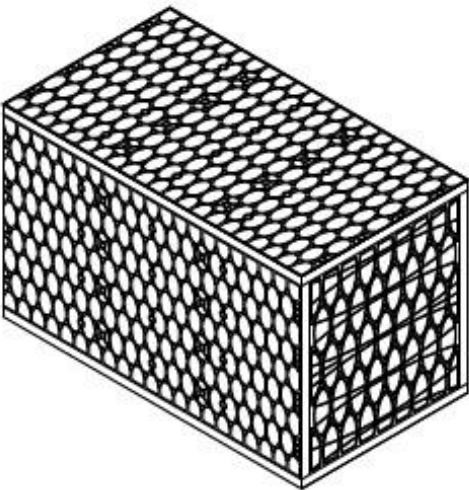
Filter runoff through devices



Capture sediment, protect waterway



Stormwater Volume Reduction Underground Detention



Underground Detention / Drainage

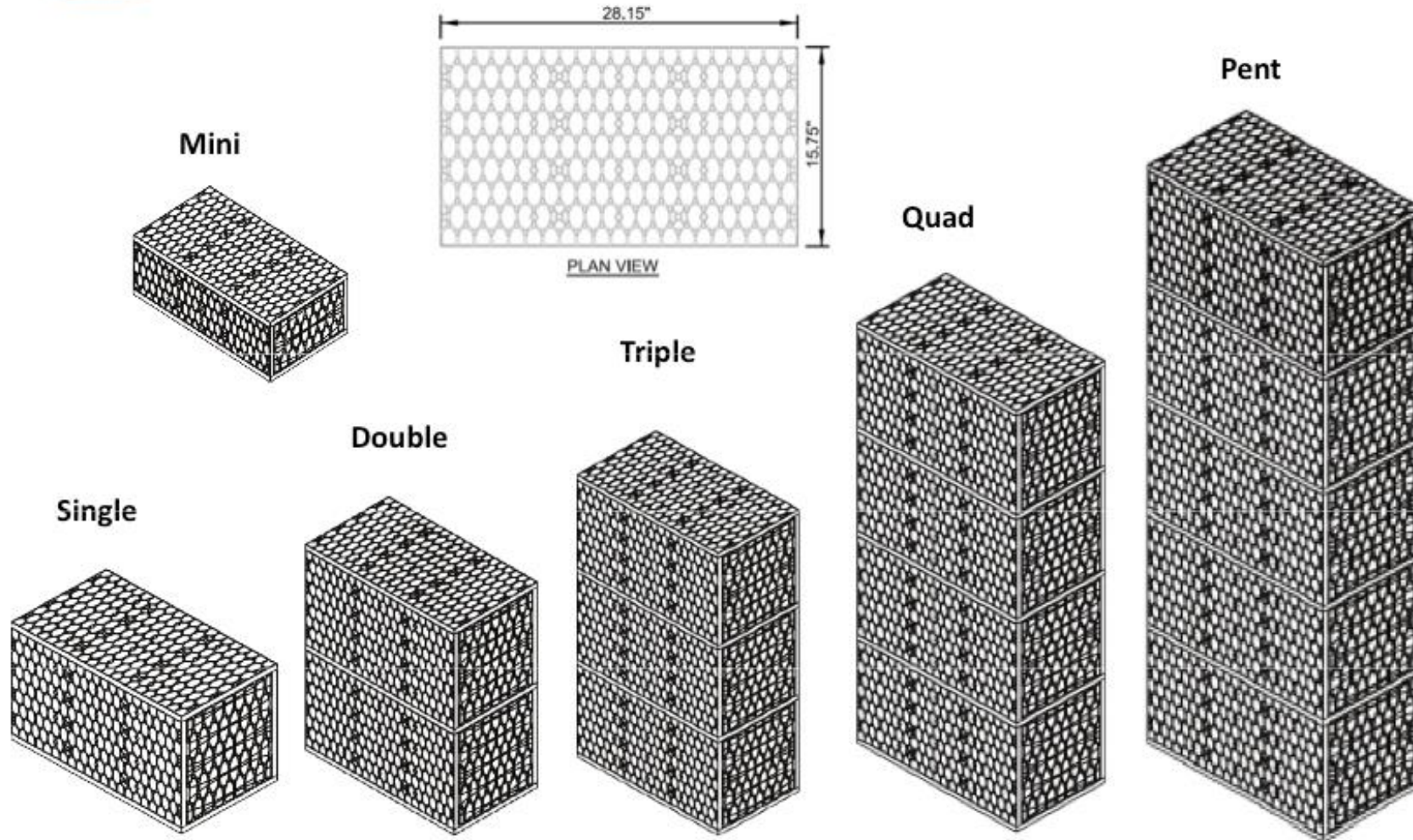




TANK

Stormwater Management
System

The R-Tank™ is a modular system and can be assembled to a variety of heights from 9 1/2" to just under 7' .



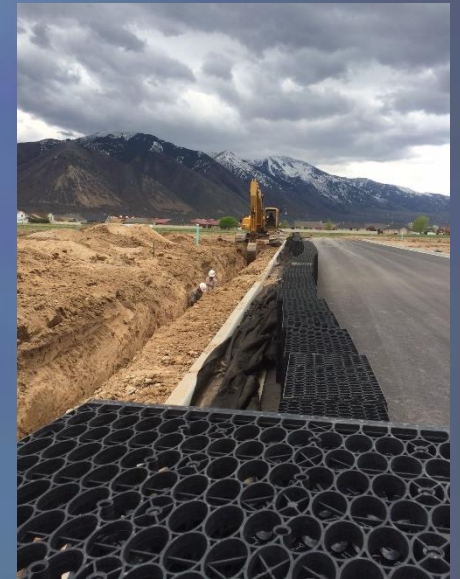
Modular Storage: 95% voids, 90% open area



Lightweight Panels are Freight friendly – can be shipped whole or assembled on site for more savings



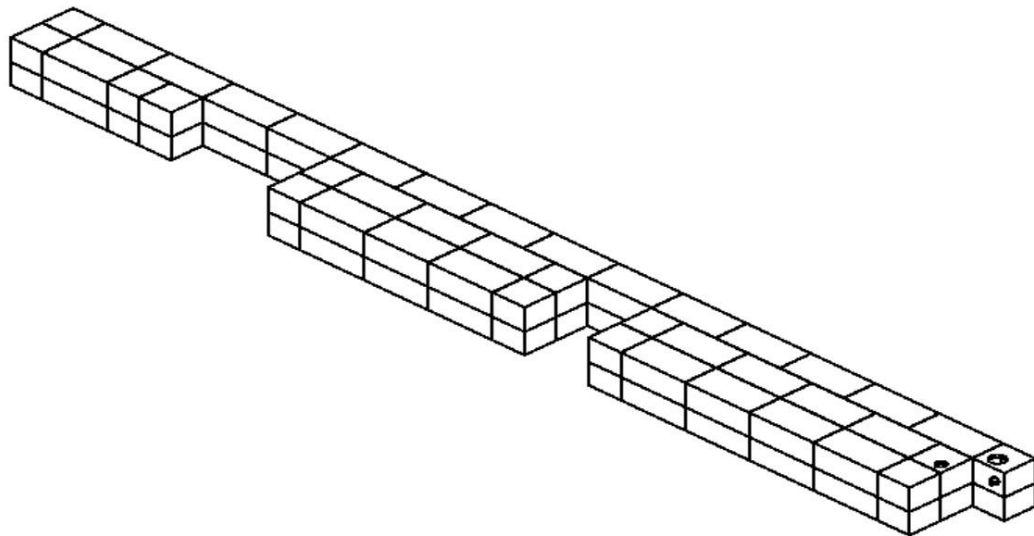
Green Infrastructure Linear Roadway



Precast Concrete Modular Stormwater Management System



StormTrap under a public street

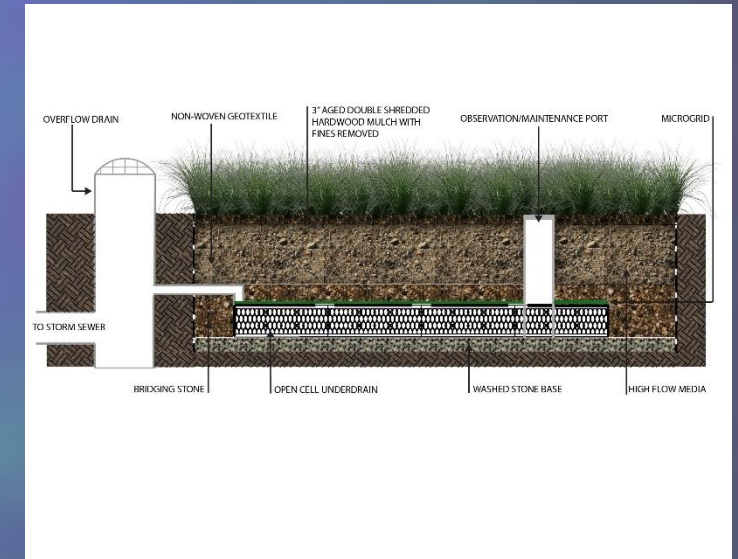
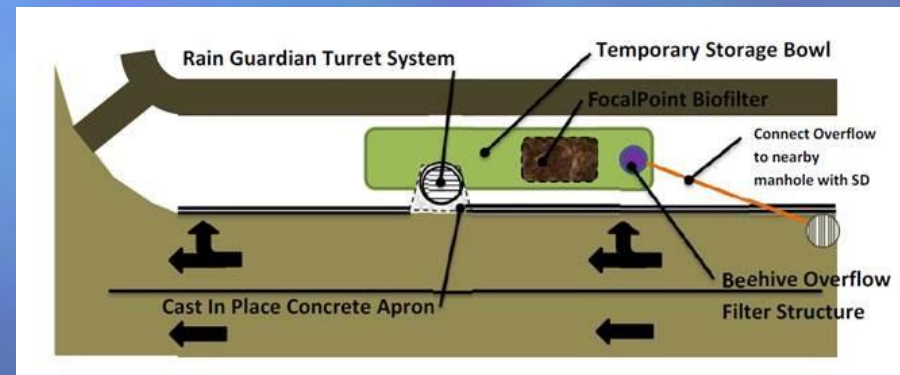
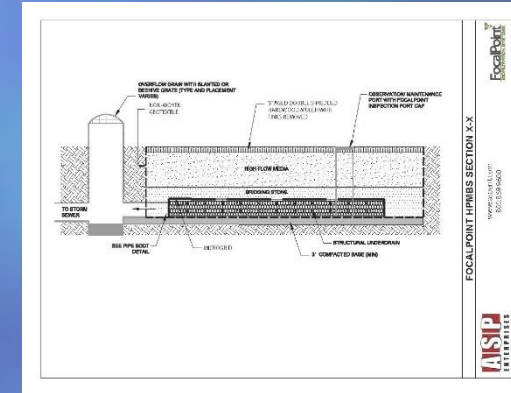
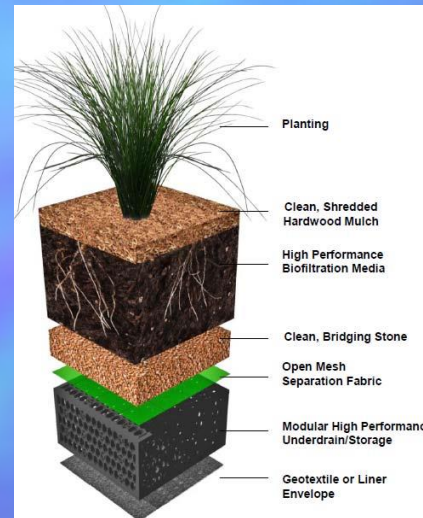


FLORENCE AVENUE
DETENTION

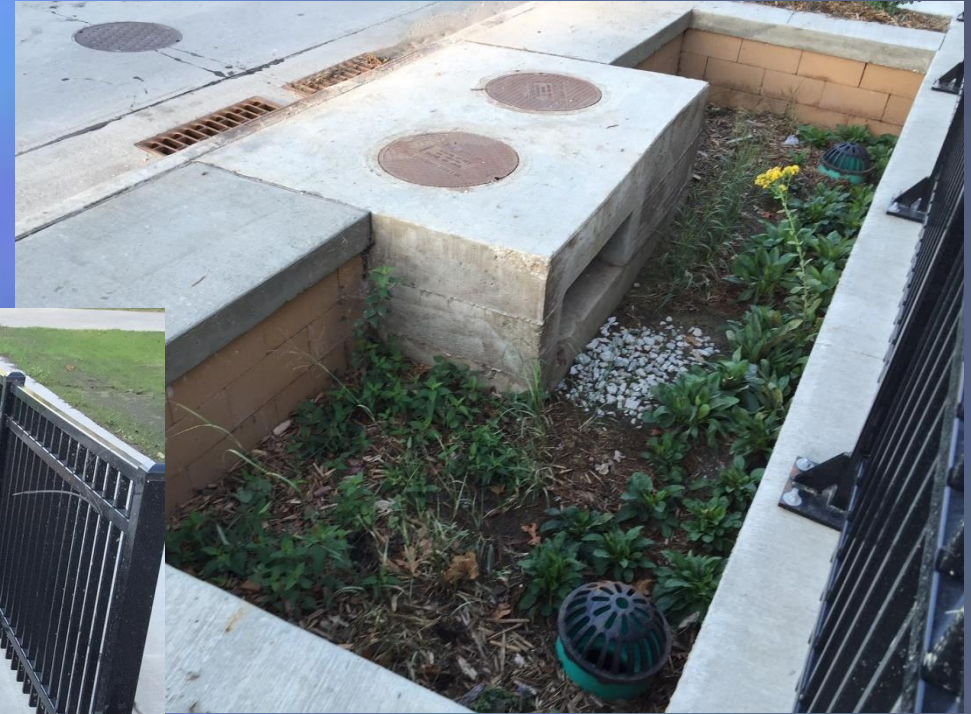


Biofiltration: pollutant removals

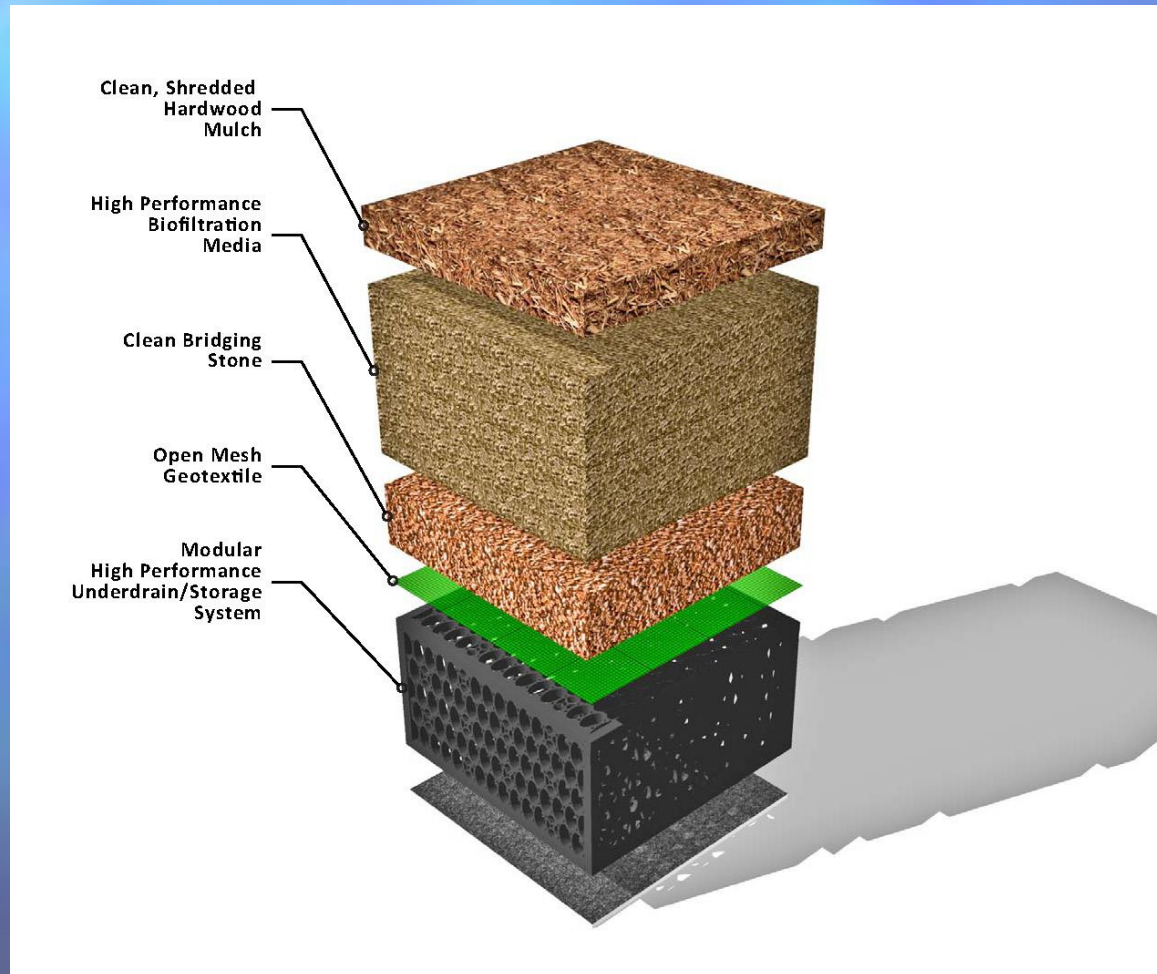
Total suspended solids, Phosphorous, Nitrogen, Metals, Oil & Grease, Bacteria



Curbside bioretention: actual WQv? Installation Cost? Maintenance?



Next Generation Bioretention



“out of the box”

GENERIC
specification, tightly
written for
Quality Assurance



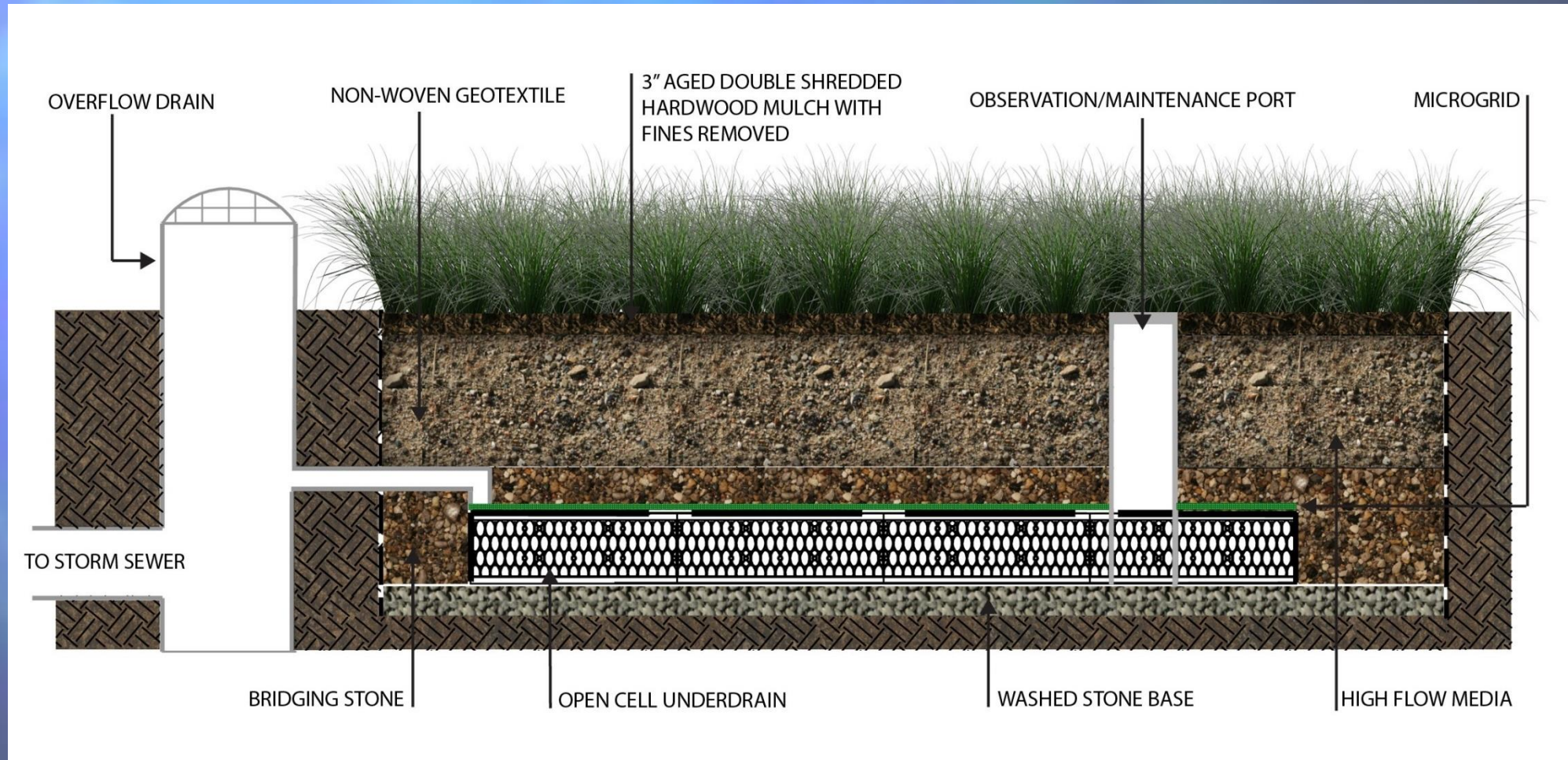
SYSTEM
specified and delivered
by the square foot



GUARANTEED
performance, verified
in-situ on every site



High-Performance Modular Bioretention System



HPMBS: Scale Drives Cost

EVEN WITH IDENTICAL SURFACE STORAGE, COSTS ARE SIGNIFICANTLY REDUCED:

- Less excavation
- Less underdrain pipe, aggregate and installation
- Less biofiltration media
- Fewer specialized plants
- Less non-standard maintenance
- Less long term maintenance

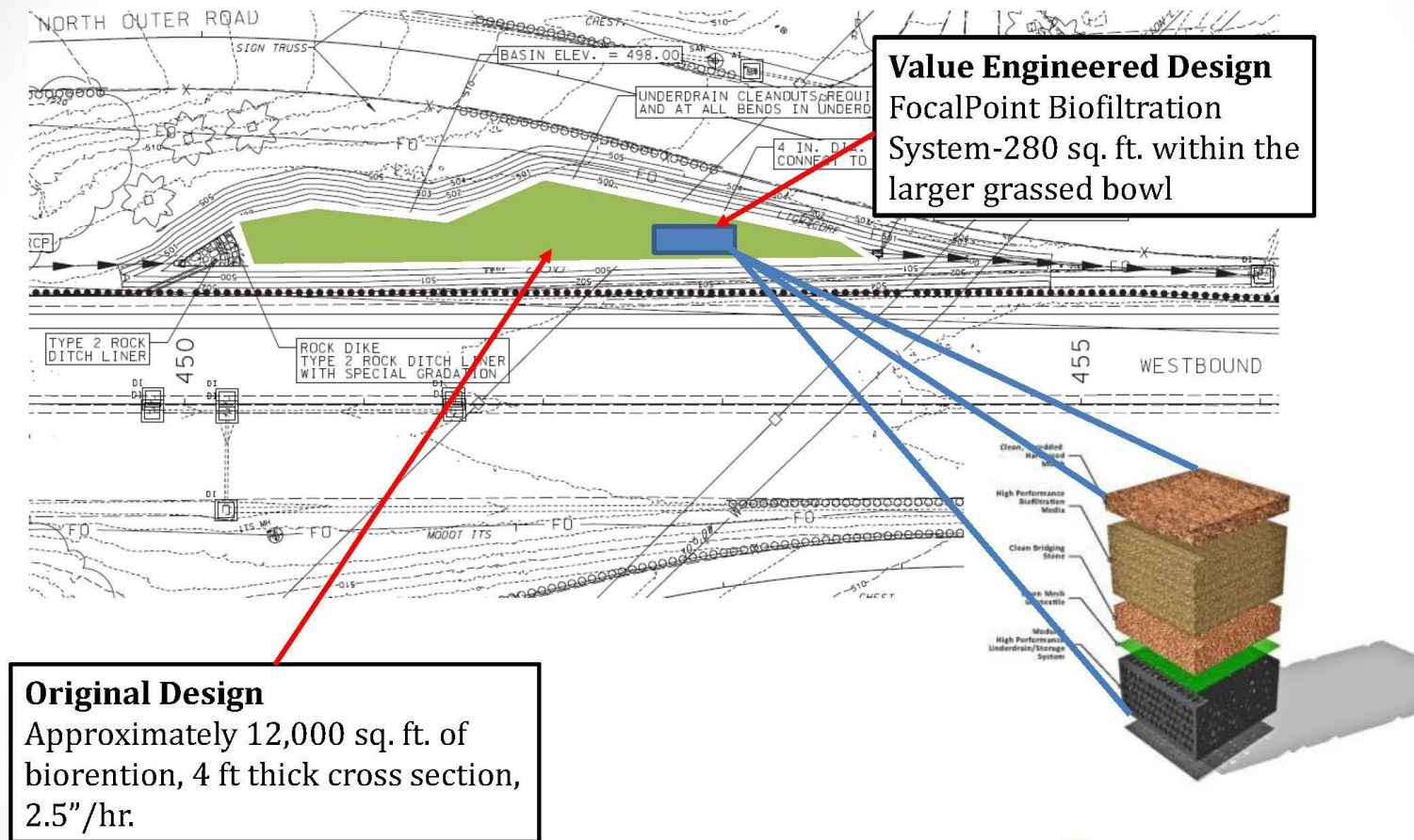
Using 2.5" HR Media

**Drainage timeframe identical
.16 CFS**

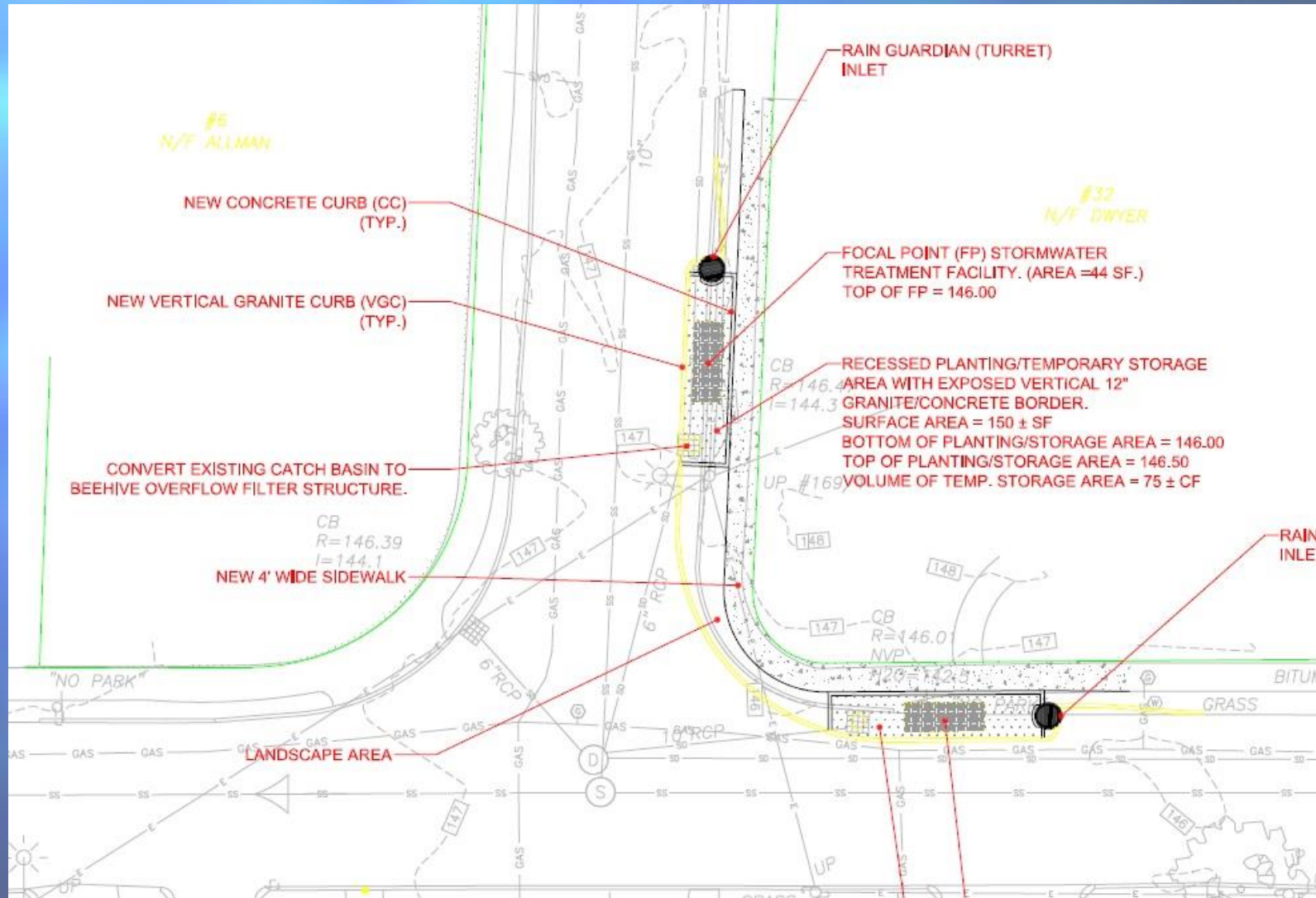
108 SF Biofiltration Bed Using 100" HR Media



Linear Roadway: MoDOT Route 63 STL



Newton, MA – curbside HPMBS w/ pre-T



Hydraulic Conductivity Test: verify performance







Recap: Green Infrastructure/LID Objectives

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Questions? * Discussion...



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