NBC Phase III CSO Control Program

NEWEA CSO/Wet Weather Issues Conference

Green Stormwater Infrastructure (GSI) Demonstration Projects to Address CSOs

October 30, 2018

Stantec | PARE CORPORATION

Introduction

Narragansett Bay Commission

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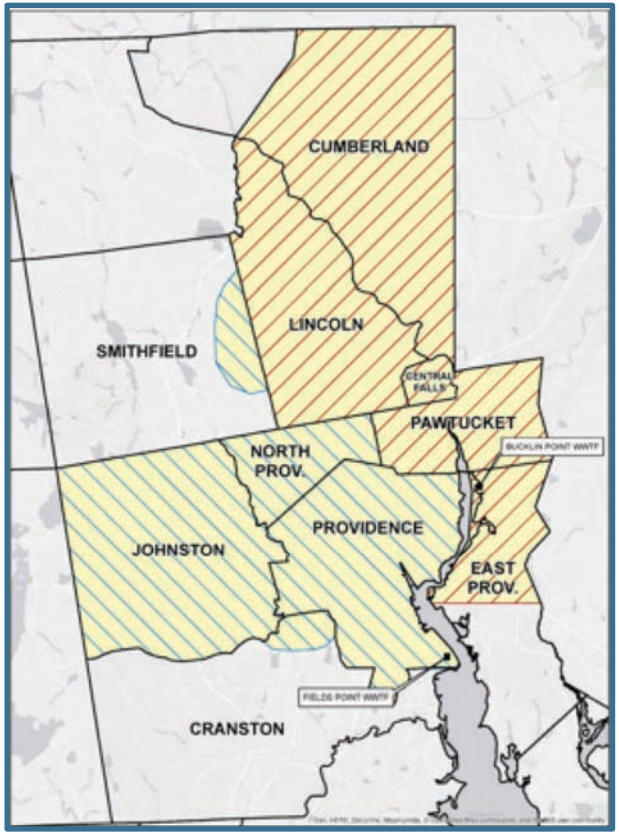
Narragansett Bay Commission

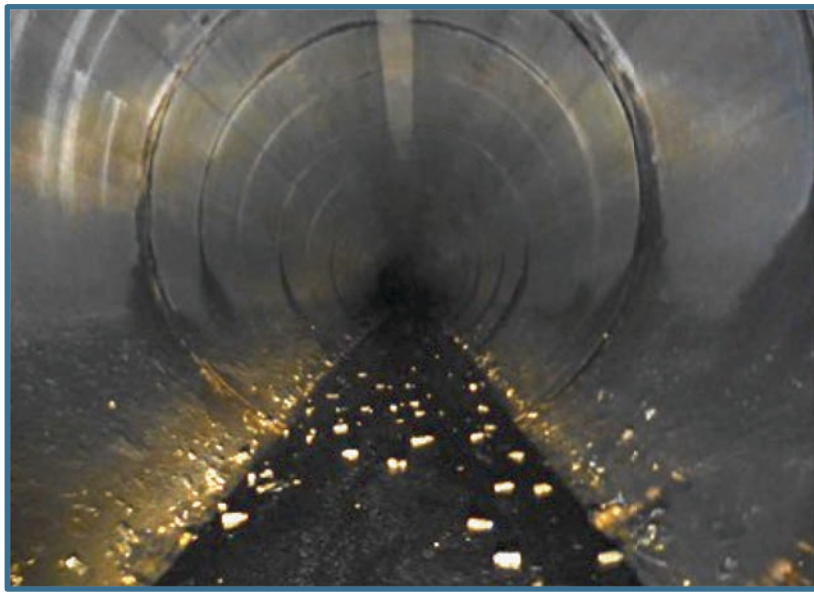
- Wastewater Collection and Treatment in 10 Communities in Greater Providence

- Operates 2 largest POTWs in RI
  - Serves 360,000 Residents
  - Serves 7,800 Businesses



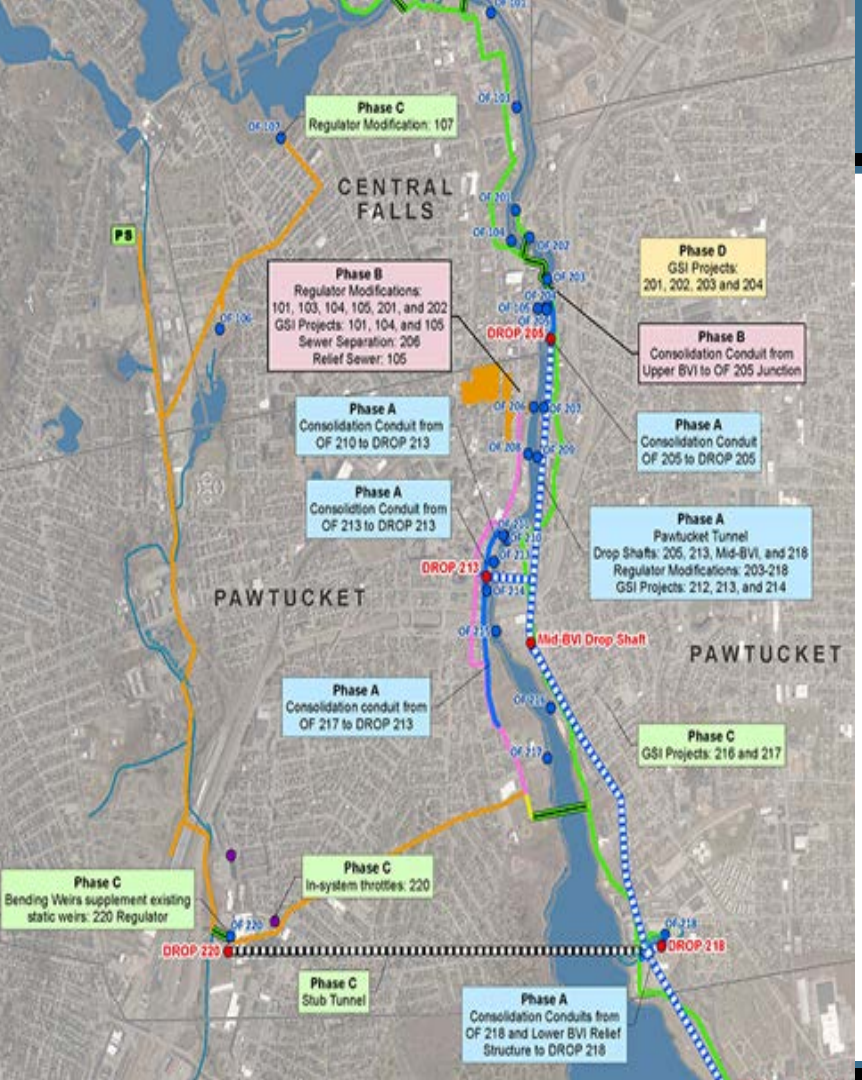
NBC CSO Control Program

- 1992: NBC Embarked on a CSO Long Term Control Program
- 1998: NBC Defined Three Phase CSO Control Program
- Program Goals:
  - 98% reduction annual CSO volumes
  - 98% reduction fecal coliform loading
  - 95% reduction in number of annual overflows
  - < 4 overflows per year
  - 75% and 80% reduction in TSS and BOD loadings, respectively
  - 80% reduction in shellfish bed closures



NBC CSO Control Program

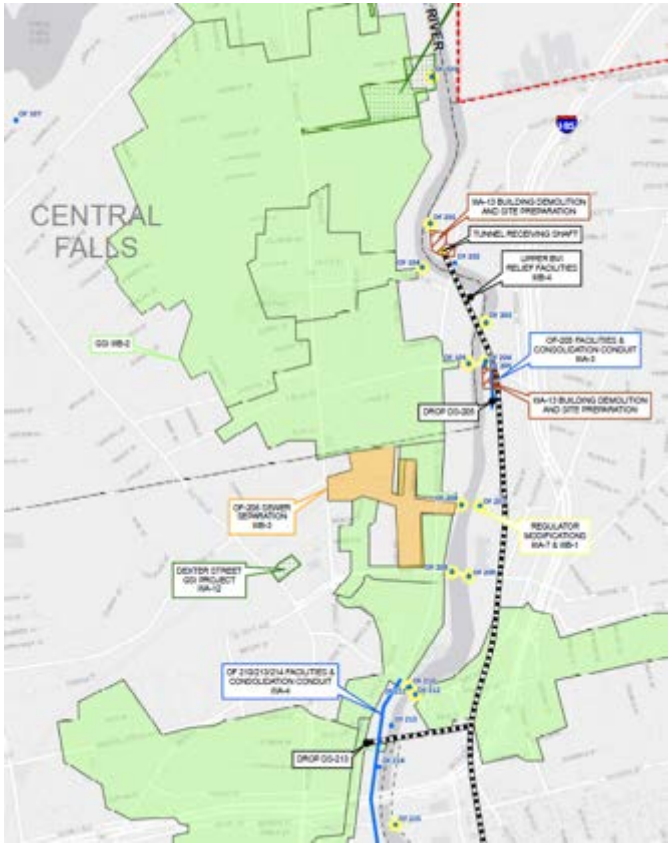
- Phase I CSO Program
  - **Construction:** 2001 to 2008
  - **Cost:** $360M
  - Deep rock storage tunnel, tunnel pump station, drop shafts, consolidation conduits
- Phase II CSO Program
  - **Construction:** 2011 to 2015
  - **Cost:** $197M
  - CSO interceptors, sewer separation, and storage/wetlands facility



Phase III Re-Evaluation

- **Phase III Re-Evaluation:** 2016/2017
- Phase III Divided Into 4 sub-phases
- **Anticipated Cost:** $750M
- Implementation Schedule Extended to Reduce Rate Payer Impact
  - Phase IIIA complete: 2026
  - Phase IIID complete: 2041

Phase III Projects

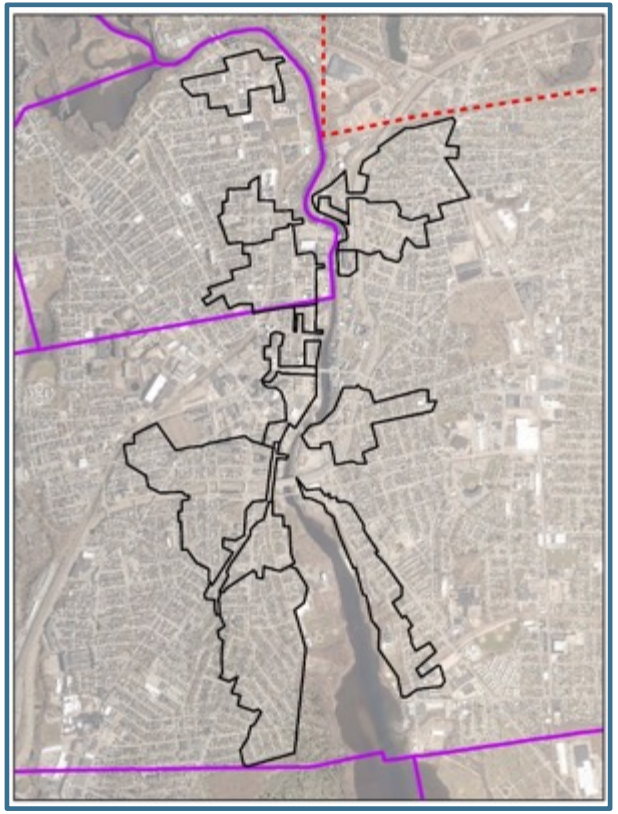


Phases IIIA/IIIB Design – 18 Contracts

- Deep Rock Storage Tunnel
- Tunnel Dewatering Pump Station
- Consolidation Conduits
- Regulator Modifications
- Sewer Separation
- **Green Stormwater Infrastructure**

Green Stormwater Infrastructure

- Reduce Volume to CSOs
- Intercept Stormwater Before Entering Combined System
- Infiltrate or Detain Stormwater



GSI Best Management Practices

- To be used at public sites and public rights-of-way
- Broad selection of GSI for vacant or developed sites
- Adaptable to various landscapes
- May enhance aesthetics of underutilized land

Initial GSI Screening Process

Step 1	Opportunity Assessment
Step 2	Land Use
Step 3	Legislation
Step 4	Landform
Step 5	Calculations
Step 6	Effectiveness
Step 7	Scalability
Step 8	Suitability

GSI Opportunities

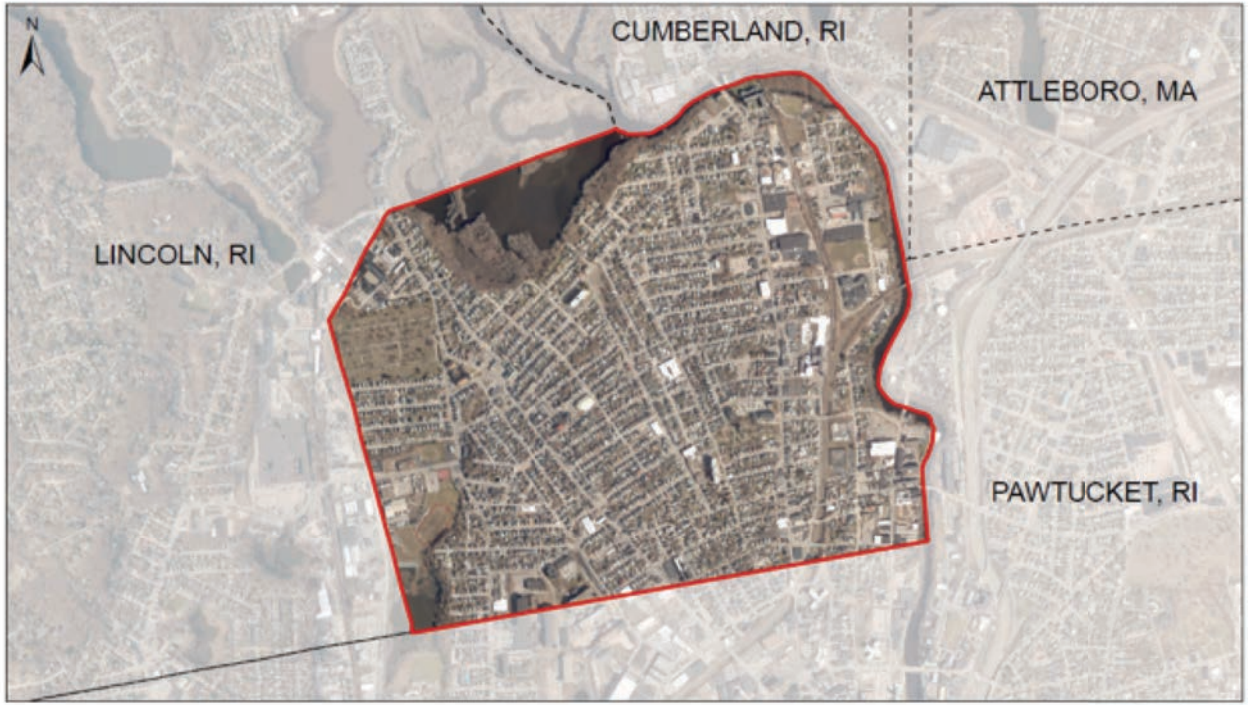
- Several Potential Sites Identified per Sewershed
- Floodplain, Historical, Environmental Constraints Considered
- Land Ownership Identified
- Stakeholder/Municipal Support
- Advance Design of GSI Demonstration Projects

Green Stormwater Demonstration Projects

- Reduce CSOs
- Diverse Site Selection
- Employ Multiple GSI Best Management Practices
- Maximize Stormwater Capture from Relatively Small Storms
- Retrofit to Existing Landscape, Provide Treatment to Maximum Extent Practical
- Demonstrate Effectiveness of GSI for CSO Control
- Demonstrate Maintenance Responsibilities
- Design with Operation & Maintenance in Mind

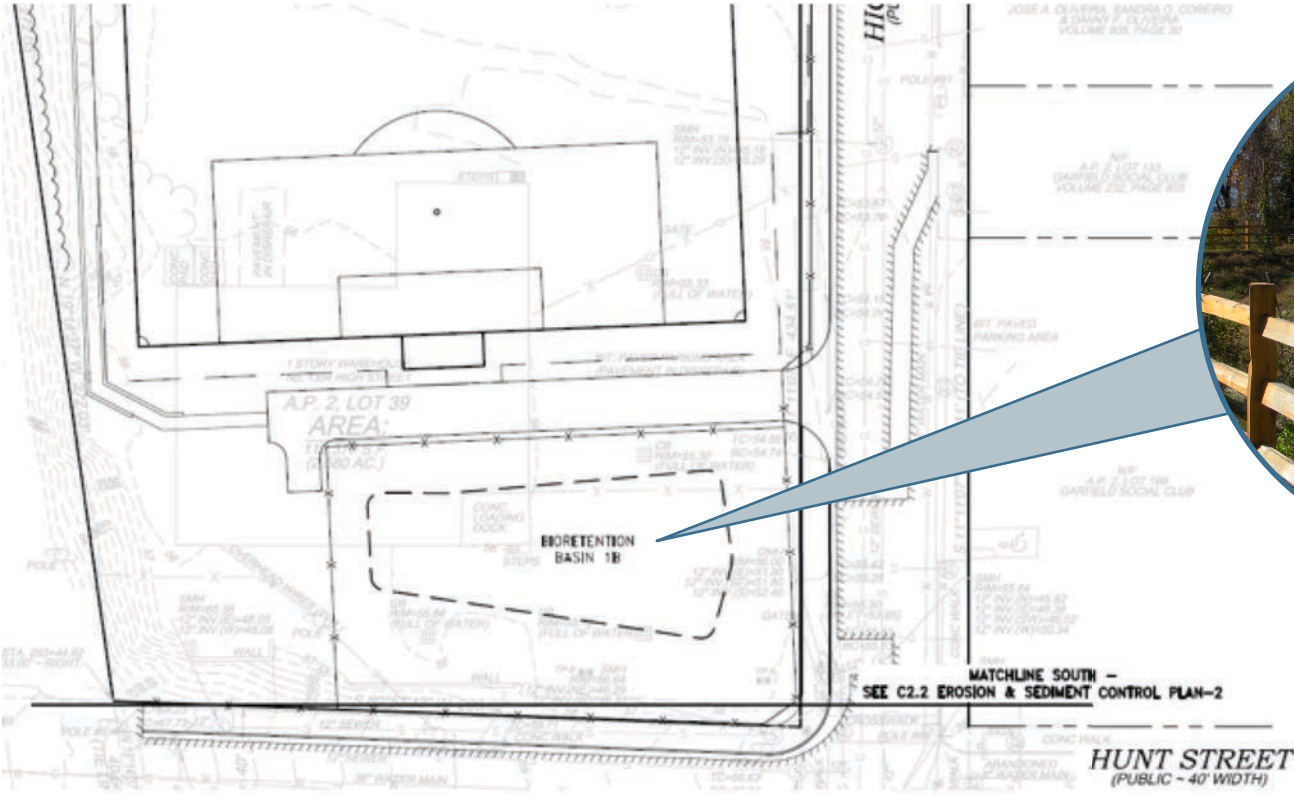
City of Central Falls, RI

- Area: 1.2 sq. mi
- Population: ~ 20,000
- Urban, High Density
- Low Income, EJ Area
- Limited Green Space and Recreational Facilities
- Served by Combined Sewers



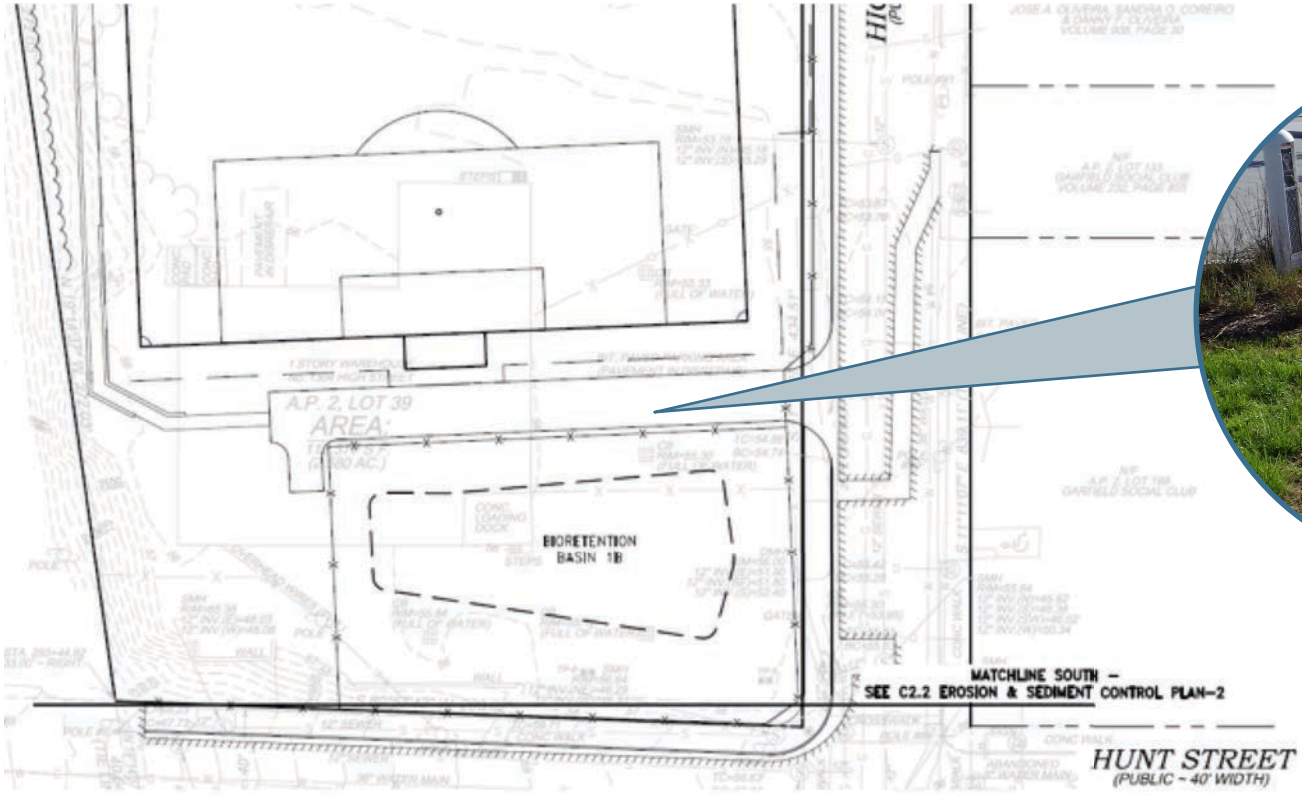
1304 High Street, Central Falls

High Street GSI Demonstration Project



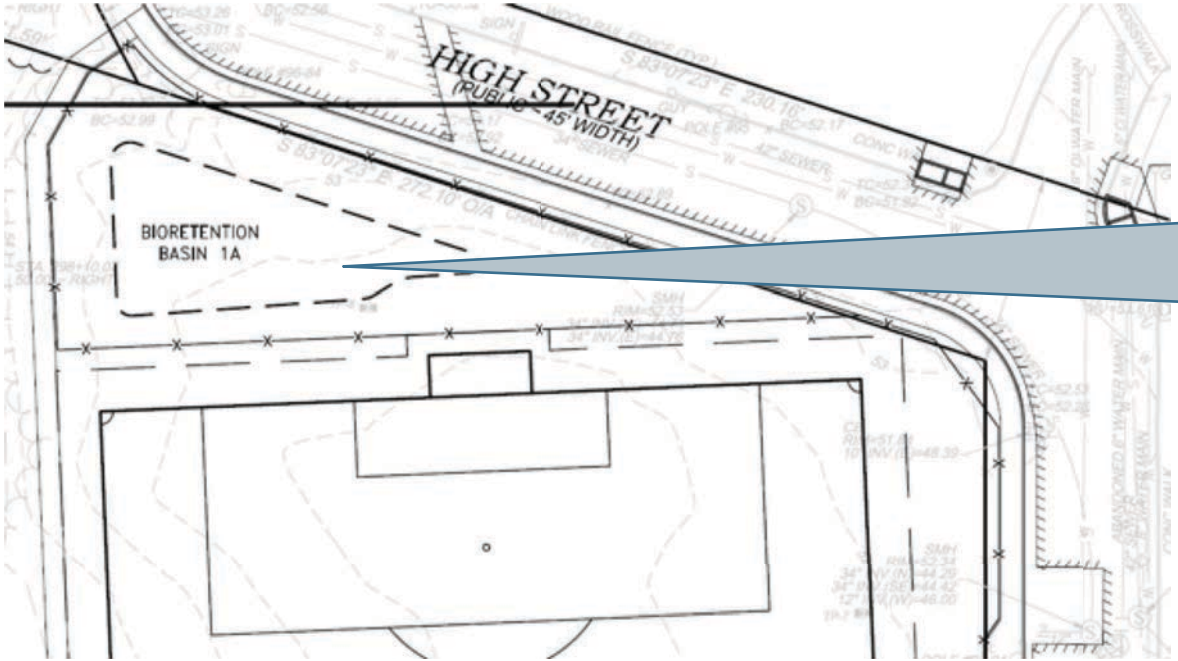
SAND FILTER

High Street GSI Demonstration Project



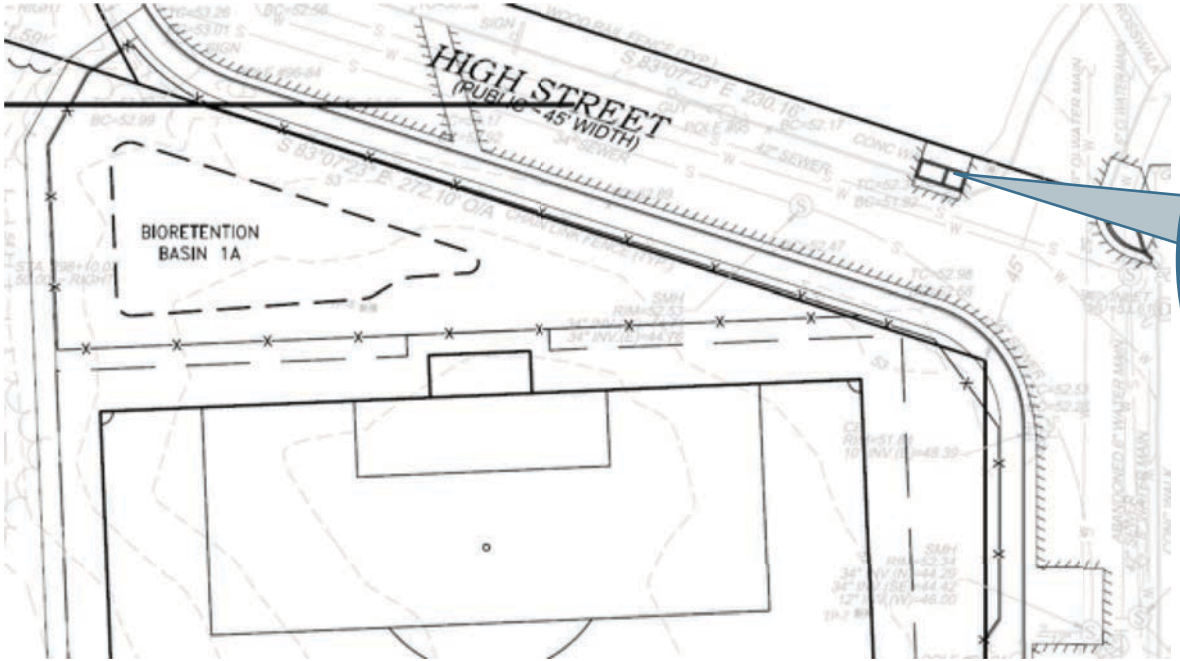
PERMEABLE PAVERS

High Street GSI Demonstration Project



BIORETENTION

High Street GSI Demonstration Project



TREE SWALE

(Source: NYCDEP)

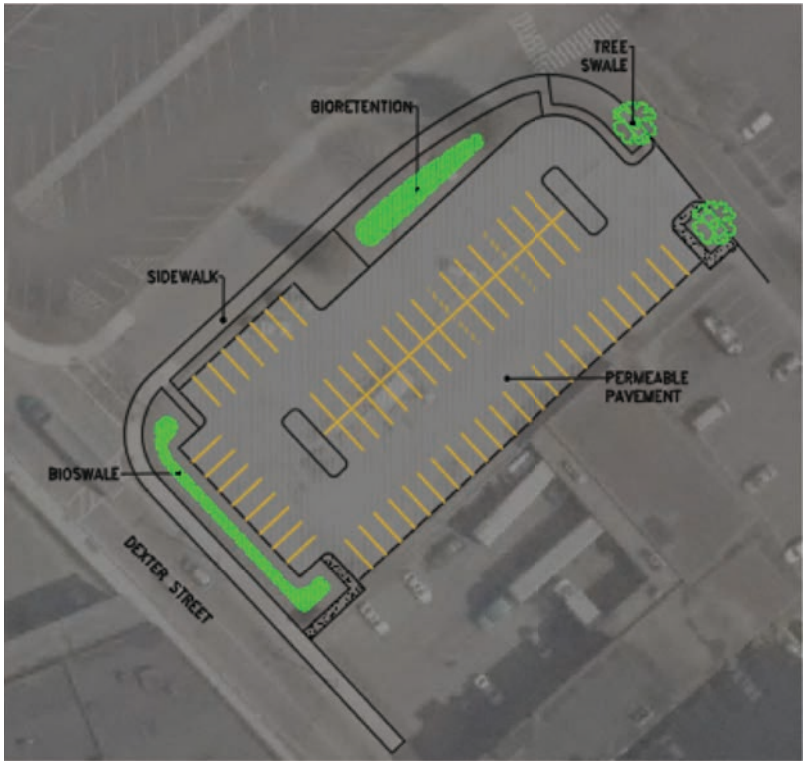
High Street GSI Demonstration Project

GSI BMP Design Basis & Predicted Results

GSI BMP	Catchment Area (AC)	Total Runoff Volume (CF)	BMP Infiltration Area (SF)	Depth in Bioretention Area
Bioretention Area – 1A	3.8	6,500	8,800	9 inches
Bioretention Area – 1B	2.0	7,700	4,800	19 inches
Permeable Pavers	0.01	490		
Total	**5.8**	**14,200**		

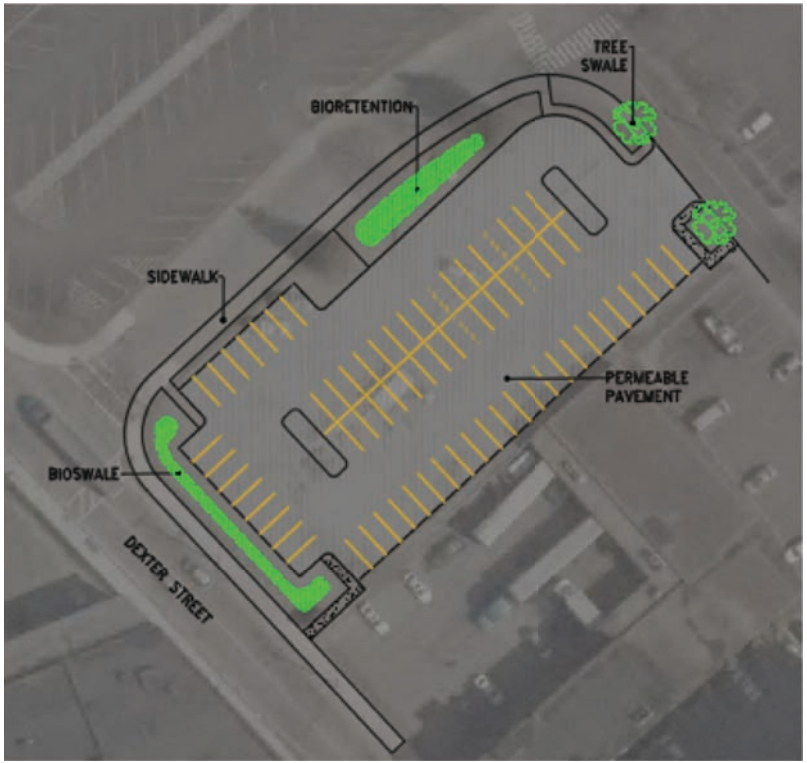
Total CSO Volume at OF-101 Before GSI	Volume of Runoff Removed from Catchment	Percent Volume Removal at OF-101
1.4 MG	0.1 MG	7.6%

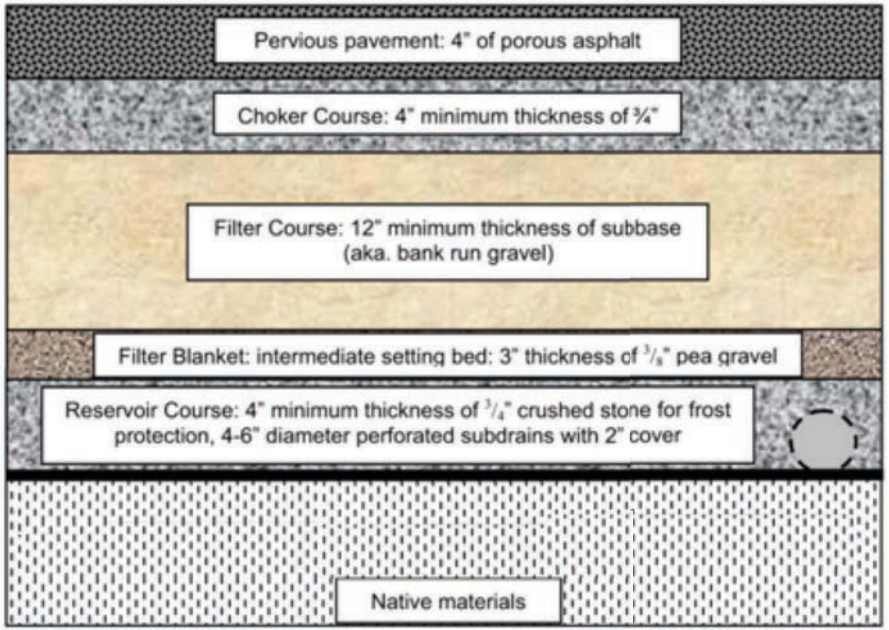
Dexter Street Parking GSI Project



- Permeable Pavement to Retrofit Existing Parking Lot
- Bioretention Areas around Perimeter
- Tree Swales in Right of Way

Dexter Street Parking GSI Project





adapted from the University of New Hampshire

Transit Oriented Development (TOD) District

- New Pawtucket/Central Falls MBTA Station
- TIGER Grant, Other Federal/State/Local Funding
- Pawtucket Developing Parking Facilities to Serve New MBTA Station
  - RIDEM Grant for GSI
- Additional Opportunities to Integrate GSI & Transit Oriented Development

Benefits to GSI for Phase III CSO Program

- GSI installations provide enhanced CSO control
  - Other Proposed Facilities Meet Required Hydraulic Performance Objectives
  - Optimize traditional “grey” infrastructure where GSI is used
  - Expenditure Target ensures commitment to GSI
- Provide operational flexibility
- Build in resiliency for increasing storm frequency/intensity
- Meet stormwater quality requirements
- Address key stakeholder and regulatory agency input

Challenges Presented by GSI

- Future Site Use and Competing Interests
  - Municipalities require future site use that meets their needs
  - GSI installations must be of sufficient size and scale to be effective
- Environmental Conditions
  - Existing subsurface conditions must be suitable for infiltration
  - Soil and groundwater contamination likely
- Site Availability
  - Site and project scope mutually agreed upon by site owner, project owner
- Stakeholder Engagement
  - Reach project consensus early to avoid scope creep
- Site Ownership and Maintenance Responsibilities

Future GSI Projects

- **Macomber Stadium & Ballfields – Central Falls**
  - Incorporate GSI Into Site Enhancements
  - RIDEM Grants for Recreational Facility Improvements, Brownfields
- **High Street Green Corridor – Central Falls**
  - Leverage Additional Opportunities Between GSI Sites
- **Sewer Separation Projects – Pawtucket, Providence**
  - Incorporate GSI Installations to Optimize Sewer Separation
- **Pawtucket/Central Falls TOD**
  - Municipal Support to Drive Future Opportunities

Use Demonstration Projects as a Catalyst for Future GSI Projects

Questions?