CSO Control Facilities
Phase III Reevaluation
Grey Alternatives
10 April 2014
- Alternatives definition & Stakeholder engagement process
- Grey infrastructure alternatives development
# Alternatives Definition & Stakeholder Engagement Process

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Alternatives Development
- April 10, Grey Infrastructure Focus
- May 22, Green Infrastructure Focus

Alternatives Evaluation
- June 19, Evaluation Criteria Focus
- September 4, Integrated Planning Workshop

Plan Definition
- October 23, Plan Review and Finalization
Alternatives Development Meeting Structure

- Alternative General Overview
  - Advantages & disadvantages
  - Technical constraints

- CSO-Specific Applications
  - Detailed evaluation

- Evaluation Criteria
  - Parking lot
Grey Infrastructure Alternatives

Meeting Outline

- Sewer separation
  - Overview
  - 035, 039, 056, 206 (baseline)
  - All other 100- and 200-series

- Pawtucket Tunnel

- Tunnel Interceptors
  - Overview
  - 101-4, 201-5, 220 (baseline)

- Spur tunnel
  - 220

- Localized combined flow handling (near-surface storage, discharge)
  - Overview
  - 035, 039, 056, 220, 101, 102, 103, 205, 218

- Stormwater control
  - Overview (flow controls, infiltration, storage, GSI)
  - 035, 039, 056
Grey Infrastructure Alternatives

Fundamental Differences

Sewer separation
- All wastewater to WWTF
- All stormwater to rivers
- Eliminates the CSO
- Discharges urban runoff to rivers

Tunnel & Near-surface storage
- CSO volumes detained & subsequently treated at WWTF
- CSO discharges to rivers for large storms
- Urban runoff treated for small storms & first flush

Localized treatment & discharge
- CSO volumes minimally treated and discharged to rivers
- Urban runoff treated for small storms & first flush

Stormwater control
- System optimization
Sewer Separation
Advantages
- Reduced stormwater discharge to NBC interceptors
  - May help upstream and downstream discharges
- Reduced treatment volume
- Potential for improved streetscape

Disadvantages
- Increased stormwater discharge to flood-prone rivers may require mitigation
- Increased pollutant load to receiving water bodies
- Major disruptions to residential and commercial areas
  - Street closures and traffic delays
  - Economic impact to businesses
- Illicit discharge potential
- Utility coordination (water, gas, electric)
- Cost of improved streetscape
Neighborhood Impacts

- Impacts to Businesses from Reduced Visibility, Access
- Impacts to Pedestrians and Traffic from Road Conditions
- Impacts on Residents from Noise, Dust, other Nuisances
Utility Issues

- Utility Crossings/Conflicts Complicate Drain Installation
- Inaccurate/Incomplete Mapping Represents Significant Risk
NBC Phase II Sewer Separation

- Water and Gas Relocations Required
- Beautification/Safety Improvements Added on Hope Street
Restoration Issues

- Costly Pavement & Concrete Base Replacement
- Sidewalk and Curb Replaced Beyond Original Limits
- Several New Wheelchair Ramps Added During Construction
Phase III
Baseline
Sewer Separation
039 Sewer Separation

OUTFALL 39
AREA = 102ac

Admiral St

Douglas Ave

Hawkins St

5th Branch Ave

Providence College

Providence
056 Sewer Separation

OUTFALL 56
AREA = 69ac

Admiral St
Douglas Ave
Hawkins St

Providence College
Providence

Branch Ave
206 Sewer Separation

OUTFALL 206
AREA = 14ac

Central Falls

Broad St

High St

Roosevelt Ave

Pawtucket

Exchange St

206

207

208

209
Advantages

- Reduced stormwater discharge to NBC interceptors
- Reduced treatment volume
- Potential for improved streetscape

Disadvantages

- Increased stormwater discharge to flood-prone rivers may require mitigation
- Increased pollutant load to receiving water bodies
- Major disruptions to residential and commercial areas
- Illicit discharge potential
- Utility coordination (water, gas, electric)
- Cost of improved streetscape
Deep-Rock Tunnel
Advantages

- Facilitates full secondary treatment of combined flows
- Construction impacts limited to shaft locations
- Low operation and maintenance costs
- Provides operational flexibility
- Cost effective for large flows

Disadvantages

- Large-scale effort & cost
Pawtucket Tunnel
Pawtucket Tunnel
Interceptors for Tunnel Connections
Interceptor Overview

➢ Advantages
  • Eases siting requirements of tunnel dropshafts or storage / treatment facilities
  • Provides additional system storage
  • Low operation and maintenance costs
  • Helps relieve strained collection systems

➢ Disadvantages
  • Major disruption of surface roads
  • Deep excavation / Micro-tunneling
  • May require land or easement acquisition
  • Potential for utility conflicts
NBC Phase II Interceptors
Phase III
Baseline Interceptors
Middle Street Interceptor

Central Falls

Middle St at Central Ave

Middle St at I-95 On-Ramp

Middle St Interceptor
High & Cross Streets Interceptor

Central Falls

High Street Railroad Underpass

Cross St Bridge

High/Cross St Interceptor

Cross St

Pawtucket
Phase III Alternative 220 Stub Tunnel

Outfall 220

Pawtucket Stub Tunnel Diameter= 10 Feet

I-95

Pawtucket Ave

Pawtucket

Providence

East Providence

Bucklin Point WWTF
Advantages

• Significantly reduce disruption to roadway and neighborhoods along interceptor route
• Little to no utility coordination required
• Isolated construction areas
• Removes need for pump station, reducing operation and maintenance costs
• Increase operational flexibility of system

Disadvantages

• Requires additional deep rock boring evaluation
• Requires additional deep rock drop shaft
Localized Combined Flow Handling
West River Interceptor
Near-Surface Storage
Treatment and Discharge
Advantages

- Provides storage of peak flows
  - Stored flow treated at WWTF after storm event
  - Localized construction impact

Disadvantages

- Screening and/or Floatable Control required
- Odor Control required
- Operation and Maintenance of remote facilities
- Limited siting possibilities in dense urban areas
- Land acquisition requirement
Treatment and Discharge Overview

Advantages
- Provides capacity relief for existing interceptors and WWTF infrastructure
- Localized construction impact

Disadvantages
- High capital costs
- High operation and maintenance costs
- Residual pollutant loading to receiving waters
- Limited siting adjacent to outfalls
- Chemical storage and delivery
- Land acquisition requirement
- Residuals discharge
Phase III
Localized
Combined
Flow Handling
Options
Phase III
Alternative
West River
Interceptor

Providence
West River
Middle School
Rhode Island School for the Deaf
Louisquisset Pike
Hopkins Middle School
Branch Ave
West River
Charles St
Rhode Island School for the Deaf
West River Interceptor
Silver Springs St
Providence
Walmart
Advantages

• Replaces sewer separation in 039 and 056 neighborhoods
• Provides relief for Branch Ave Interceptor

Disadvantages

• Difficult construction
  • Requires jacking or boring beneath highway
  • Proximity to West River
  • Accessibility concerns
• Easement acquisition requirement
Localized Flow Handling
Outfall 220

Morley Field

Pawtucket

Moshassuck River

Underground Tank Storage=7.6 MG (OF-220)

Morley Field

Main St
Localized Flow Handling Outfalls 101 and 103

CDR Proposed Site – Pierce Park / Ballfield
Localized Flow Handling
Outfalls 104 and 105
Localized Flow Handling
Outfall 205

I-95
Pawtucket
Central Falls
Middle Street Interceptor
Underground Tank Storage=6 MG (OF-201, 203, 204, 205)
CDR Site Total Storage=7+ MG (OF-205)
Total Storage=15 MG (OF-201, 203, 204, 205)
Oak Grove Cemetery
Bennett Hwy
Cottage St
Localized Flow Handling
Outfall 205

Front Street looking towards Central Ave
Localized Flow Handling
Outfall 218

Boys and Girls Club
Elson Campus

Underground Tank
Storage= 12 MG
(OF-218)

Pawtucket

Dunnell Park

East Providence

To
BPWWTF
Localized Combined Flow Handling Overview

Near-Surface Storage

➢ Advantages
  • Provides storage of peak flows
  • Localized construction impact

➢ Disadvantages
  • Screening and/or Floatable Control required
  • Odor Control required
  • Operation and Maintenance of remote facilities
  • Limited siting possibilities in dense urban areas
  • Land acquisition requirement

Screening, Disinfection & Discharge

➢ Advantages
  • Provides capacity relief for existing interceptors and WWTF infrastructure
  • Localized construction impact

➢ Disadvantages
  • High capital, O&M costs
  • Residual pollutant loading to receiving waters
  • Limited siting opportunities
  • Chemical storage and delivery
  • Land acquisition requirement
  • Residuals discharge
Stormwater Flow Control & Management
Hydraulic Controls Overview

➤ Advantages
- Keeps stormwater out of combined sewer
- Can be integrated with GSI
- Low Capital Costs
- Low Operation and Maintenance Costs

➤ Disadvantages
- Strategic surface ponding
- Often requires specific surface conditions or improvements
- Limited by specific health and safety consideration including FEMA regulations
Phase III
Stormwater
Flow Control
&
Management

Vortex Flow Throttle

Detention Storage on Atwood Ave
Johnston, RI
Advantages
- Provides capacity relief for existing interceptors and WWTF infrastructure
- Odorless storage
  - Expands siting possibilities
- Lower operation and maintenance costs
- Provides for treatment of stormwater at WWTF
- Can be integrated with GSI

Disadvantages
- Requires dedicated stormwater collection system
- Requires land acquisition or easements
- Susceptible to grit buildup (can be mitigated)
Suitable
• Uniform Slope
• Sufficient Curb Reveal

Not Suitable
• Major Intersections

Marginally Suitable
• Flat Slope

035 Stormwater Management

Rochambeau Ave
North Burial Ground
North Main St
Camp St
Hope St
Doyle Ave
Providence
035 Stormwater Management

North Main St at Abbott St

Cypress Street
039/056 Stormwater Management

Douglas Ave at Admiral St

- Not Suitable
  - Minimal Curb Reveal
  - Major Roadway Crossings
  - Minimal Slope

- Marginally Suitable
  - Small Curb Reveal
  - Uniform Slope
  - Major Street Crossing

- Not Suitable
  - No Slope
  - Little to No Curb Reveal

Providence College

River Ave

Branch Ave

Providence

Glasgow St

Douglas Ave
039/056 Stormwater Management

Veazie St at Sunbury St

Grand Broadway at Stansbury St

Vandewater St at Grand Broadway
039/056 Stormwater Management

Grand Broadway at Stansbury St

Vandewater St at Grand Broadway
206 Stormwater Management

Suitable
- Sufficient Curb Reveal
- Uniform Slope

Not Suitable
- Dead-End Alleyway

Central Falls

Blackstone Ave East of Roosevelt Ave

Montgomery St
High St
Exchange St
Roosevelt Ave
Pawtucket
206 Stormwater Management

Blackstone Ave West of Roosevelt

Roosevelt Ave at Blackstone Ave
Next Meeting

22 May 2014, 9:00AM

Green Infrastructure Focus
Localized Flow Handling Outfalls 101 and 103

Alternative Site – Under Utilized Parking Lot

Alternative Site – Vacant land on High St at River St
Near-Surface Storage Outfalls 104 and 105

CDR Proposed Site – Elizabeth Webbing Mills on Charles St

Alternate Site – High St at Charles St