



A 21st Century Approach to Cleaning Stormwater Commercial Street and South River Projects

*25th Anniversary Symposium:
Finding Solutions to Our Coastal Challenge*

Friday, March 18, 2016
Wylie Center, Endicott College, Beverly

Agenda

- Commercial Street Project
- South River Flood Project
- Questions and Answers

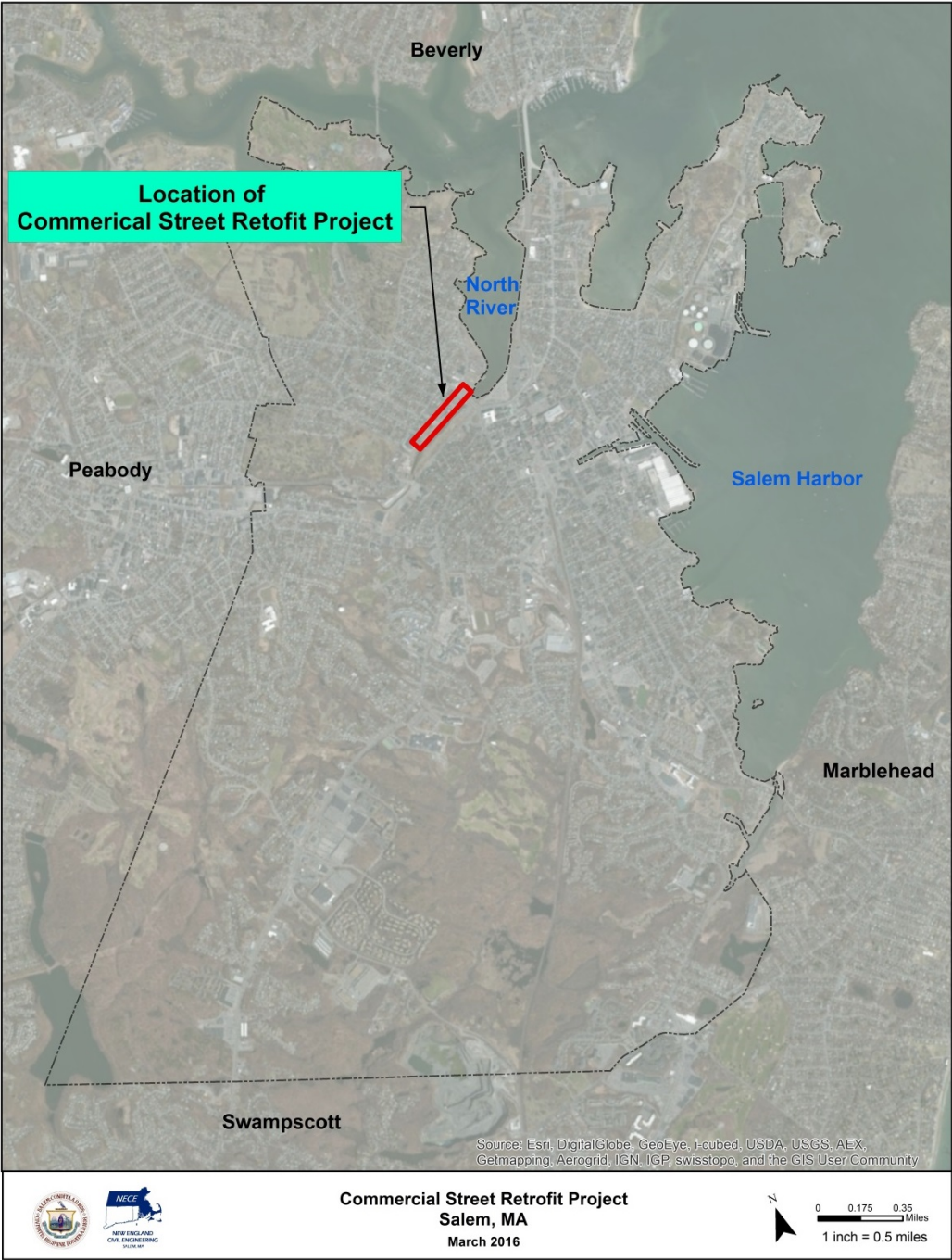
Key Players

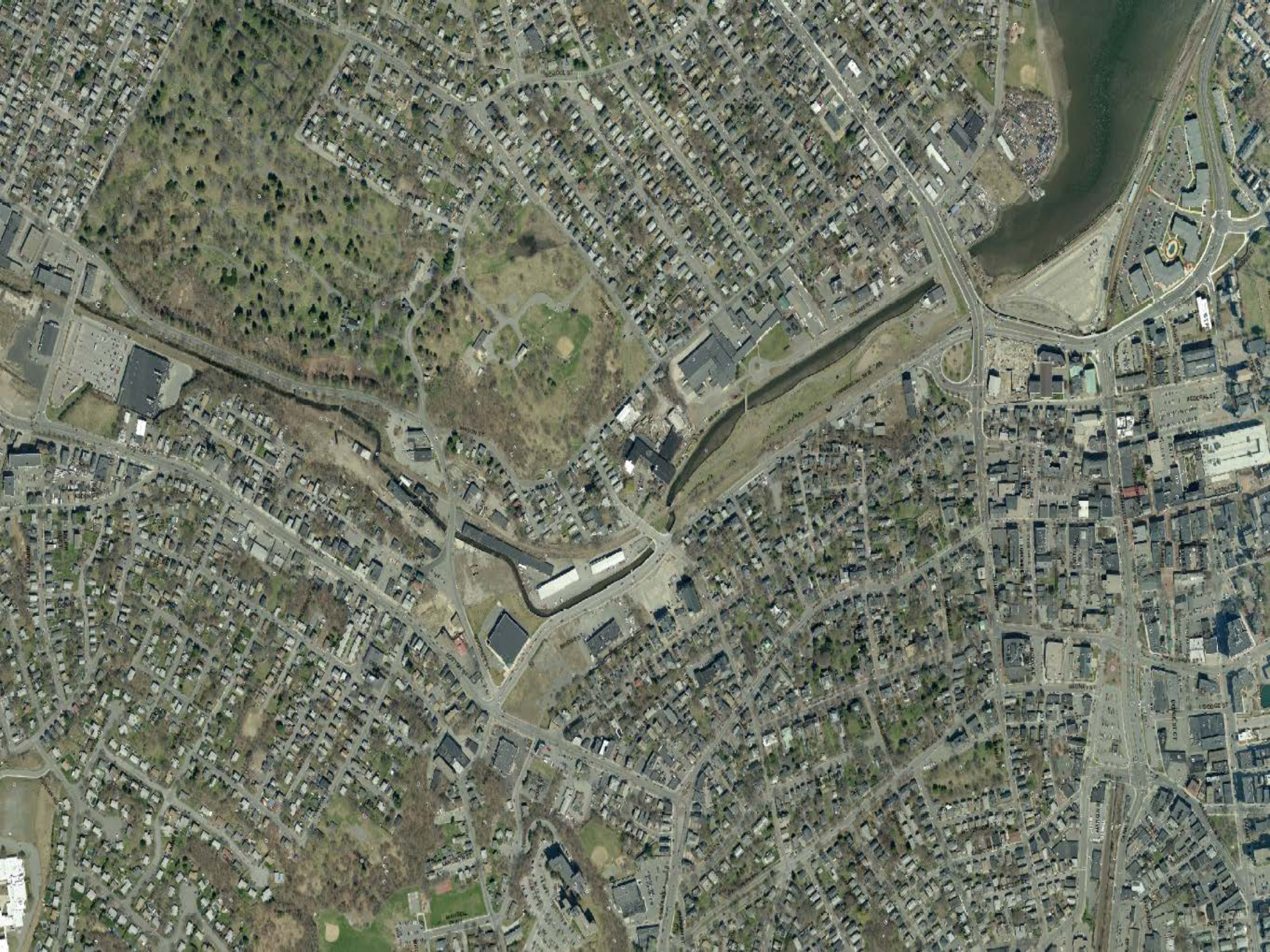
- City of Salem
 - Kimberley Driscoll, Mayor
- North Shore Region – CZM
 - Adrienne Pappal
 - Christina Kennedy
 - Kathryn Glenn
- New England Civil Engineering Corp. (Salem, Ma)
- SSCW – Barbara Warren

Commercial Street Project Summary

- Commercial Street
 - Salem's North River
- Coastal Pollution Remediation Grant
 - Design and Permitting
 - Completed in 2015 (\$41,350)
 - Construction
 - Spring/Summer 2016 (176,250)
- Low Impact Development Retrofit Project
 - Abatement of Targeted Stormwater Pollution Sources
 - Best Management Practices

The Location







MASON ST

SUFFRIM
STREET
EXT

S MASON ST

COMMERCIAL ST

NORTH ST

COMMERCIAL STR

BRIDGE ST

The Problem

Existing Conditions - 2013



Vehicular traffic and parking leave oil and hydrocarbons on the road. Missing landscape timbers that once contained the islands have disappeared providing a continual source of sediments being washed into the North River.



The Problem

Existing Conditions - 2013



The Problem

Existing Conditions - 2013

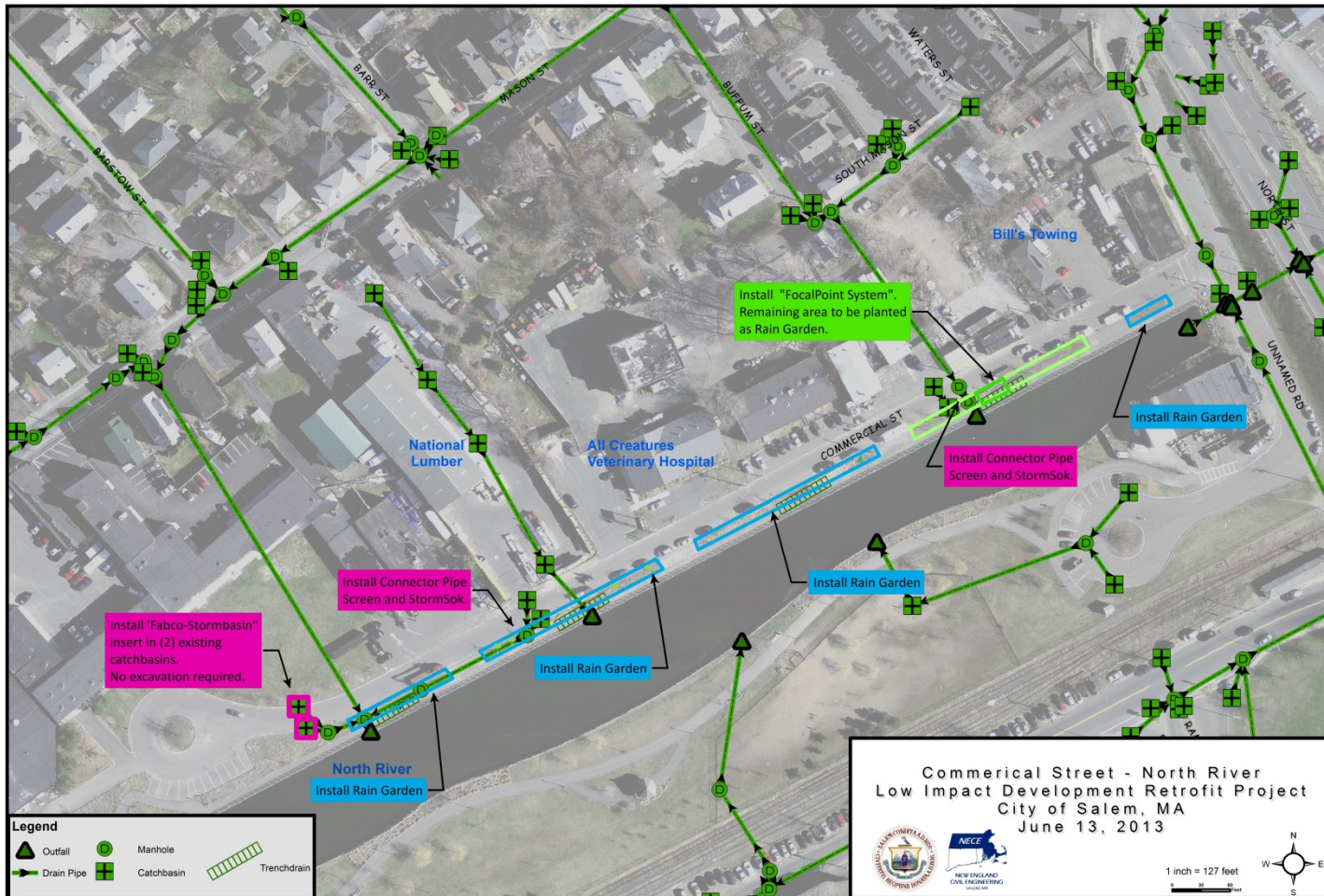


Sediments and dog feces get washed off Commercial Street and the sidewalk directly to the North River stormwater outfall pipes.

The Solution

- Landscape Island Modifications
 - Receive, infiltrate, store and treat contaminants
- Bio-filtration Cells
 - Intercept first flush (0.5 to 1-inch rainfall)
- Catch basin retrofits
 - Storm Pod (tss and oil)
 - Outlet screens (solids and floatables)
- Community Outreach
 - (Abutter) Dialogue
 - Stewardship?
 - Awareness

Retrofit Locations



Stormwater Treatment Units - FocalPoint



A High Flow, High Performance Solution to Implementing Low Impact Development

FocalPoint
BIOFILTRATION SYSTEMS
2nd Generation Low Impact Development (LID) Concept

High Treatment Rates and Pollutant Removal Performance Makes FocalPoint the Water Quality Solution for Implementing LID Strategies!

FocalPoint can be utilized for:

- Infiltration
- Stormwater Harvesting
- Stormwater Detention

FocalPoint's High Flow Capacity Allows for a Significant Amount of Stormwater to be directed to a Small Footprint of BioFiltration.

FocalPoint Facilitates a Significantly Smaller Surface Filtration Footprint than Traditional BioFilters – reducing Plant, Construction, Land and Maintenance Costs.

Traditional BioFiltration Footprint

FocalPoint BioFiltration Footprint

FocalPoint Incorporates Six Specific Components to Achieve This Unique and Valuable System. Each of the Six Components is Designed to overcome challenges associated with 1st Generation Low Impact Development Designs and Applications.

Component #1: Higher Flow Media
Overcomes the challenges of Clogging & Flooding and Large Space requirements Associated with 1st Generation Low Impact Development.

FocalPoint Media

Traditional Media:

- Flows at Less Than 5" Per Hour
- Flows Slower with Age

FocalPoint Media:

- Flows at 100" Per Hour
- Flows Faster with Age as roots create pathways through media that enlarge over time
- Resistant To Clogging

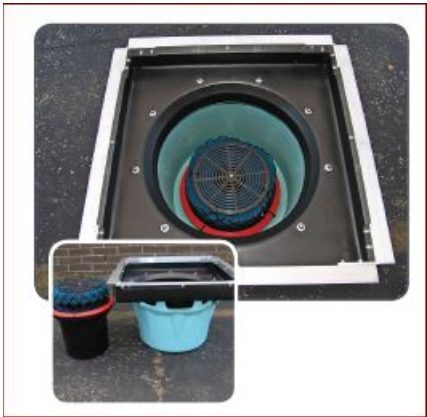
Component #1: Higher Flow Media
Overcomes the challenges of Limited and/or Inconsistent Removal Rates Associated with 1st Generation Low Impact Development Media.

High Pollutant Removal Rates
Third Party Studies Representing Over \$3 Million in Research

✓ Total Phosphorus:	73%
✓ Total Nitrogen:	43%
✓ Total Suspended Solids:	85%
✓ Total Metals:	57%
✓ Oil & Grease:	90%
✓ Bacteria	95%

Targeted pollutant variations available

Stormwater Treatment Units – Catchbasin Inserts



Commercial Street, Salem's North River Low Impact Development Retrofit Project



Plantings – Grasses and Low Growing Perennials



Switch Grass- *Panicum virgatum*



Weeping Sedge- *Carex pendula*



Wineleaf Cinquefoil- *Potentilla tridentata*



Little Bluestem- *Schizachyrium scoparium*

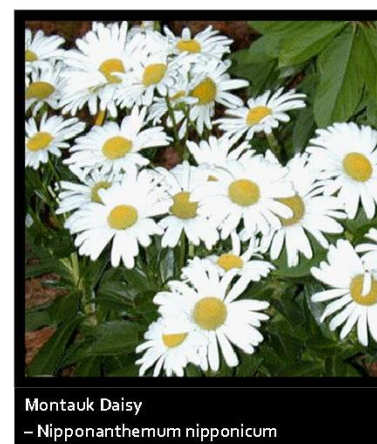
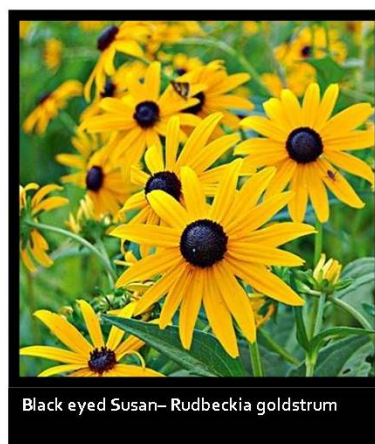
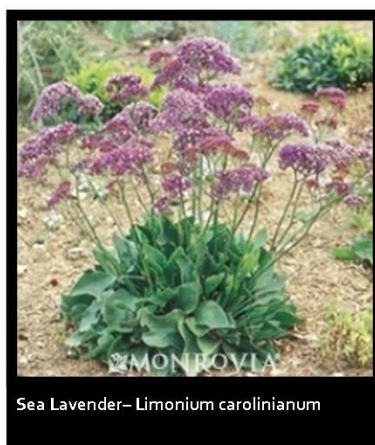
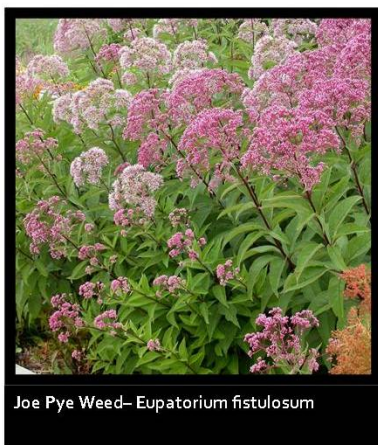


American Beach Grass-
Ammophila breviflora

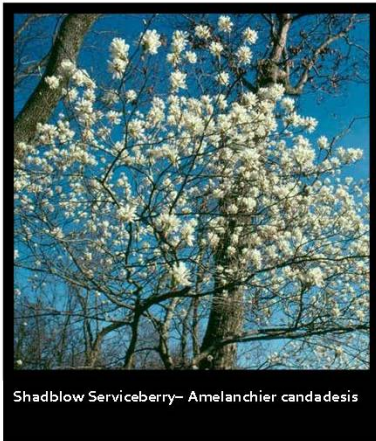


Geranium- *Geranium macrorrhizum*

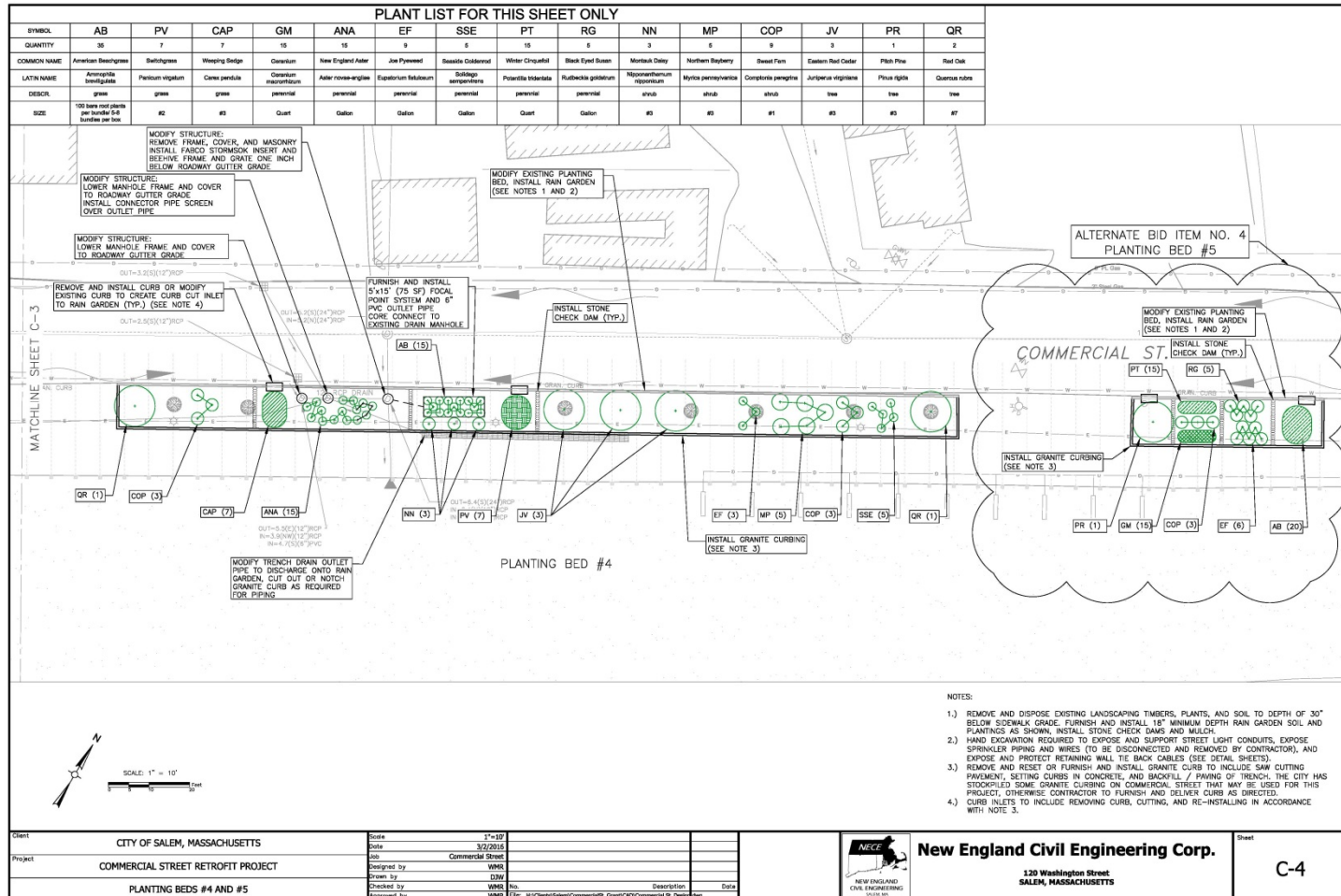
Plantings – Shrubs and Perennials



Plantings – Trees and Shrubs



Commercial Street, Salem's North River Low Impact Development Retrofit Project



Commercial Street Project

- Bids Open March 23, 2016
- Project Complete by June 2016
- Flexible Bid
 - Menu of treatment installations based on cost
- Future Opportunities for monitoring
 - When installed and operating

South River Flood Mitigation Project

- South River Watershed
 - 2/3 land mass in Salem
- Canal Street Area
 - Lower elevation than most of the watershed
 - Has to wait to drain
- Flooding
 - Extreme Storms and High Tide



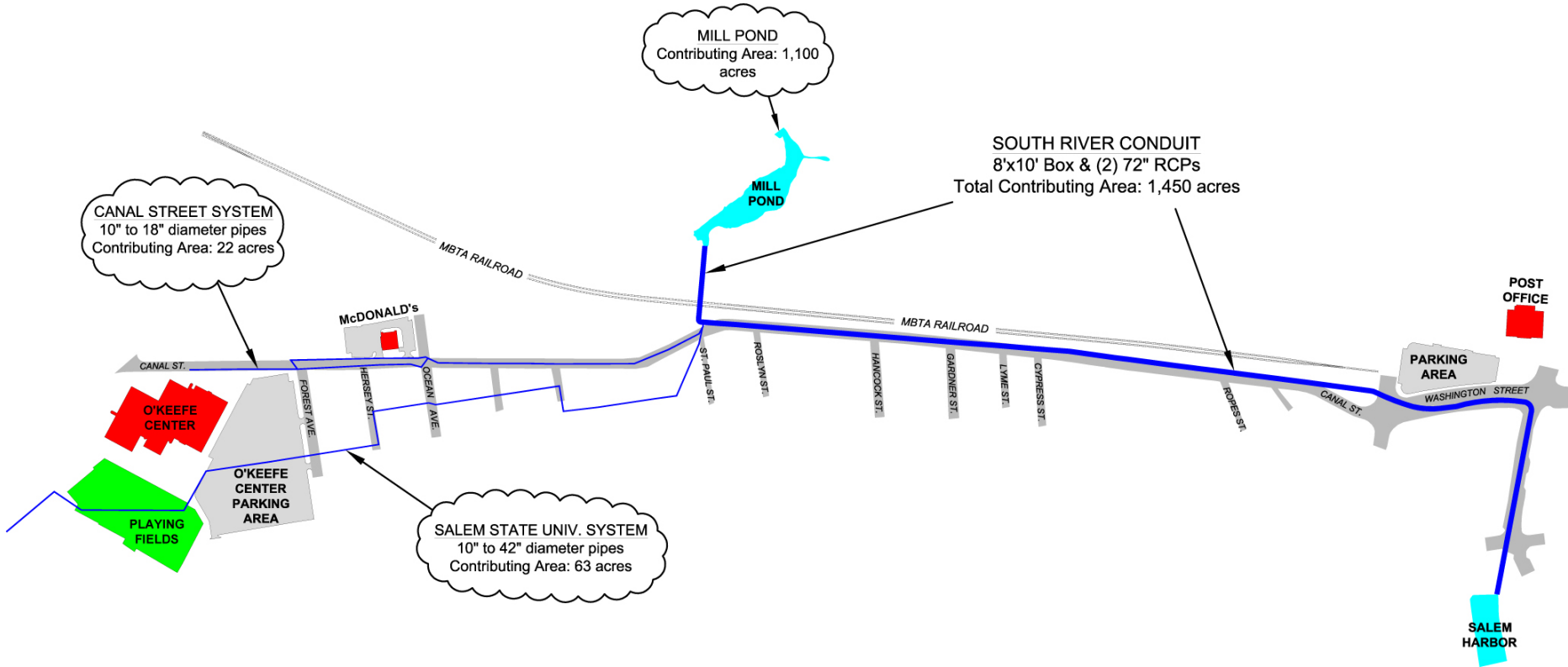


McDonald's
WAKE UP WITH A
DOLLAR MENU AT BR

eE surprise

McDonald's

Overview – Existing Infrastructure



Canal Street Flood Mitigation / Roadway Improvement Project

- Project 1 – Phase I Flood Mitigation Project
 - Comprehensive Utility Improvements in Canal St
- Project 2 – Canal Street Roadway Improvements
- Project 3 – Phase II Flood Mitigation Project
 - Drainage Improvements, Flood Storage, Harbor Outlet Improvements - Canal Street / SSU Area

Canal Street Flood Mitigation / Roadway Improvement Project

- Project 3 – Phase II Flood Mitigation Project
 - Drainage Improvements, Flood Storage, Harbor Outlet Improvements - Canal Street / SSU Area
 - Provide 100-year flood protection for over 30 acres and more than 50 existing buildings
 - Upper Watershed - more-effectively direct water to existing South River Conduit.
 - Lower Watershed - construct remaining portion of Canal Street Flood Mitigation Improvements:
 - Remainder of lower gravity system
 - 4.0 million gallon subsurface storage on O’Keefe Parking Lot
 - Pump station, and force main to outfall at Salem Harbor in Forest River Park
 - Construction planned to start Summer 2016
 - 24 month construction period



NO.	DATE	DESCRIPTION
1	10/20/2020	ISSUED FOR PERMITTING
2	11/10/2020	REVISED FOR COMMENTS
3	12/15/2020	REVISED FOR COMMENTS
4	01/15/2021	REVISED FOR COMMENTS
5	02/15/2021	REVISED FOR COMMENTS
6	03/15/2021	REVISED FOR COMMENTS
7	04/15/2021	REVISED FOR COMMENTS
8	05/15/2021	REVISED FOR COMMENTS
9	06/15/2021	REVISED FOR COMMENTS
10	07/15/2021	REVISED FOR COMMENTS
11	08/15/2021	REVISED FOR COMMENTS
12	09/15/2021	REVISED FOR COMMENTS
13	10/15/2021	REVISED FOR COMMENTS
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17	02/15/2022	REVISED FOR COMMENTS
18	03/15/2022	REVISED FOR COMMENTS
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29	02/15/2023	REVISED FOR COMMENTS
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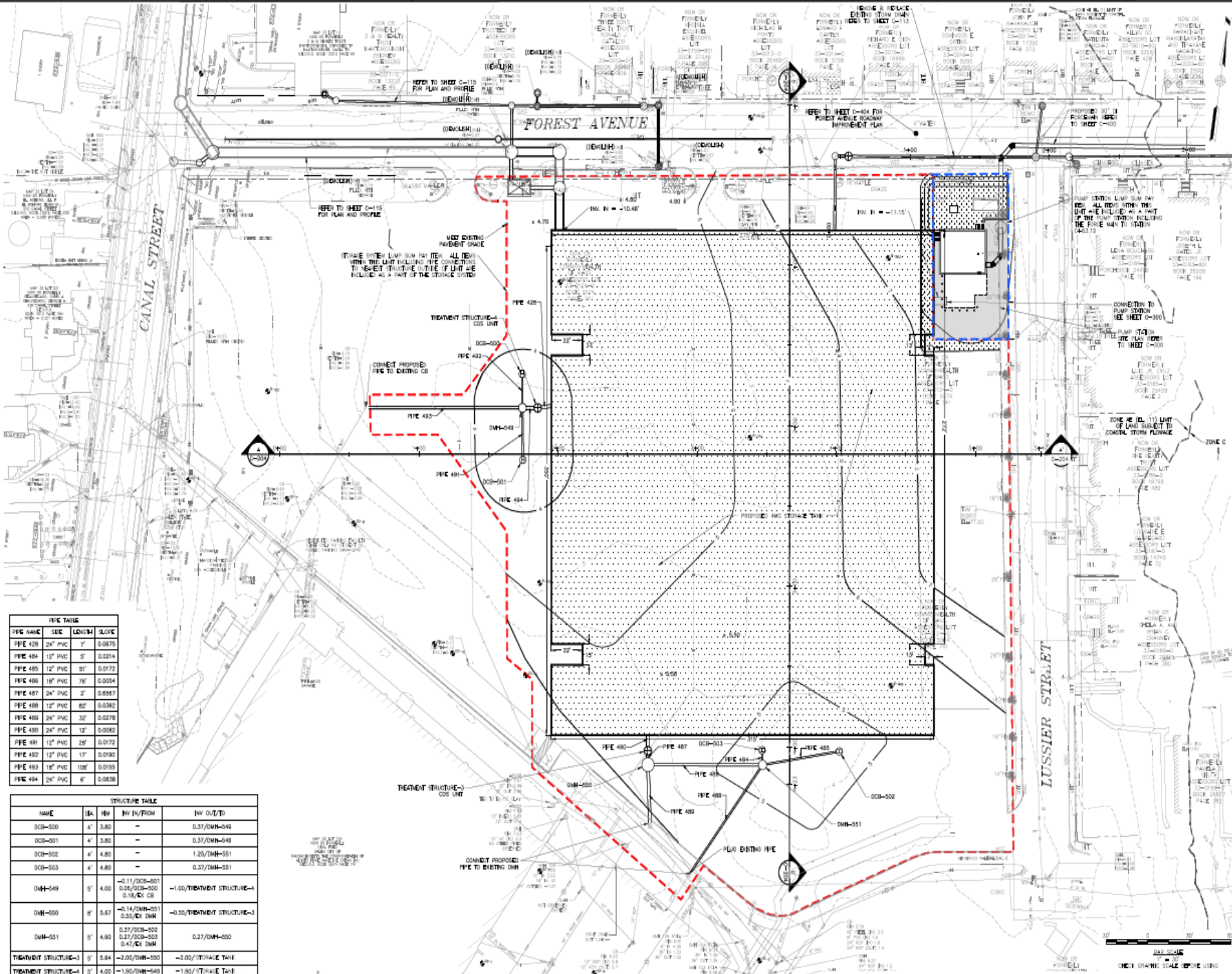
OVERVIEW OF FLOOD MITIGATION IMPROVEMENTS

CITY OF SALEM, MASSACHUSETTS
 DEPARTMENT OF PUBLIC WORKS

CANAL STREET DRAINAGE
 REGION 1, SALEM, MASSACHUSETTS

JOB NO. 224494.02
 DATE 11/2020
 SHEET 1 OF 2

FIGURE 4



PIPE TABLE			
PIPE NAME	SIZE	LENGTH	SLOPE
PPE 428	24" PVC	7'	0.0675
PPE 434	12" PVC	5'	0.0214
PPE 435	12" PVC	31'	0.0172
PPE 436	18" PVC	76'	0.0054
PPE 437	24" PVC	2'	0.0581
PPE 438	12" PVC	82'	0.0382
PPE 439	24" PVC	32'	0.0378
PPE 440	24" PVC	12'	0.0582
PPE 441	12" PVC	28'	0.0172
PPE 442	12" PVC	17'	0.0190
PPE 443	18" PVC	108'	0.0193
PPE 444	24" PVC	6'	0.0538

STRUCTURE TABLE				
NAME	IN	HW	IN IN/FORM	IN OUT/TO
DCH-500	4'	3.80	-	0.37/DCH-549
DCH-501	4'	3.80	-	0.37/DCH-549
DCH-502	4'	4.80	-	1.25/DM-551
DCH-503	4'	4.80	-	0.37/DM-551
DM-549	5'	4.00	-0.11/DCH-501 0.06/DCH-500 0.16/CGS	-1.00/TREATMENT STRUCTURE-4
DM-550	6'	5.67	-0.14/DM-551 0.03/CGS	-0.55/TREATMENT STRUCTURE-3
DM-551	5'	4.80	0.37/DCH-502 0.37/DCH-503 0.47/CGS	0.37/DM-500
TREATMENT STRUCTURE-3	5'	5.64	-2.00/DM-550	-2.00/STORAGE TANK
TREATMENT STRUCTURE-4	5'	4.02	-1.60/DM-549	-1.60/STORAGE TANK

40 Shubert Road, Suite 110
 Andover, MA 01810
 978.750.8971 | www.wardandcurran.com

**WARD
&
CURRAN**
 CONSULTING ENGINEERS

DATE	BY	CHK	REV	DESCRIPTION

**STORAGE FACILITY
GRADING & DRAINAGE PLAN**

CITY OF SALEM, MASSACHUSETTS
 DEPARTMENT OF PUBLIC WORKS
 PHASE II
 CANAL STREET PROJECT
 SALEM, MASSACHUSETTS

FOR NO. 22284204
 DATE: 05/25/2015
 SCALE: AS SHOWN
 SHEET: 23 OF 100

100% DESIGN SUBMITTAL - NOT FOR CONSTRUCTION

C-203



Viewpoint 2 – Lussier street looking northwest towards Forest avenue.



Viewpoint 1 - From southeast looking north across the fence.



\\na\shared\projects\228340_Sistem_Dx - Phase II Flood Mitigation_TDR\DWG\Drawings\Current\VEN\DR\VEN\228340-REC\DRING-Forest River Park_2016-01.dwg, Jun 15, 2016 - 10:46am

A

B

C

D

1

2

3

4

5

6

PROPOSED GRASS SWALE

RELOCATED EXISTING BASKETBALL COURT

PROPOSED DUGOUT (TYP.)

PROPOSED BATTING CAGE

RELOCATED PIONEER VILLAGE ENTRANCE

PROPOSED BOARDWALK

PROPOSED WETLAND REPLICATION (SEE SHEET C-509 FOR DETAILS)

EXISTING POND

PROPOSED CULVERT OUTFALL

LIMIT OF WORK (TYP.)

PROPOSED BENCH (TYP.)

PROPOSED SELECTIVE CLEARING

PROPOSED BIO-RETENTION AREA

PROPOSED PAVEMENT RESURFACING

FIELD LIGHTING (TYP.)

40 Shattuck Road, Suite 110
 Merrimack, MA 01840
 978.792.6371 | www.woodardcurran.com

WOODARD & CURRAN
 CONSULTANTS

COMMITMENT & INTEGRITY DRIVE RESULTS

REV	DESCRIPTION	DATE

CHECKED BY: BP
 DESIGNED BY: MB
 DRAWN BY: MB

**FOREST RIVER PARK
 RENDERING**

CITY OF SALEM, MASSACHUSETTS
 DEPARTMENT OF PUBLIC WORKS

SALEM
 CANAL STREET
 FLOOD MITIGATION PROJECT
 SALEM, MASSACHUSETTS

JOB NO: 228340-04
 DATE: JANUARY 2016
 SCALE: 1" = 20'
 SHEET: 1 OF 1

RENDER

Water Quality Improvements

- New Drainage System to Storage Tank
 - Deep sumps in new catch basins
- Sediment Removal Units Before Tank
- 4.0 mg Storage Tank
 - Further sediment removal
- Floatables Removal
 - Catch basin hoods, sediment removal units and pump screens
- Grass Swale Treatment
- Enhanced BMP's
 - Public Outreach
 - Good House Keeping
 - Street sweeping, etc.

Commercial Street and South River Projects

- Thank you
- Questions and Answers