Stormwater Conveyance System & Green Infrastructure Planning Project

CITY OF PLATTSBURGH

Lake Champlain Basin Program

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Lake Champlain – Lake George Regional Planning Board

LAKE CHAMPLAIN BASIN PROGRAM TECHNICAL ADVISORY COMMITTEE

December 3, 2014

SEAL OF THE CITY OF PLATTSBURGH
IPSI SIBI FRAMIUM VIRCUS
MARCH 29, 1902

City of Plattsburgh

The City of Plattsburgh is the largest urbanized population center on the New York shore of Lake Champlain

Population: 19,989
Area: 6.6 Sq. mi

City of Plattsburgh Background Information

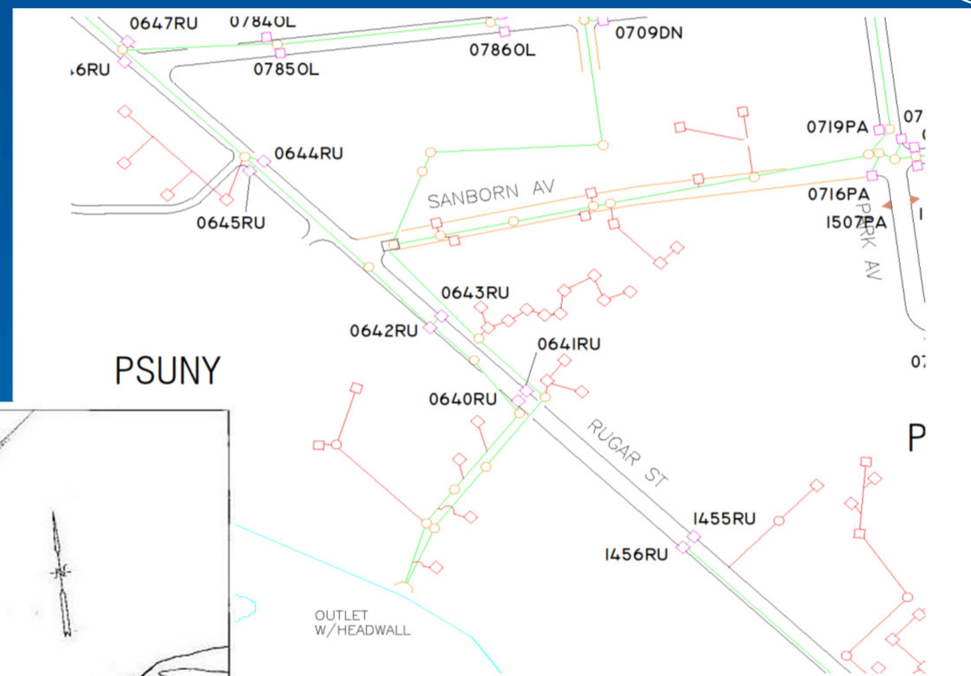
- Shoreline: 5.5 Miles
- Miles of Street: 61 miles
- Storm Sewer: 108,022 feet (20 miles)
- Sanitary/Combined Sewer: 267,000 feet (50 miles)

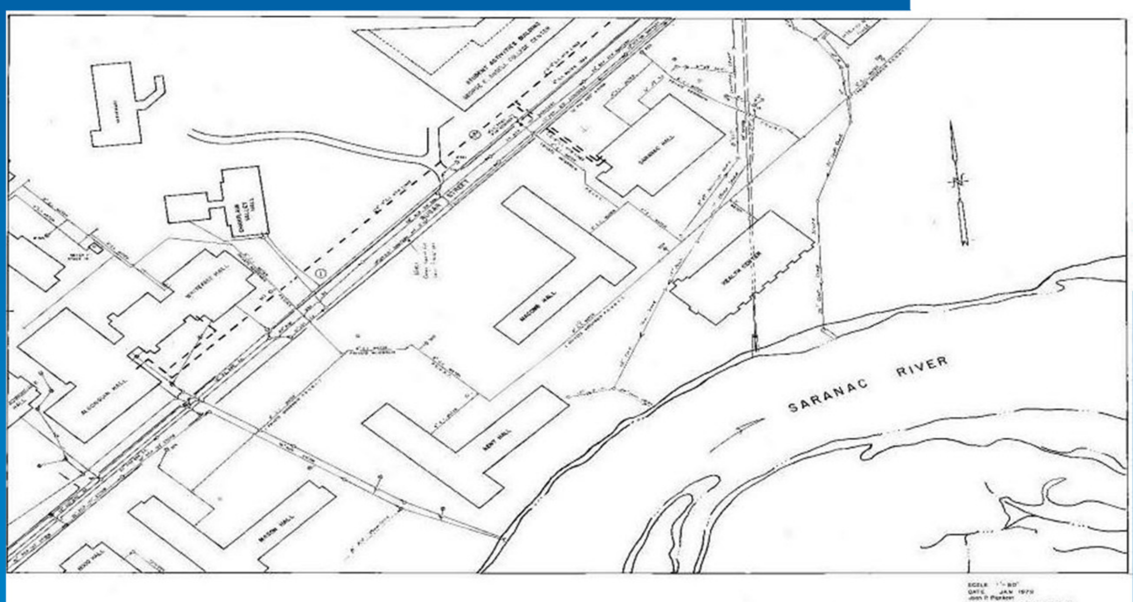
Project Objectives

- GIS based mapping of City Stormwater System
- Calculation of flow, storage within system and discharge
- Assess vulnerabilities
- Green Infrastructure opportunities/implementation
- Public education

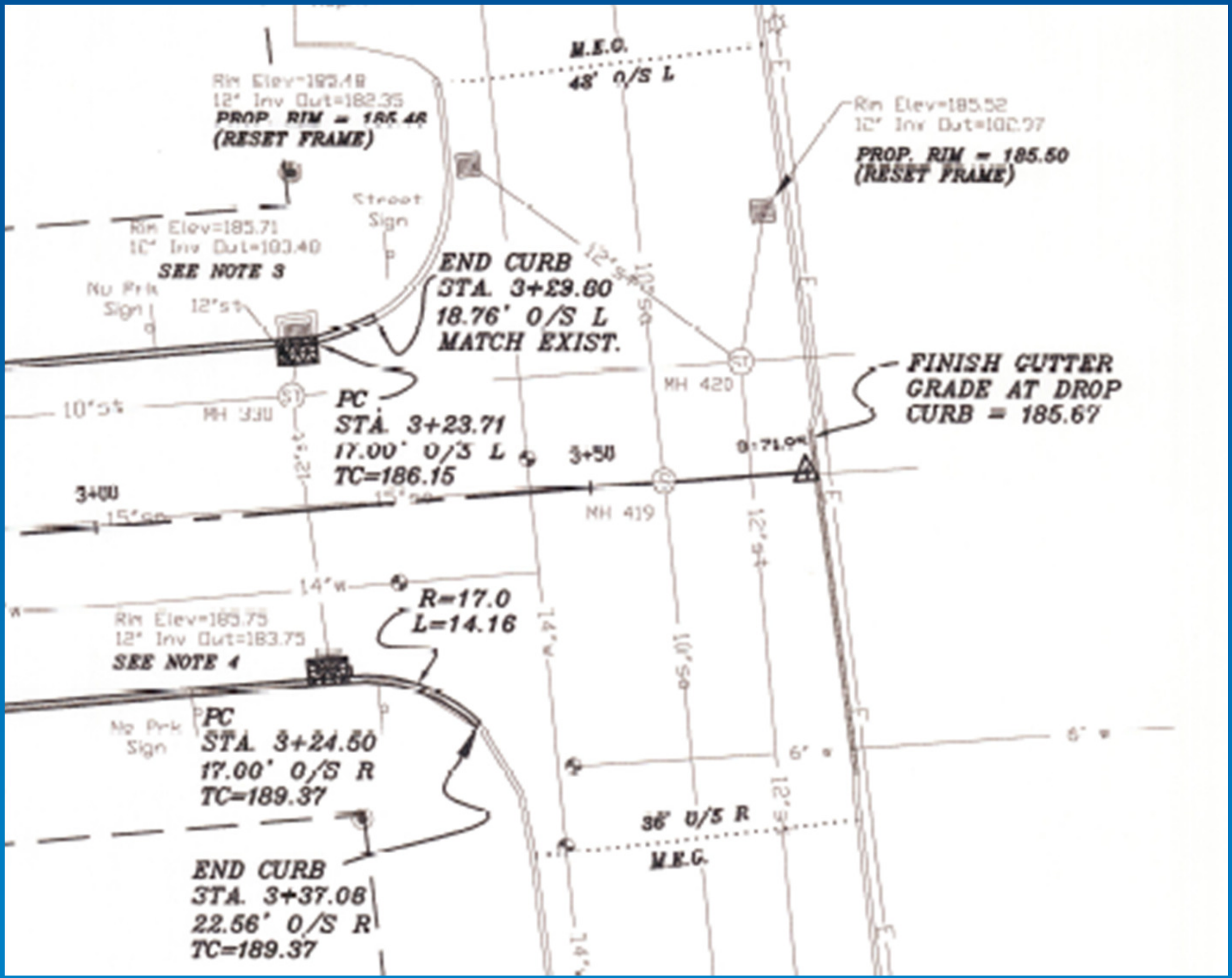
Lake Champlain Basin Program

Compile & Digitize
Existing Stormwater Infrastructure Maps



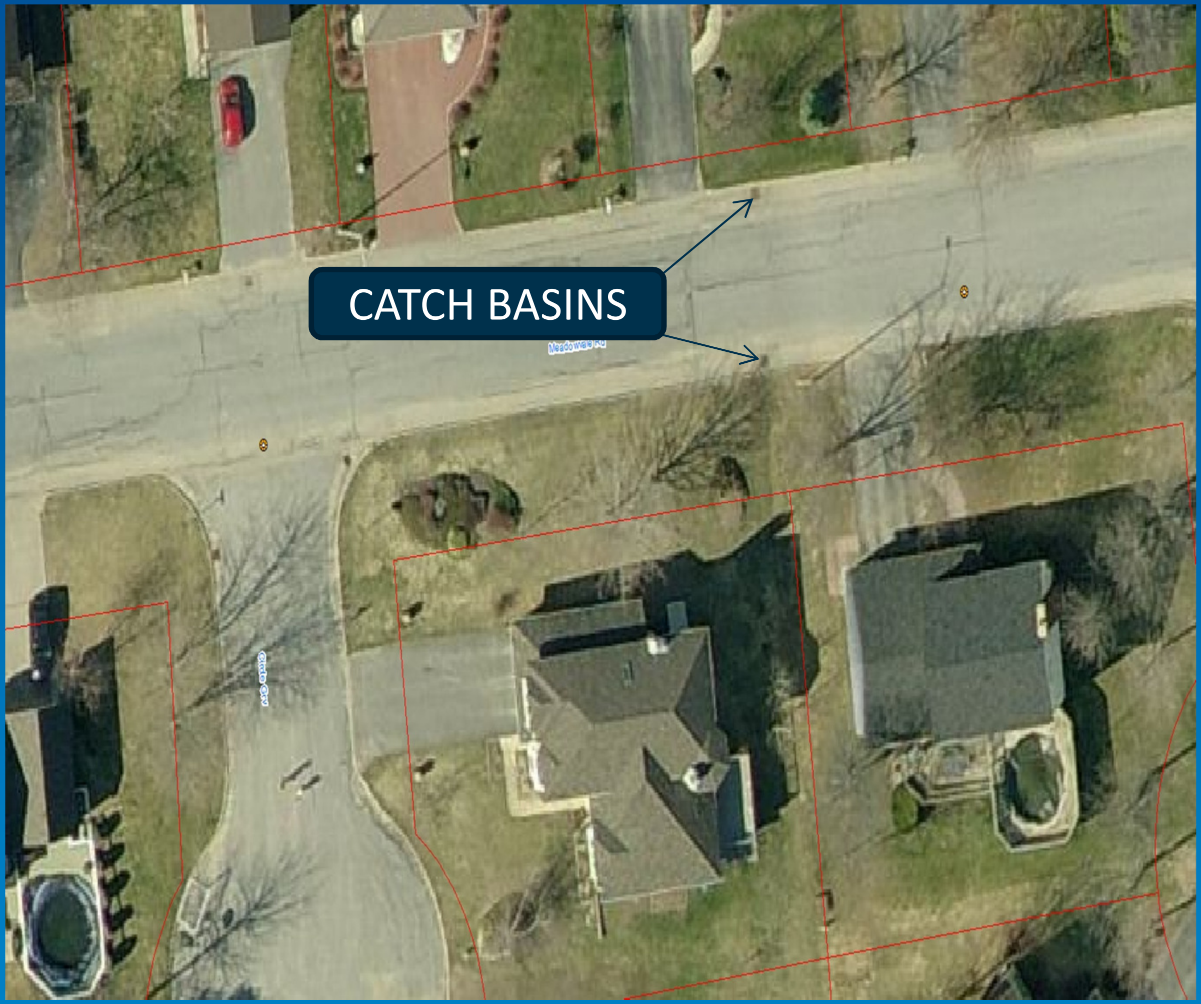


Compile & Digitize
Existing Stormwater Infrastructure Maps



Geometrically correct (Ortho-rectify) data

- Storm sewer manholes and catch basins data:
  - rim/invert elevation
  - Material
  - frame & grate type
- Storm sewer mains:
  - Diameter
  - Length
  - Material
  - Year installed



Complete Stormwater Infrastructure Mapping

- Geometrically correct positional discrepancies
- Field GPS Survey
  - 2,400 catch basins
  - 660 manholes

Complete Stormwater Infrastructure Mapping

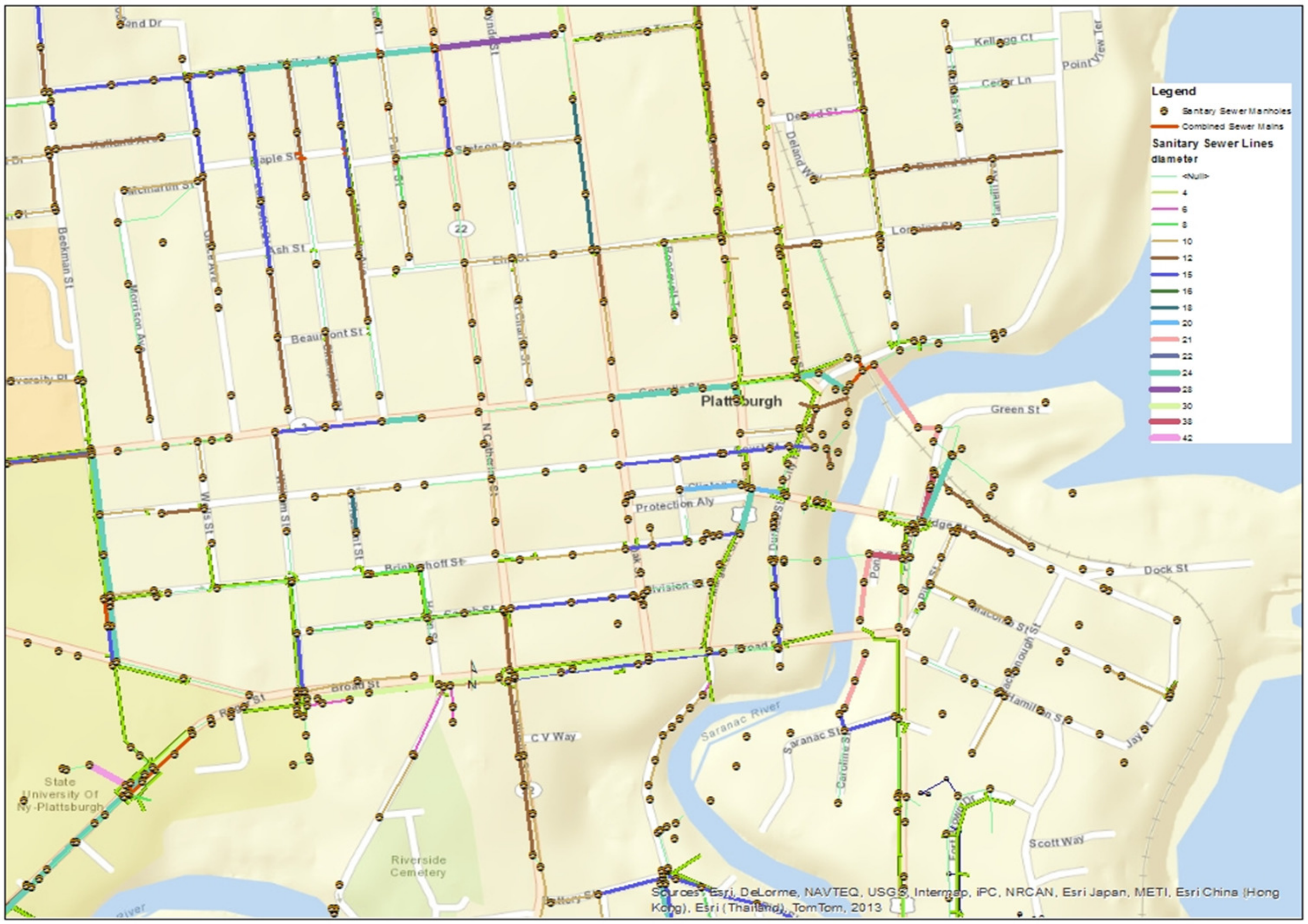


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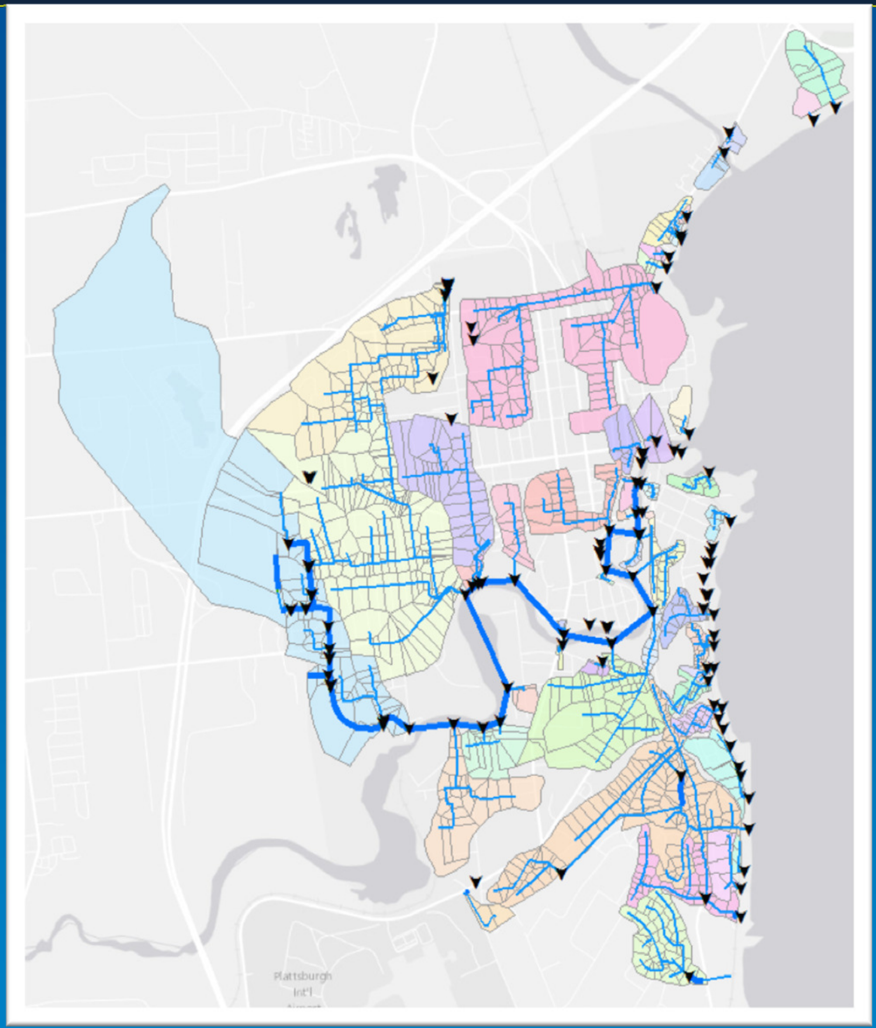
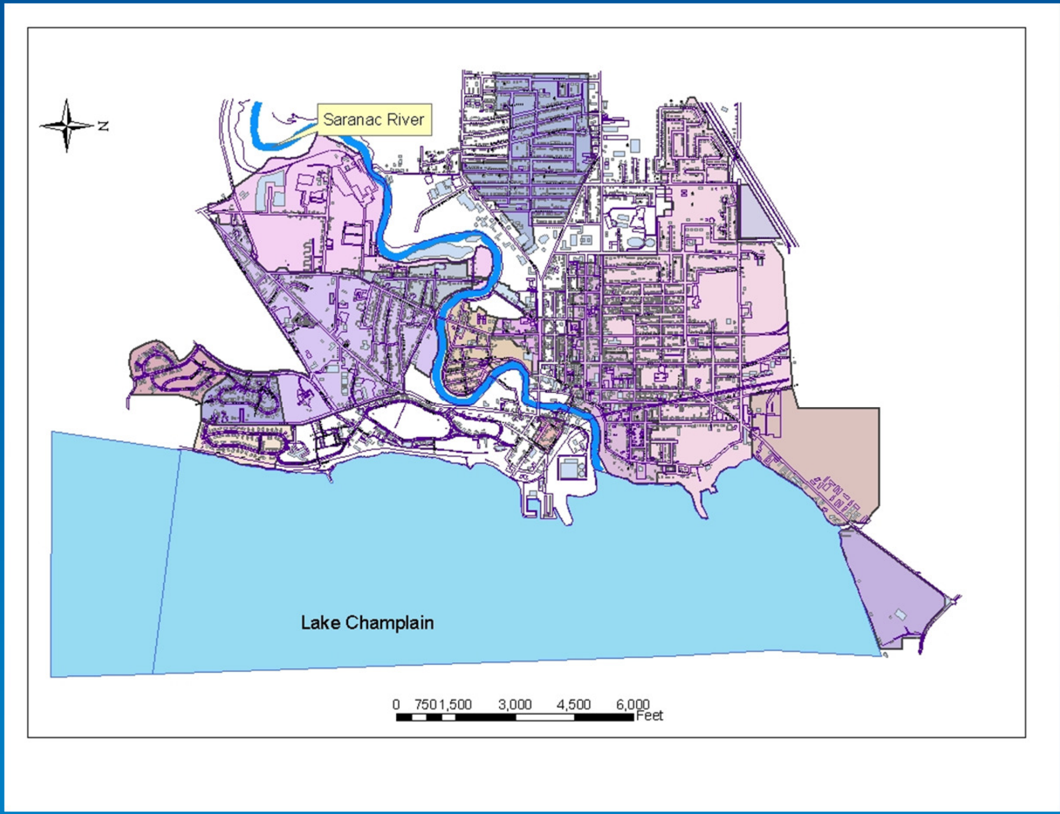
Fig. 3-2 – Modeled sub sewersheds



Delineation of Sub-Sewersheds

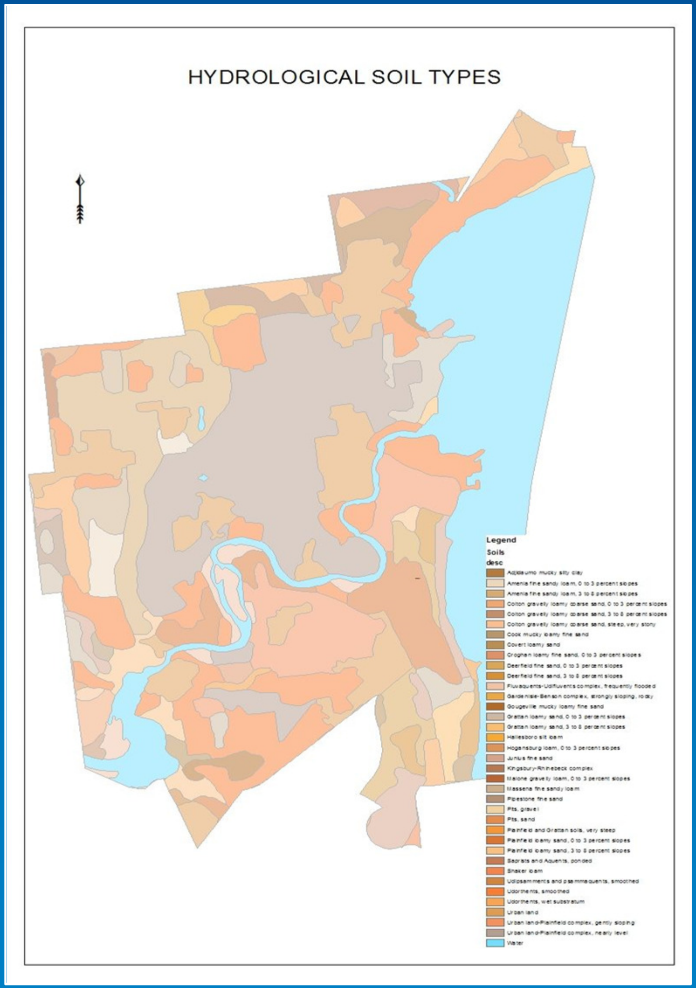
- Digital Elevation Model overlaid with completed stormwater infrastructure map

- Field verification as necessary



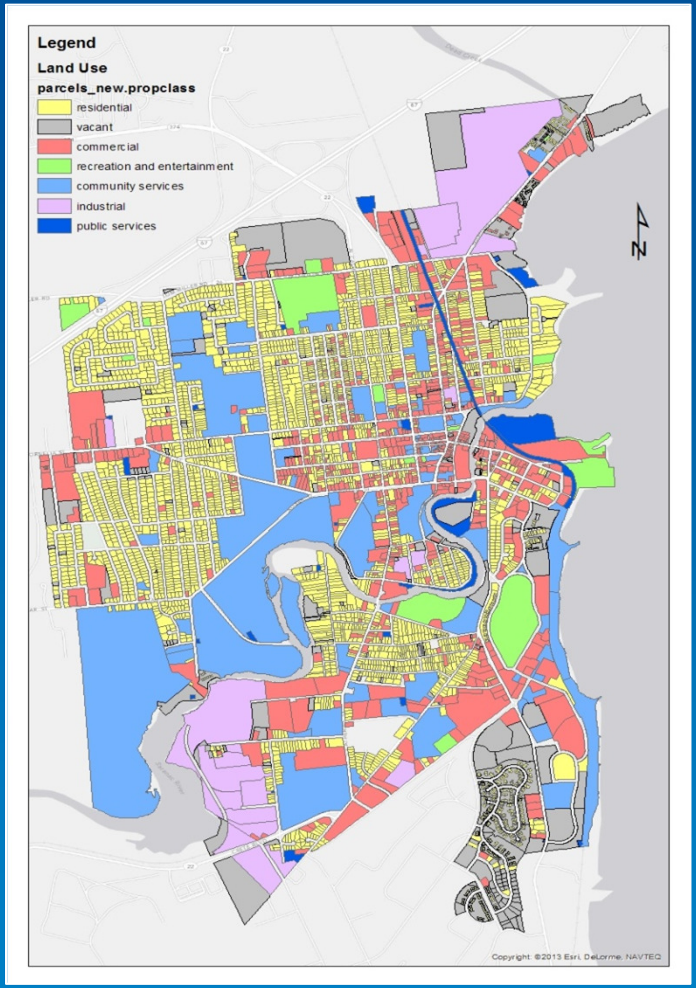
Calculate runoff, discharge and storage volume

- Identify hydrological soil types (Group A,B,C,D)



Calculate runoff, discharge and storage volume

- Identify land use

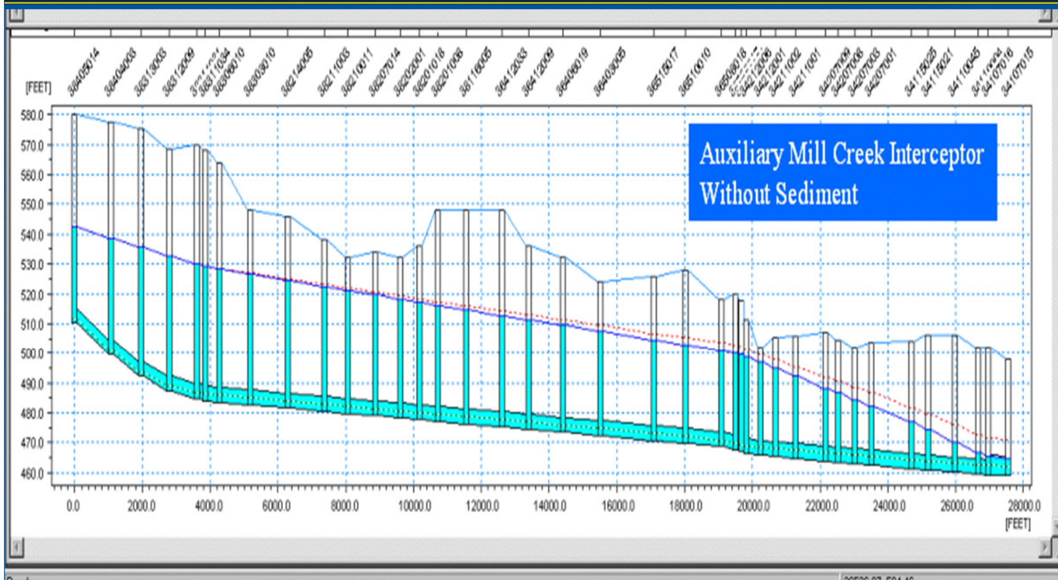


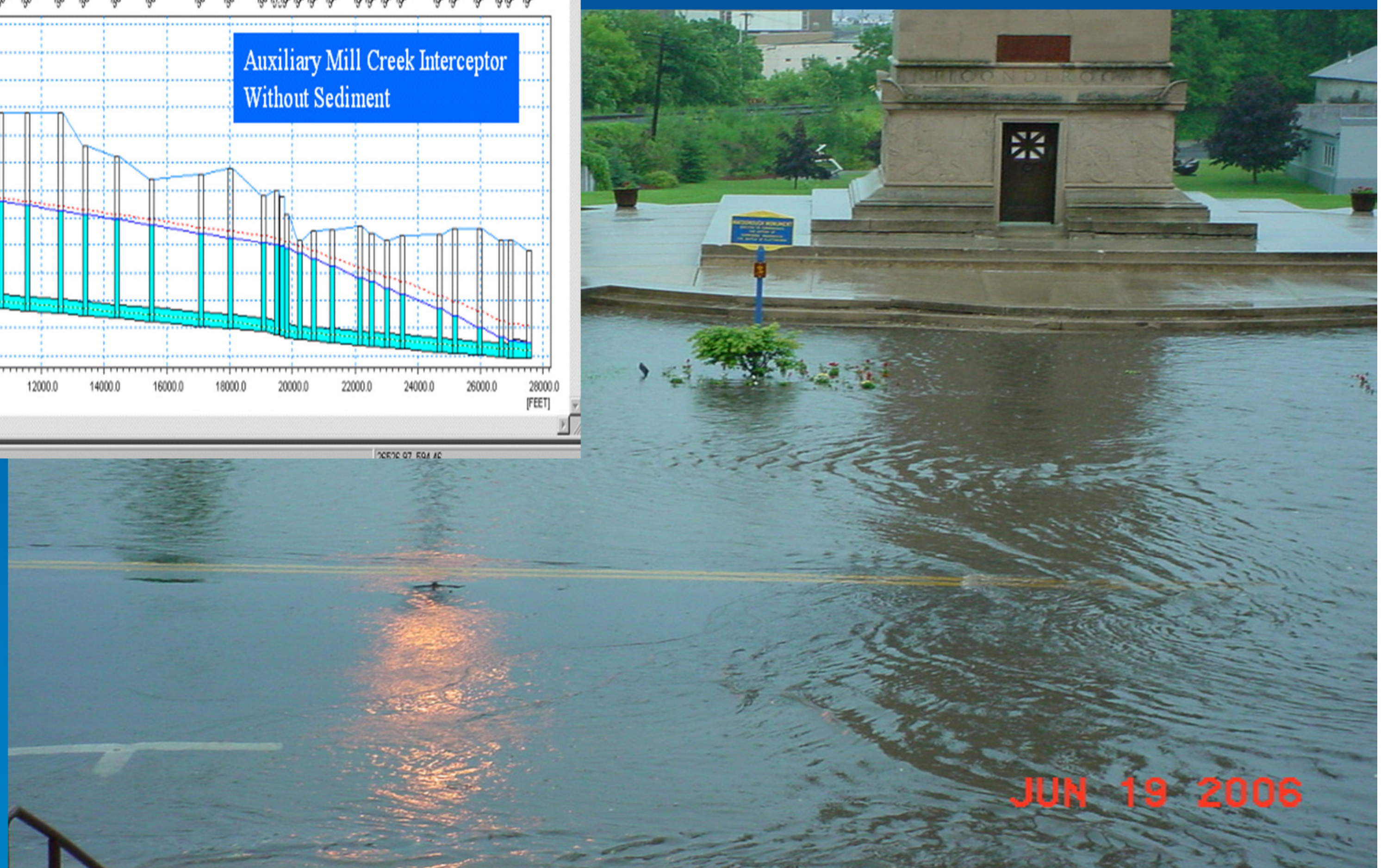
Calculate Runoff, Discharge and Storage Volume

- Use EPA Stormwater Management Model (SWMM) along with historical rainfall and snowmelt data to characterize the frequency and volume of discharges to receiving waters from the storm sewer system

- Dynamic rainfall-runoff simulation model used for single event and long term (continuous) simulation

Identify System Vulnerabilities using SWMM5





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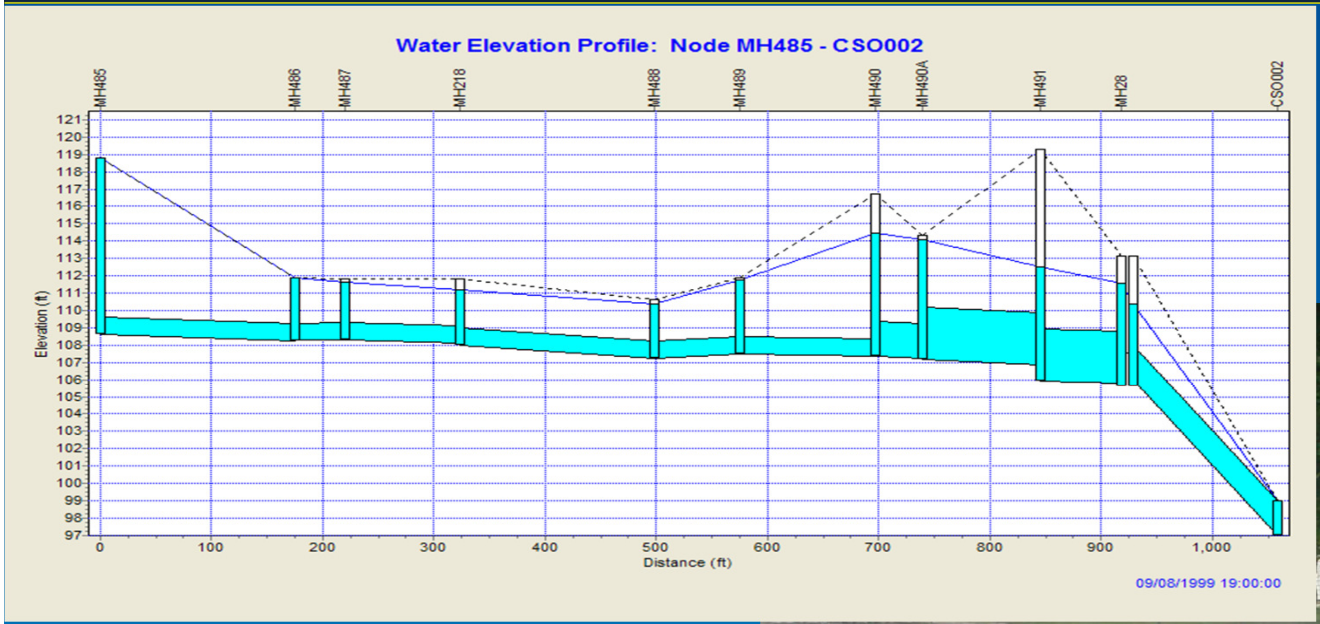
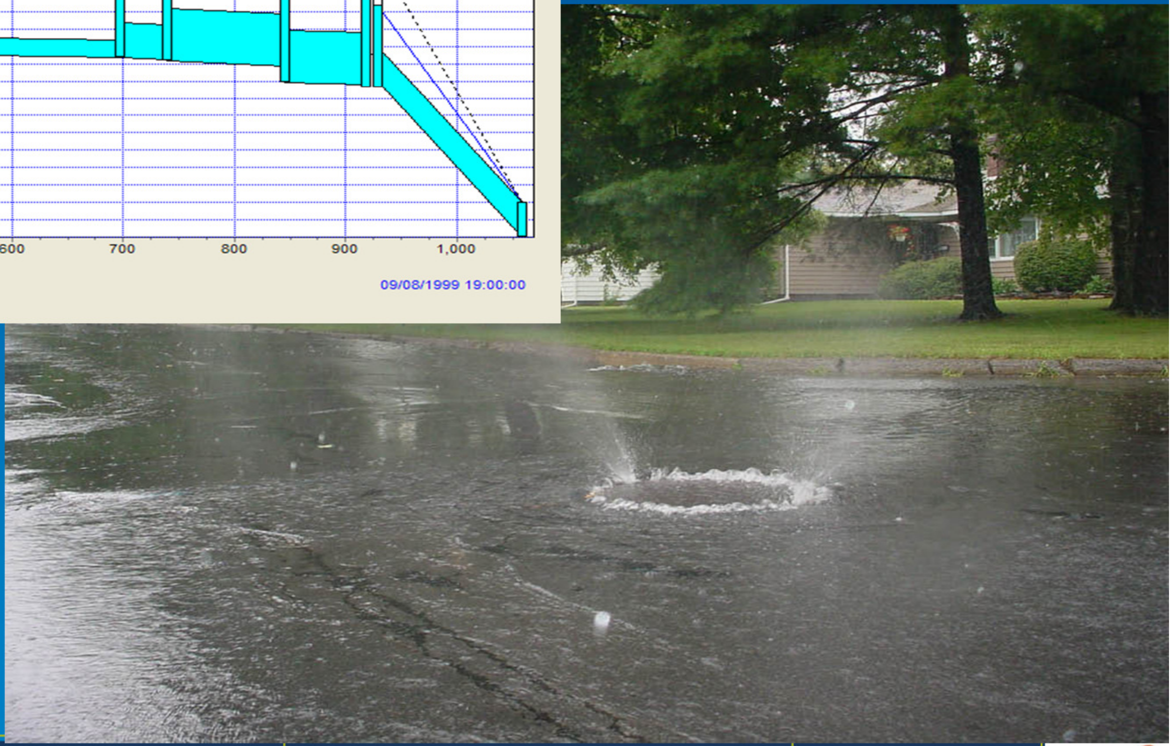
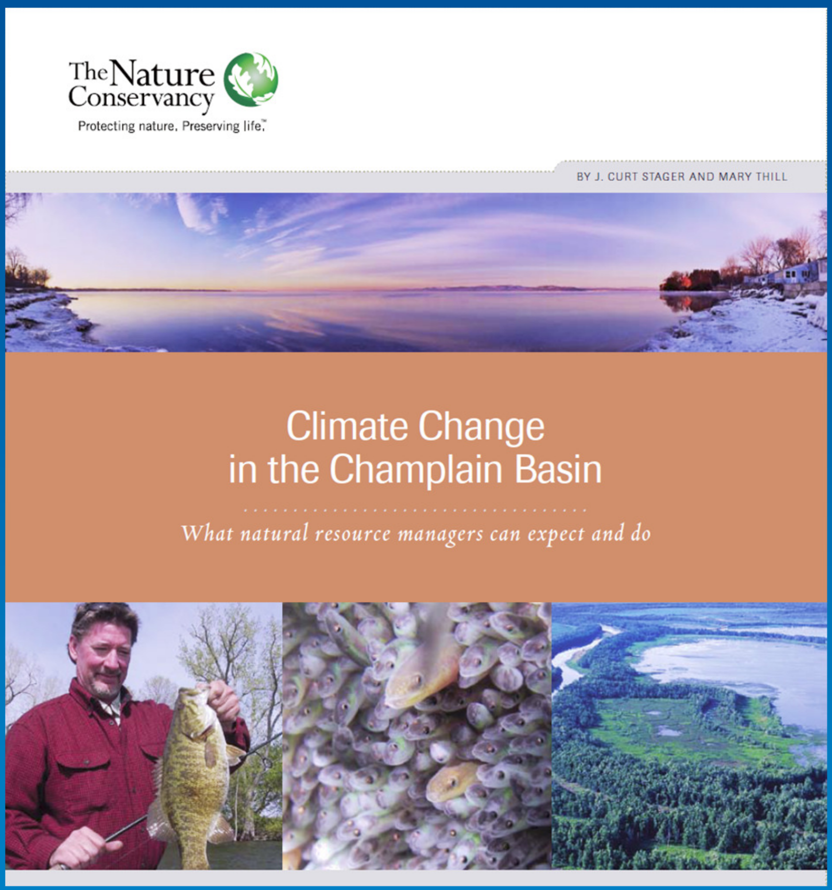
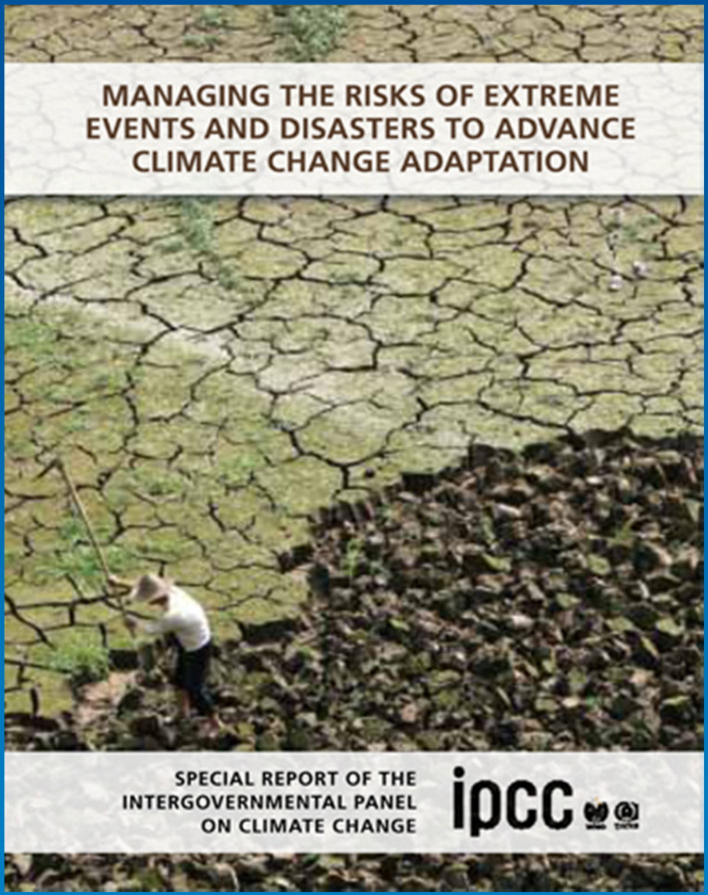
Assessing System Vulnerabilities





Climate Change & Vulnerability





24-Hour Precipitation Projections

Table 3-3. 24-hour Precipitation Frequency Current Estimates and Projections

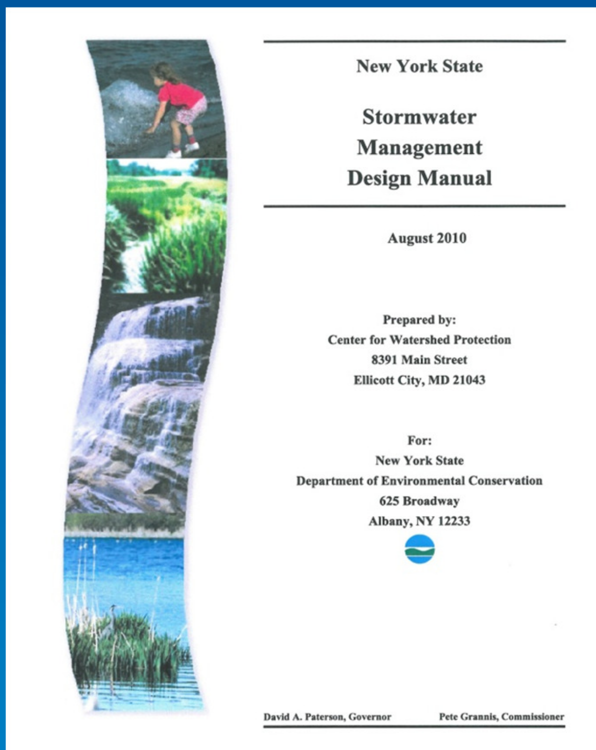
ARI (y)	NRCC / Plattsburgh	EPA CREAT / Peru NY			
		2010	2035	2060	2100
5	2.62	2.4	2.5	2.6	2.8
10	3.04	2.9	3.1	3.2	3.4
25	3.71	3.7	3.9	4.1	4.4
50	4.32	4.5	4.7	4.9	5.2
100	5.02	5.4	5.7	5.9	6.3

ARI: Average recurrence interval

Gray shading indicates values directly from CREAT; others interpolated or extrapolated

GI Retrofit Project Design and Construction

GI Project design and implementation using NYSDEC Stormwater Design Manual


New York State

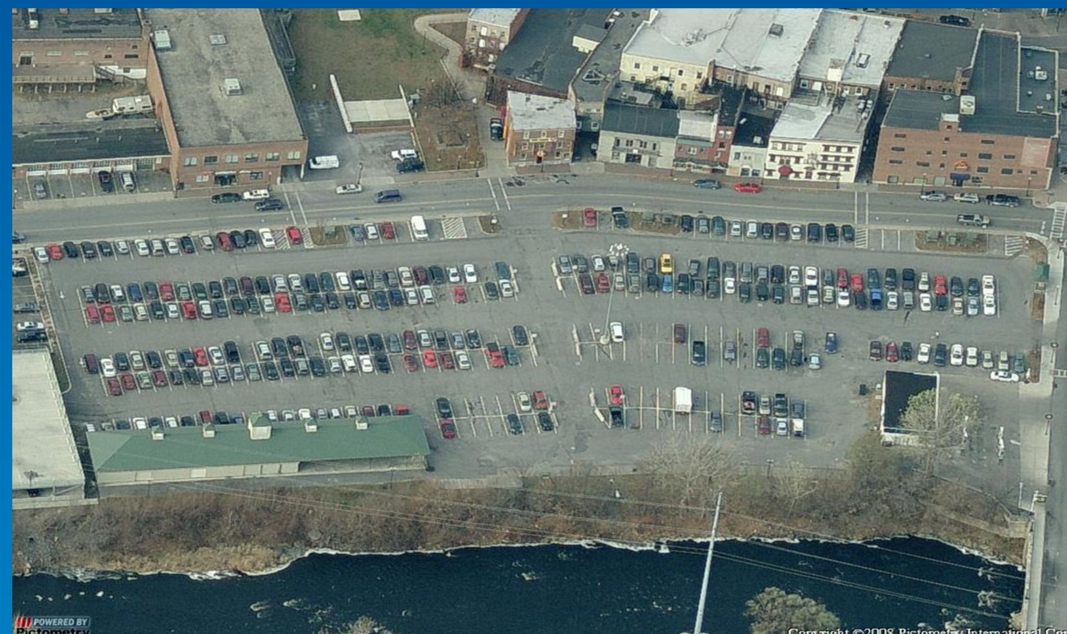
Stormwater Management Design Manual

August 2010

Prepared by:
Center for Watershed Protection
8391 Main Street
Ellicott City, MD 21043

For:
New York State
Department of Environmental Conservation
625 Broadway
Albany, NY 12233

David A. Paterson, Governor   Pete Grannis, Commissioner



Municipal Parking Lot at Durkee Street

NYSDEC Stormwater Design Manual
Chapter 5 – Green Infrastructure Practices

Section 5.3 – Runoff Reduction

This section presents a series of green infrastructure principles and practices that can be incorporated in the site design to allow for:

- micro management of runoff
- promote groundwater recharge
- increase losses through evapotranspiration
- emulate the preconstruction hydrology, resulting in reduced water–quality-treatment volume.

Green Infrastructure (GI) Technologies Evaluation

- GI practices evaluated to reduce stormwater runoff and improve stormwater quality
  - Disconnection of rooftop runoff
  - Rainwater harvesting–rain barrels/cisterns
  - Infiltration planters
  - Rain gardens
  - Tree pits
  - Porous pavements
  - Green roofs
  - Stream daylighting
  - Stormwater planters

Details, Details

- Validity of soils data
  - Soil infiltration rates
- Groundwater impacts
  - Depth (2-ft separation)
  - Flow paths
- Institutional issues
  - Who owns/maintains the treatment units ?
  - Who pays ?
  - What happens in more densely developed communities?

Site Evaluation Ranking Matrix Parameters and Ranking Criteria

SITE EVALUATION	POINT SCORING				
	5	4	3	2	1
Level of coordination necessary to implement GI project	Low		Moderate		High
Is the property City owned?	Yes		Easement/ROW		No
SUBWATERSHED ASSESSMENT					
Site Slope	0 to 4%	5 to 8%	9 to 12%	13 to 15%	16+%
Hydrologic Soil Group	A	B	C	C/D	D
Acreage available for siting GI projects	>5 acres	3 to 4 acres	2 to 3 acres	1 to 2 acres	< 1 acre
FLOOD REDUCTION					
Is the site within a flood prone area?	Directly		Bordering		No
For the 5 year design storm, are storm manholes surcharged above the ground surface?	Yes				No
For the 10-year design storm, what level of flooding occurs in in the site or manholes directly upstream of the site?	0.5 to 1.0 MG	0.1 to 0.5 MG	0.01 to 0.1 MG	<0.01 MG	
Does the site or the area immediately around the site contribute to flood problems downstream in the sub-sewershed?	Yes		Possibly		No
Number of Combined Sewer Overflow (CSO) events in the subwatershed over the past 5 years	10+	7 to 9	4 to 6	1 to 3	0
POLLUTANT REDUCTION					
Proximity to storm sewer system inlet	0 to 50 ft	51 to 100 ft	101 to 150 ft	151 to 200 ft	201 + ft
Existing stormwater treatment system?	No				Yes
Major land use within sub-watershed	Industrial or densely populated	Industrial/ Commercial	Commercial	Commercial/ Residential	Residential/ Schools
Imperviousness of sub-watershed	High	High – Moderate	Moderate	Low-Moderate	Low
Does this project address a direct discharge into:	Lake Champlain		Saranac River		Other
Will the project reduce stormwater flow into a CSO?	Yes		Possibly		No
NATURAL SYSTEM ENHANCEMENT					
Will a GI project enhance or preserve existing natural vegetation?	Yes		Possibly		No
PROJECT BENEFITS					
Will the project cultivate educational opportunities (base on location, accessibility, to public, amt. of foot traffic)?	Yes, highly visible	Yes, moderately visible	Moderate	Low to Moderate	No

Modeled Hydraulic Network

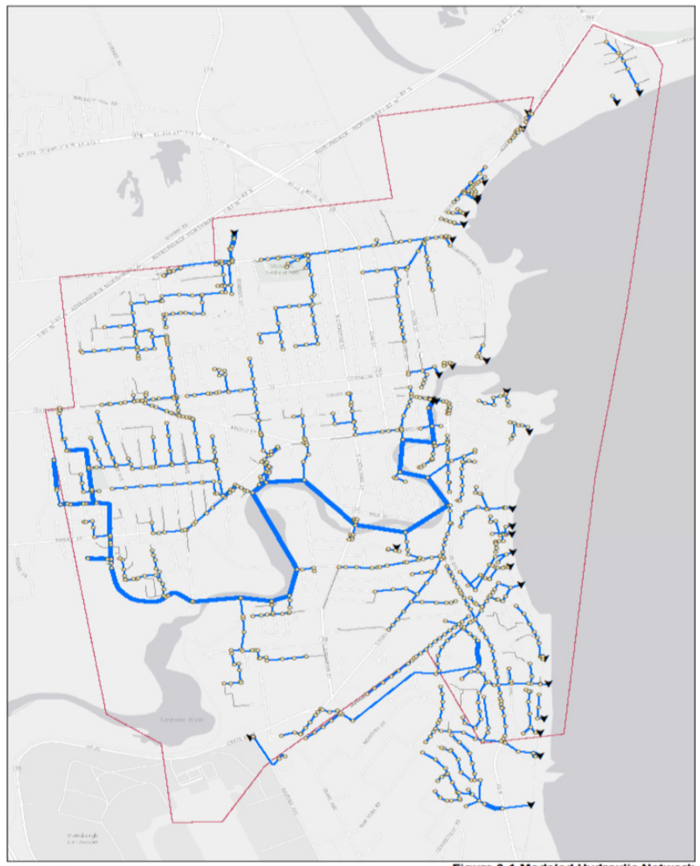
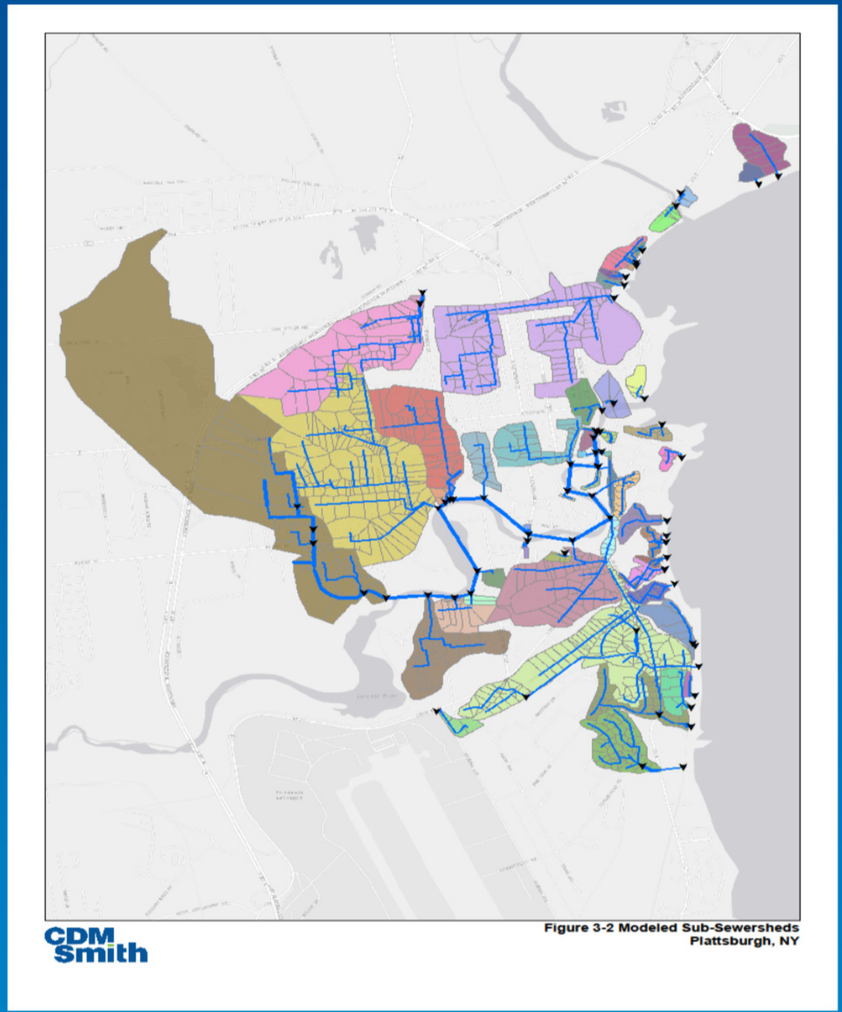


Figure 3-1 Modeled Hydraulic Network
Plattsburgh, NY

Sub-Sewersheds



Simulated Flooding and Minimum Depth Below Rim
5-Year Design Storm

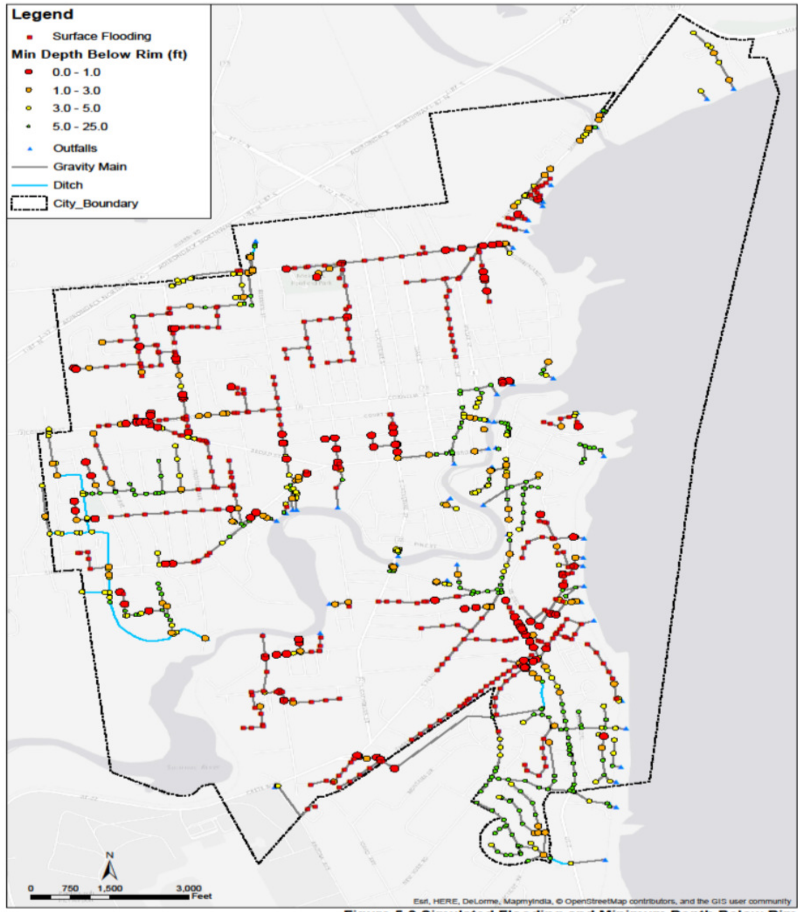
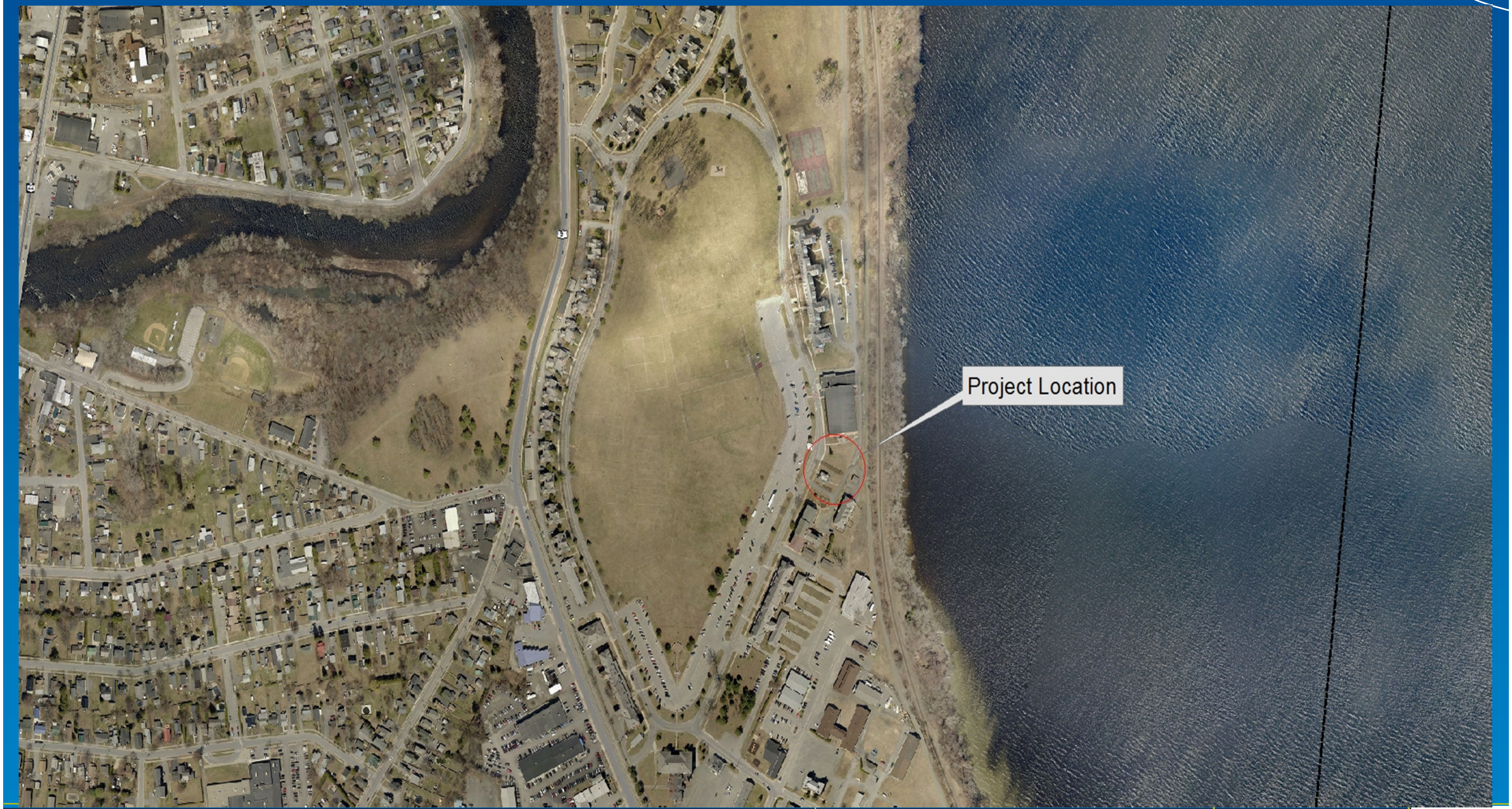


Figure 5-3 Simulated Flooding and Minimum Depth Below Rim
5-yr Design Storm
Plattsburgh, NY

Simulated Flooding and Minimum Depth Below Rim
5-Year Design Storm

U.S. Oval Parking Lot



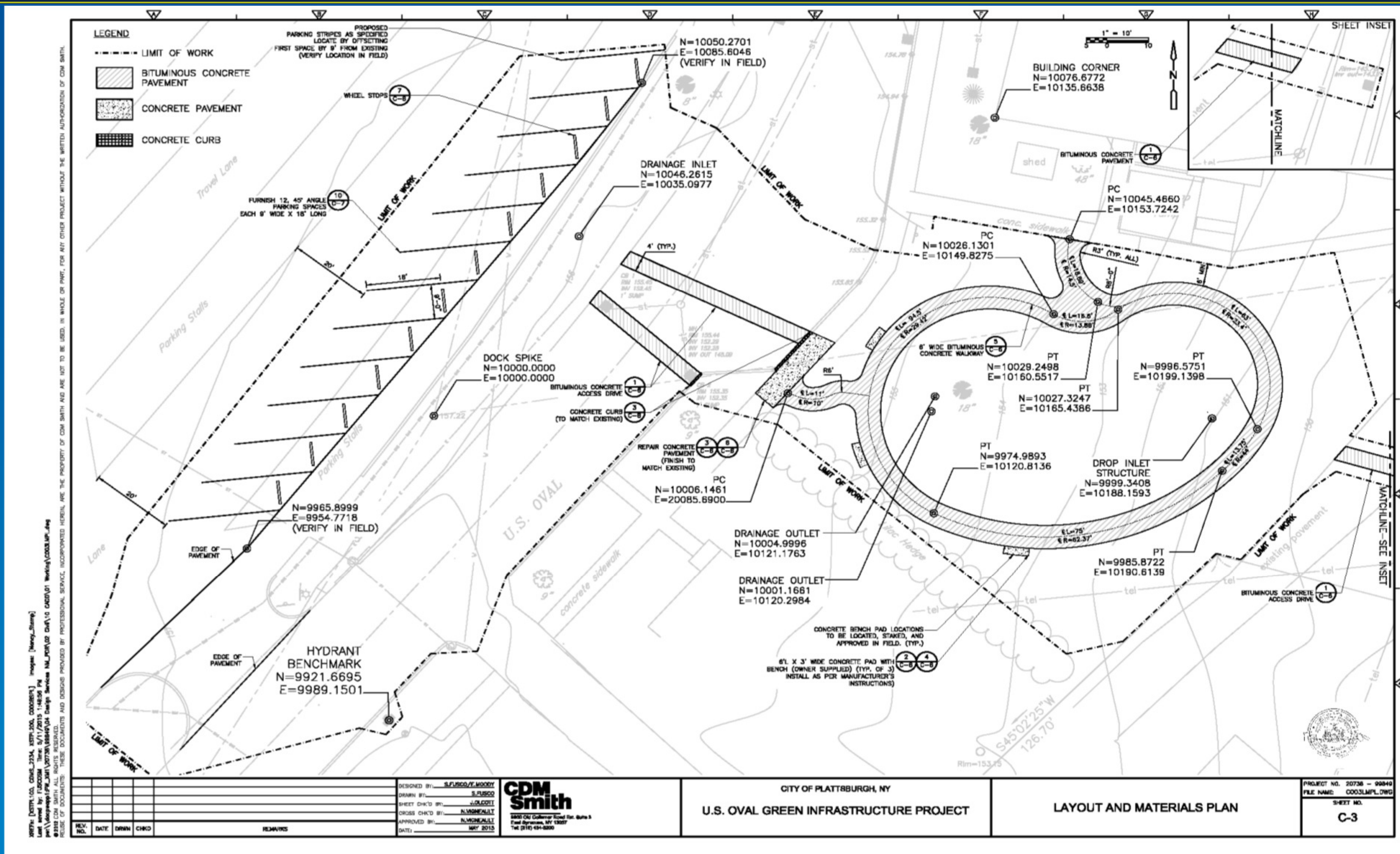
Bioretention Basin Project Location

U.S. Oval Parking Lot

Bioretention Basin Project Location

Flooding at U.S. Oval

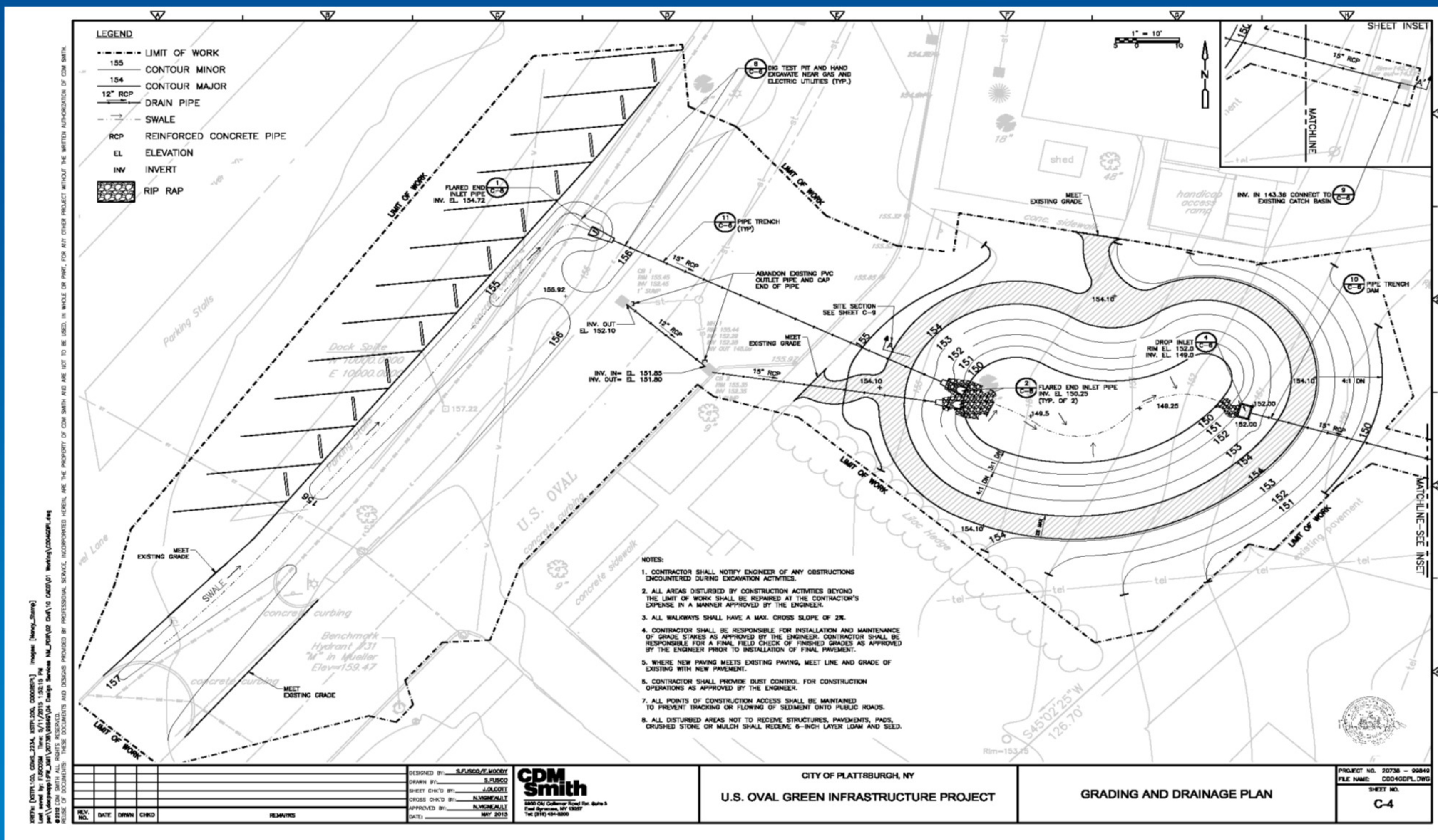
Bioretention Basin
Site Plan



NYWEA

Bioretention Basin
construction progress photo

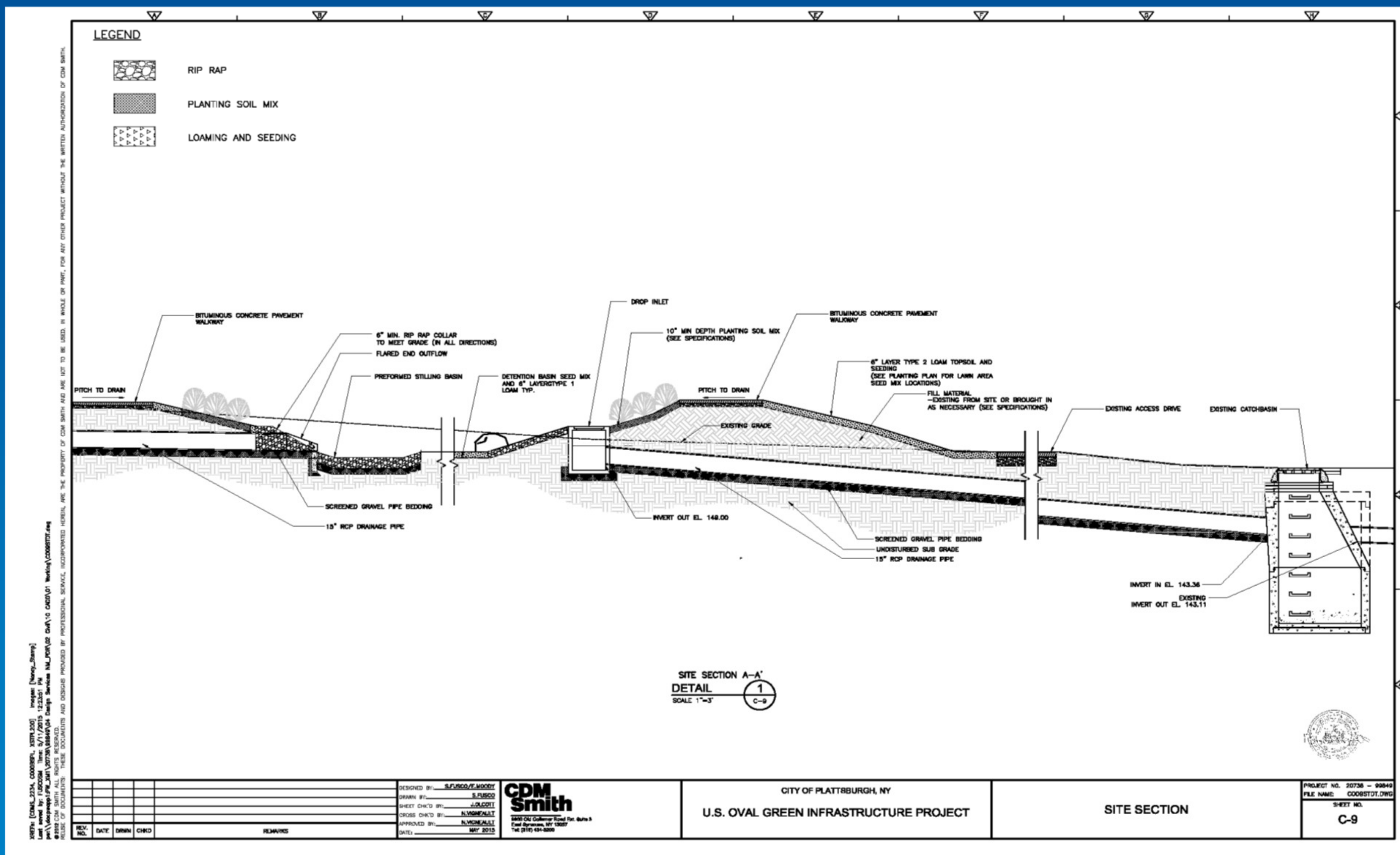
Bioretention Basin Grading Plan



NYWEA

Bioretention Basin

Bioretention Basin Profile



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Bioretention Basin
Public Outreach Workshop

Public Outreach Workshops

Broaden the objectives to encourage use by public

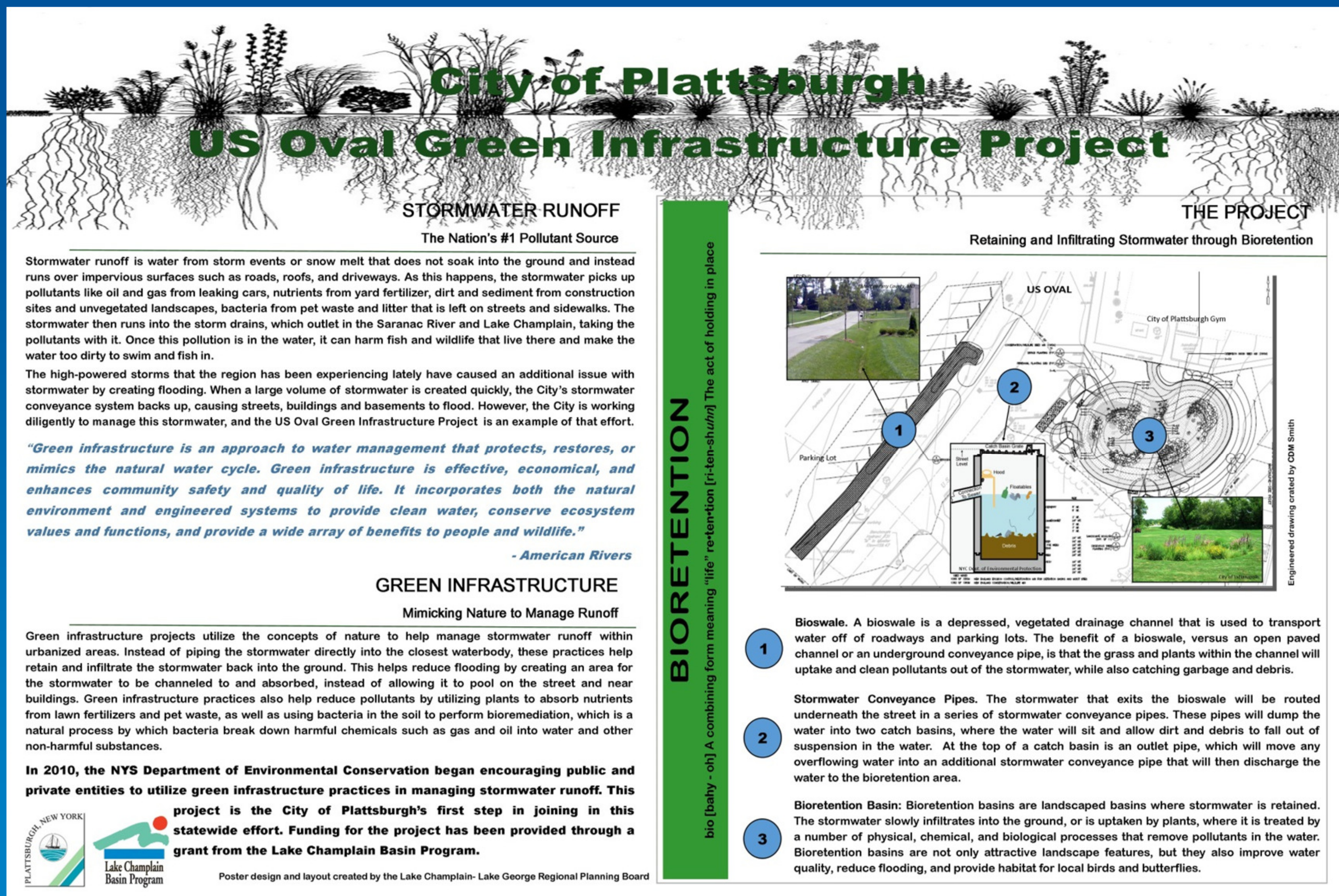
Reasons to incorporate GI into projects is not limited to only flood avoidance and pollutant reduction

- Also Consider:
  - Creation of habitat
  - Increased land value
  - Improved neighborhood/aesthetics
  - Groundwater recharge
  - Water quality improvement
  - Erosion control – attenuate peak flow rate
  - Educational value – promote watershed education and stewardship

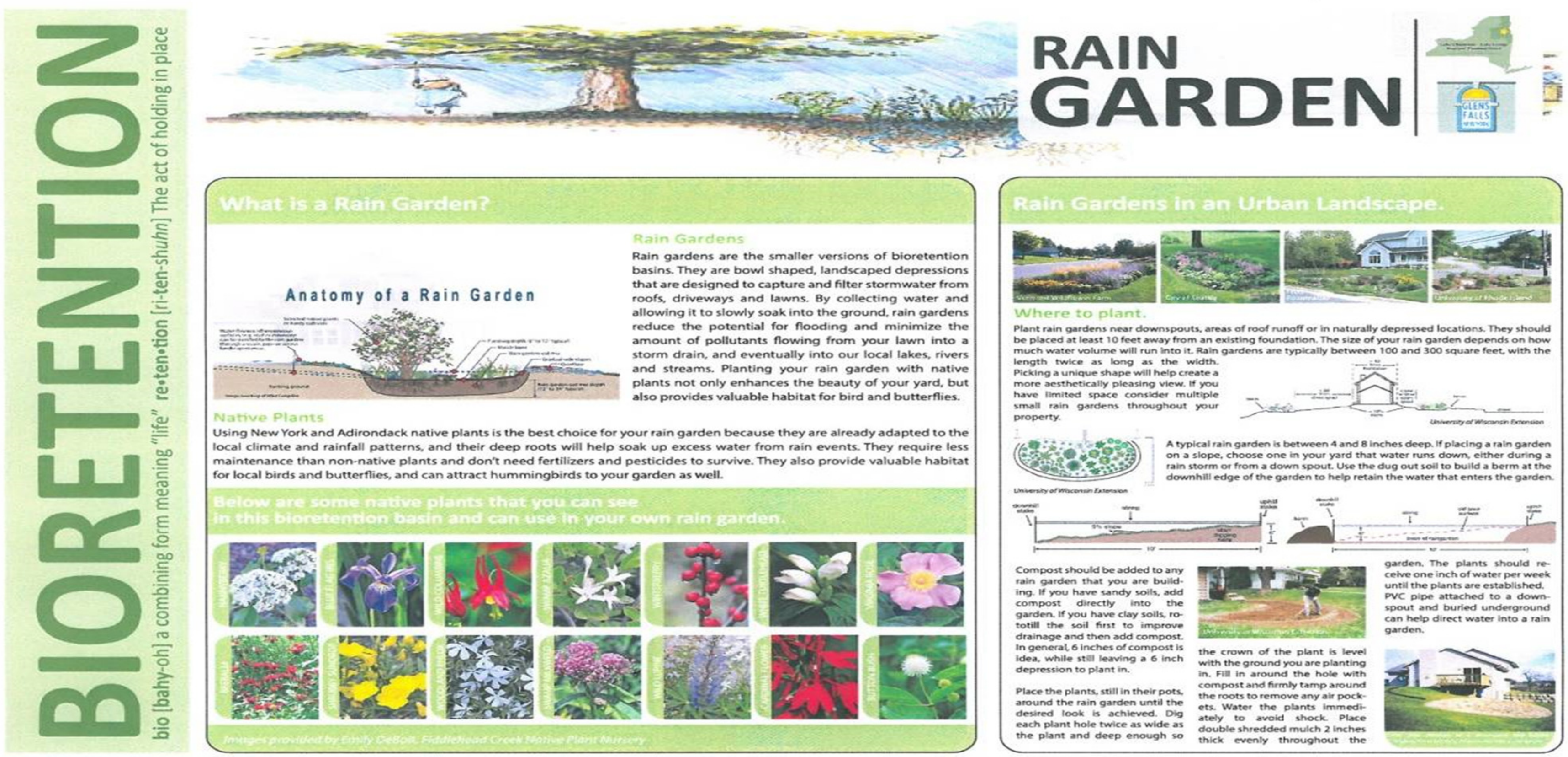
Embracing Stormwater Management in Site Design

NYWEA

U.S. Oval Green Infrastructure Project Poster



Educational Signage



Lake Champlain Basin Program

Introducing Homeowners to Green Infrastructure

Lake Champlain is listed on the NY Department of Environmental Conservation's Impaired Waterbodies List due to an increased amount of pollution within its water. The major contributor of this pollution is stormwater runoff. Stormwater runoff is water from rain or melting snow that does not soak into the ground. Instead, it runs over impervious surfaces, for example roofs, driveways, patios and sidewalks.

The City of Plattsburgh is committed to helping reduce stormwater pollution from entering into the Saranac River and Lake Champlain, as well as reducing the amount of flooding on its streets. The City has taken many steps to improve stormwater conveyance and retention, and is now asking the homeowners within the City to join them. Together, we can create a sustainable City that is a great place to live, work and visit.

City of Plattsburgh

INTRODUCING HOMEOWNERS TO GREEN INFRASTRUCTURE

"Informing the public about the condition of the Lake is critical in restoring and protecting water quality and the diverse natural and cultural resources of the Basin. By enhancing the public's understanding and appreciation of water quality, fisheries, wetlands, wildlife, recreation, and cultural heritage, it will foster a sense of personal responsibility that leads to improved stewardship of the Basin's resources."

Lake Champlain Basin Program
State of the Lake Report

As the stormwater moves across impervious surfaces it picks up pollutants such as gas, oil, litter, fertilizers and pet waste. The stormwater then runs into the storm drains, which discharge to Lake Champlain and the Saranac River. These pollutants can have a negative effect on the Lake by causing excess algae and plant growth, which harms fish populations and the quality of the Lake's water for swimming and drinking.

But you can help! By installing a small green infrastructure practice on your property!

For more information, please contact

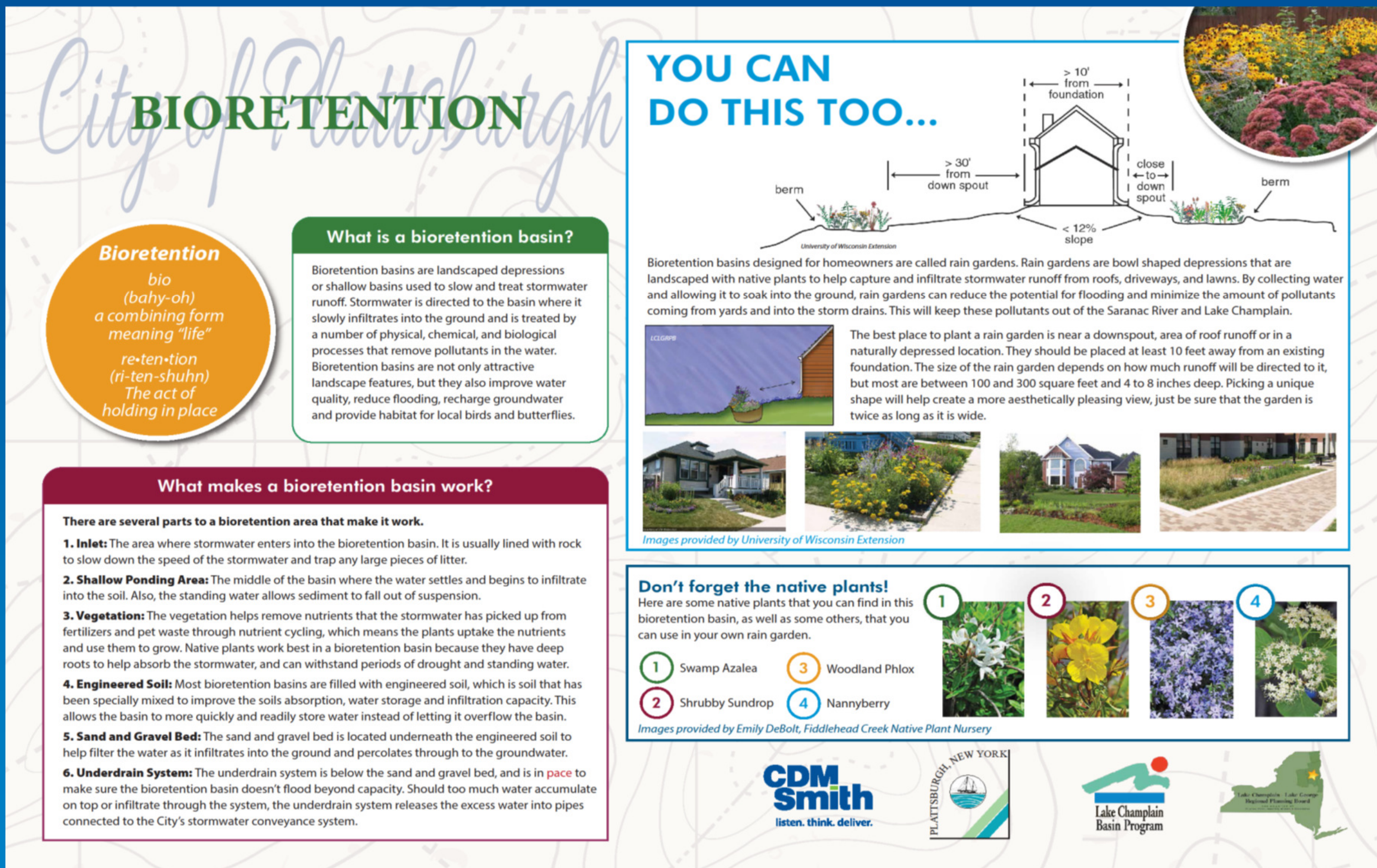
City of Plattsburgh
Engineering and Planning Department
41 City Hall Place
Plattsburgh, NY 12901

Monday through Friday
8:00 am to 4:00 pm
Phone (518) 563-7730

Lake Champlain Basin Program

PLATTSBURGH, NEW YORK

You can do this too….



Results

- Completed mapping system to identify areas for improvement within the City's sub-surface infrastructure
- City is better prepared to address stormwater volume reductions and stormwater quality improvements
- Aid to elected officials within the City in making important choices for the betterment of Lake Champlain as a whole.
- Able to plan for vulnerable areas within the City should be weather patterns continue as they have in recent years.
- Public education regarding green infrastructure technologies not only for the improvement of water quantity and quality, but also for the quality of life of the residents within the City.

Questions?