Green Infrastructure in the Greater Lansing Area

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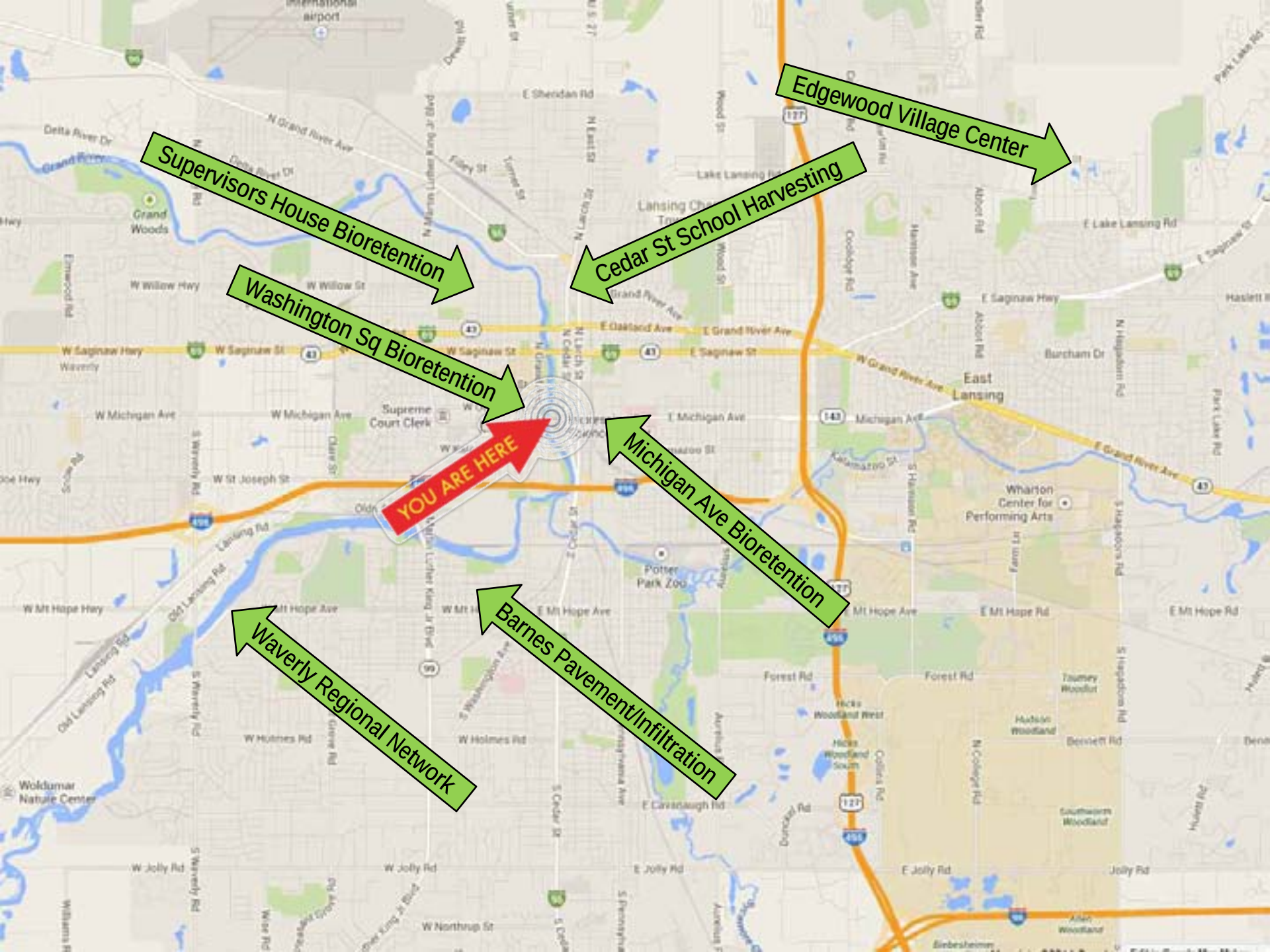
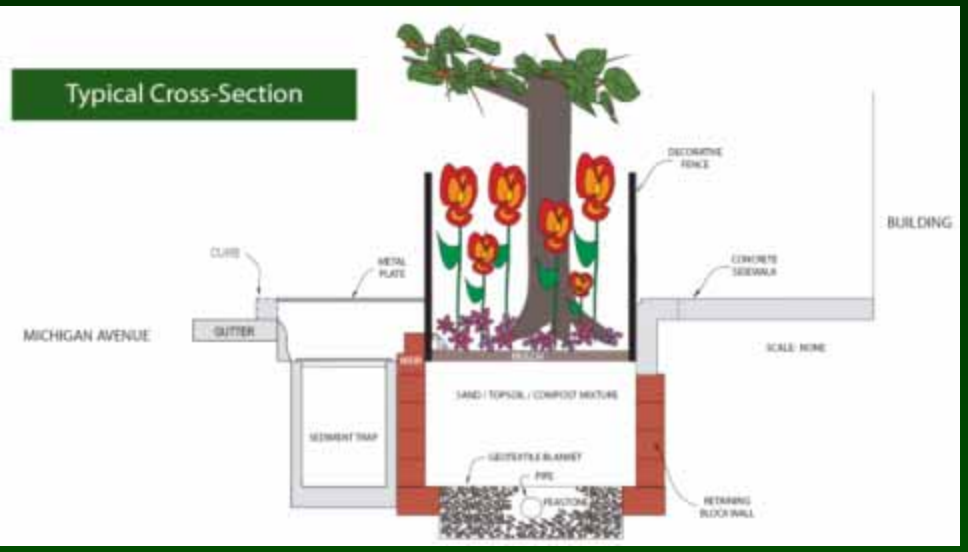
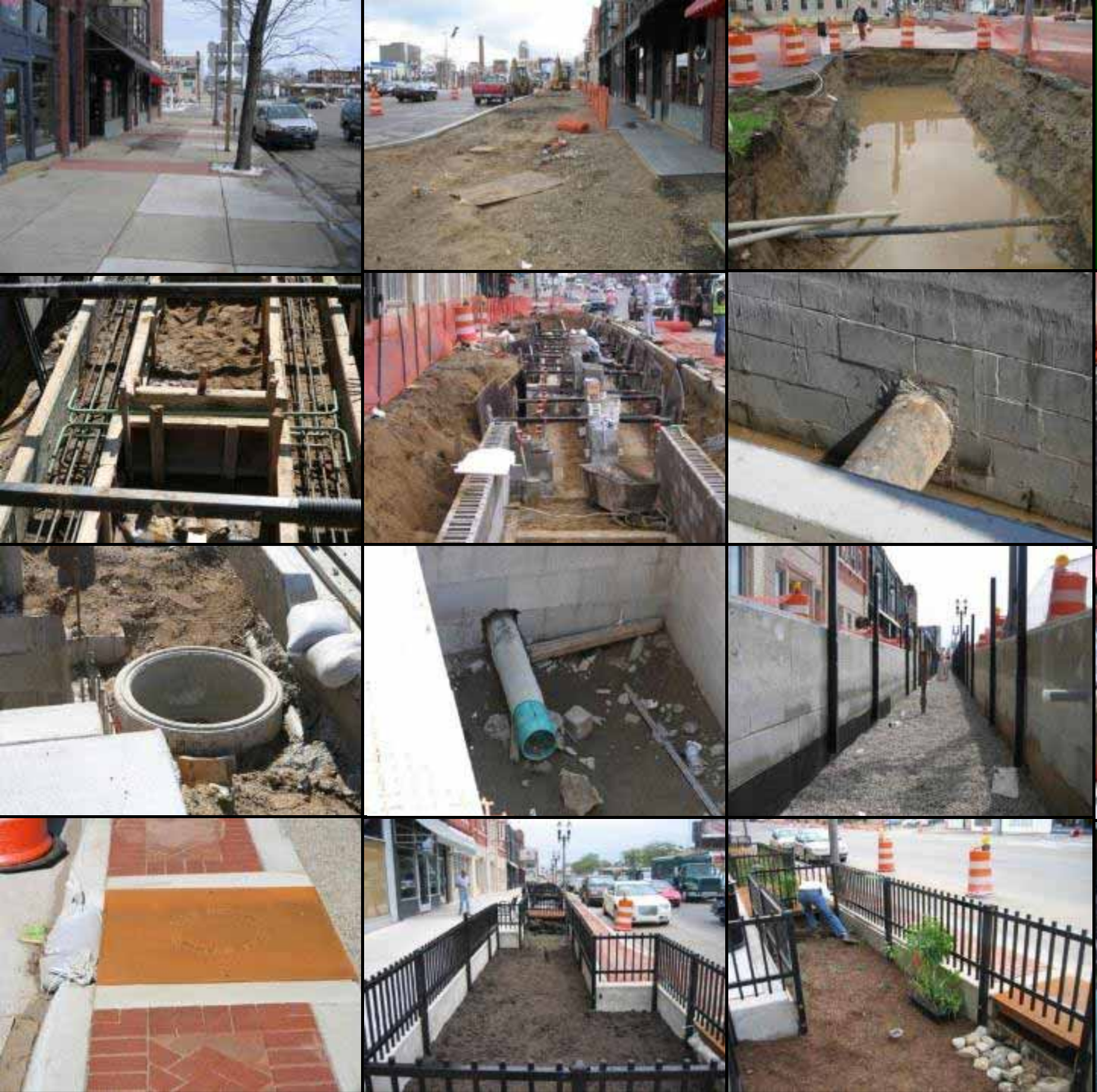

Edgewood Village Center
Supervisors House Bioretention
Cedar St School Harvesting
Washington Sq Bioretention
YOU ARE HERE
Michigan Ave Bioretention
Barnes Pavement/Infiltration
Waverly Regional Network

Michigan Avenue Planter Box Bioretention



Design

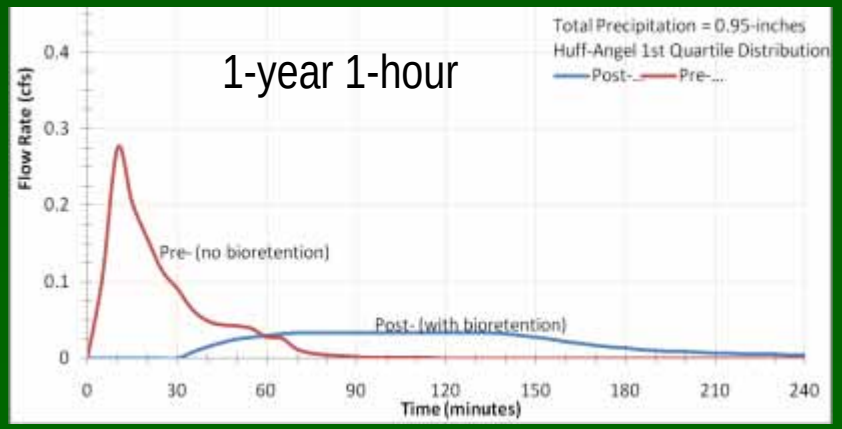
- Ultra-Urban
- 5-ft wide planter box style bioretention
  - 30 bioretention gardens
  - 7,631 square feet
  - 4.1 acre tributary area
- 4 blocks, both sides
- ADA compliant
- Adaptable to community needs



Construction 2007 to 2008

Final Product

- Cost $122/sf ($30/sf without urban constraints)
- Storage Volume 1.5 cf/sf
- Cost $81/cf of storage
- 90% Storm Design (+/-)
- 75% decrease in average annual runoff volume



This planter box bioretention treats the 25-year storm event (4.1-inches)

Challenges and Lessons Learned

- Trash/debris
  - Collection
  - Cigarette butts
  - Dog poop
  - Wind blown trash
- Education
  - Local businesses
  - Maintenance
- Design-Construction
  - Plant now, don't wait
  - Geotextile
  - Detailed grading plans
  - Cars hitting the fence
- Monitoring
  - Low flows
  - Simulated rainfall event

Cedar Street School
(aka Old Town Medical Arts Building)

Rain Water Harvesting

Cedar Street School

Project: Repurposing vacant school building. Now medical office, gymnasium, and commercial lease space

Storm Water Components

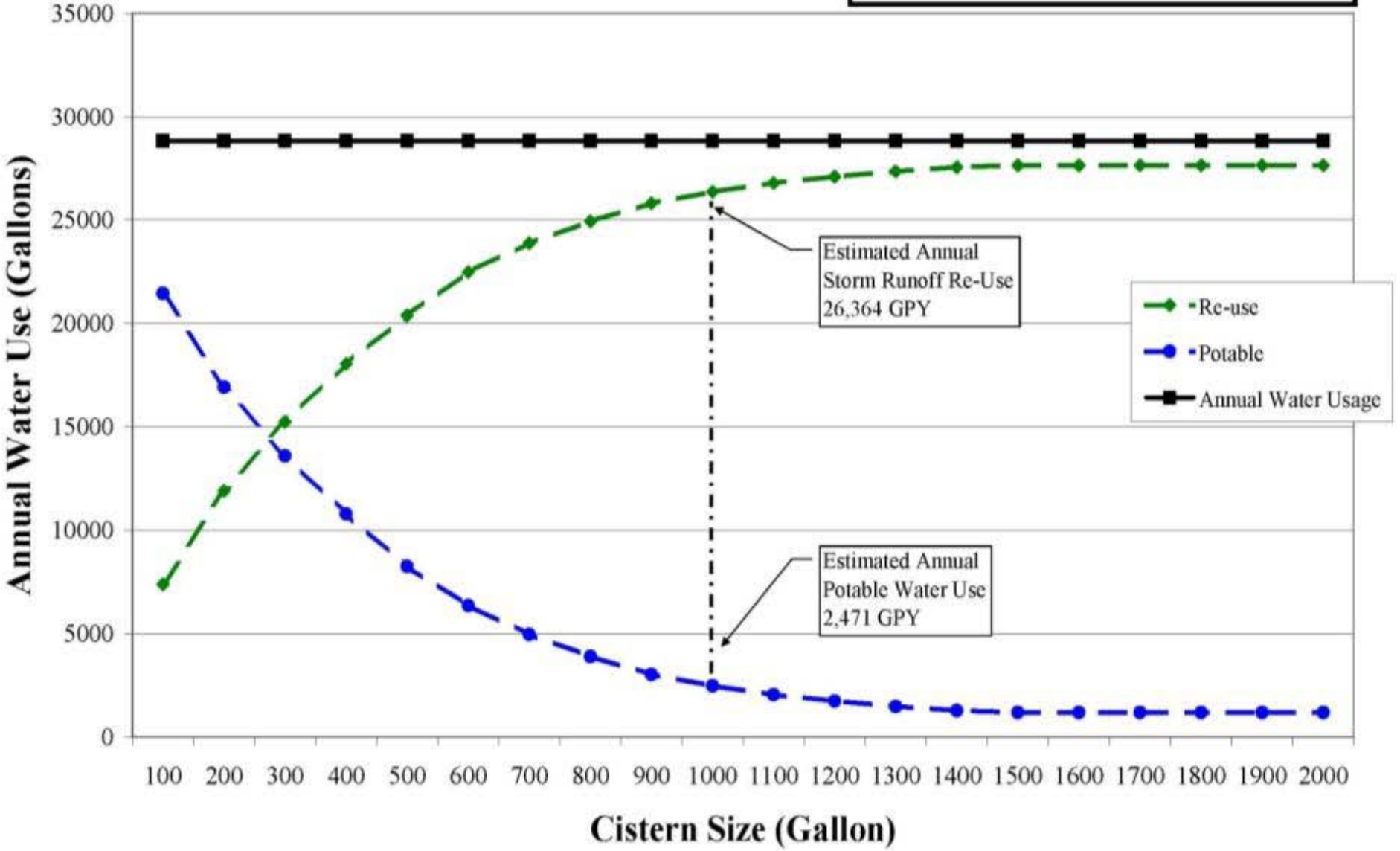
- Rain water harvesting
  - 6,500 sft Roof Area
  - 1,200 gal Cistern
- Swirling concentrator
- Subsurface detention and infiltration

Captures and treats 90% average annual rainfall

Cedar Street School
Water Re-use/Potable-use
@ Demand of 79 GPD

WE Credit 3.1 & 3.2
Water Use Reduction
Provided:

1. **Water Saving Plumbing Fixtures**
2. **Storm Runoff Water Re-Use**



Rain Water Harvesting

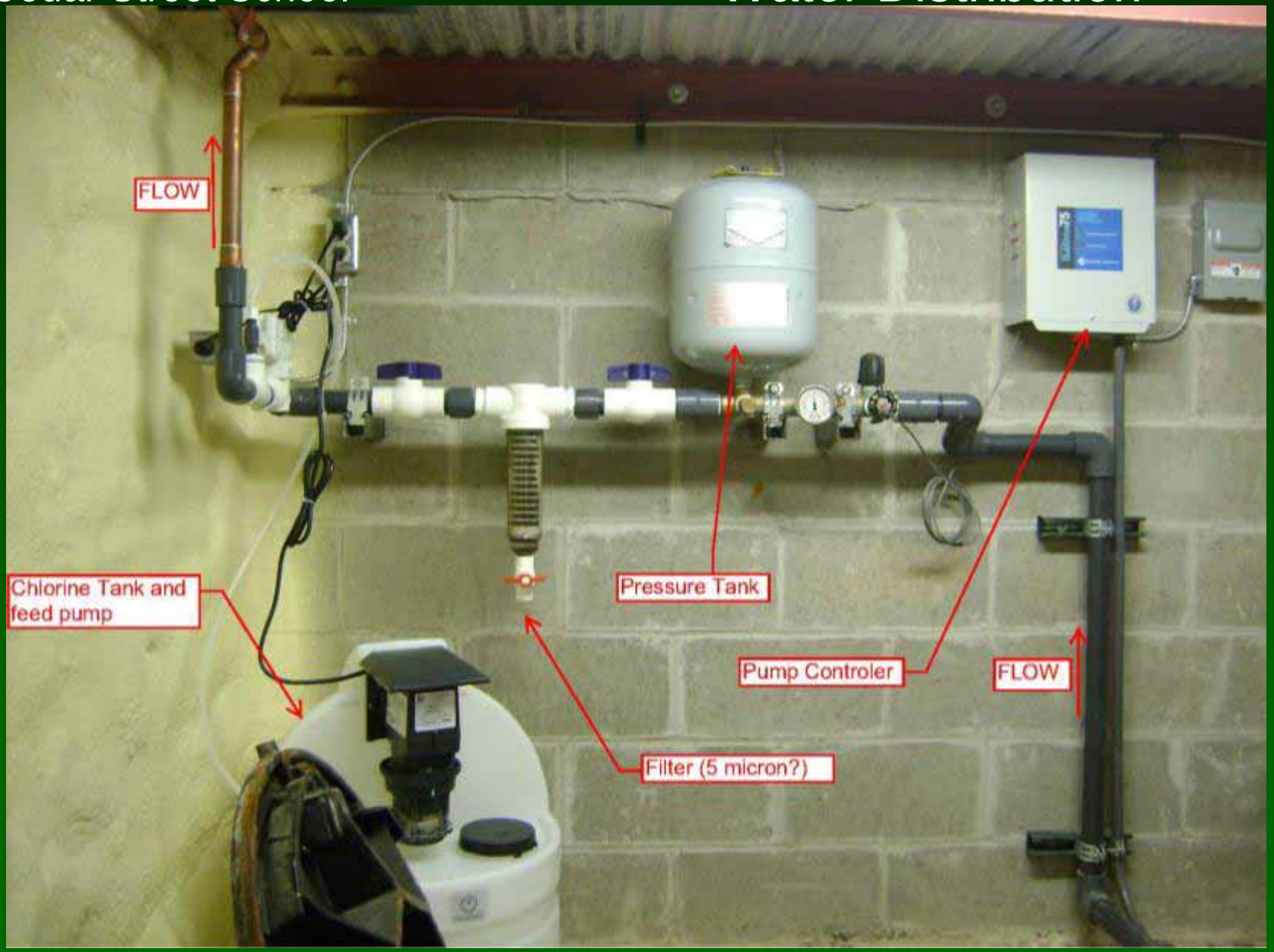
Cedar Street School

Cistern Fill Lines

Rain Water Harvesting

Cedar Street School

Water Distribution



Rain Water Harvesting

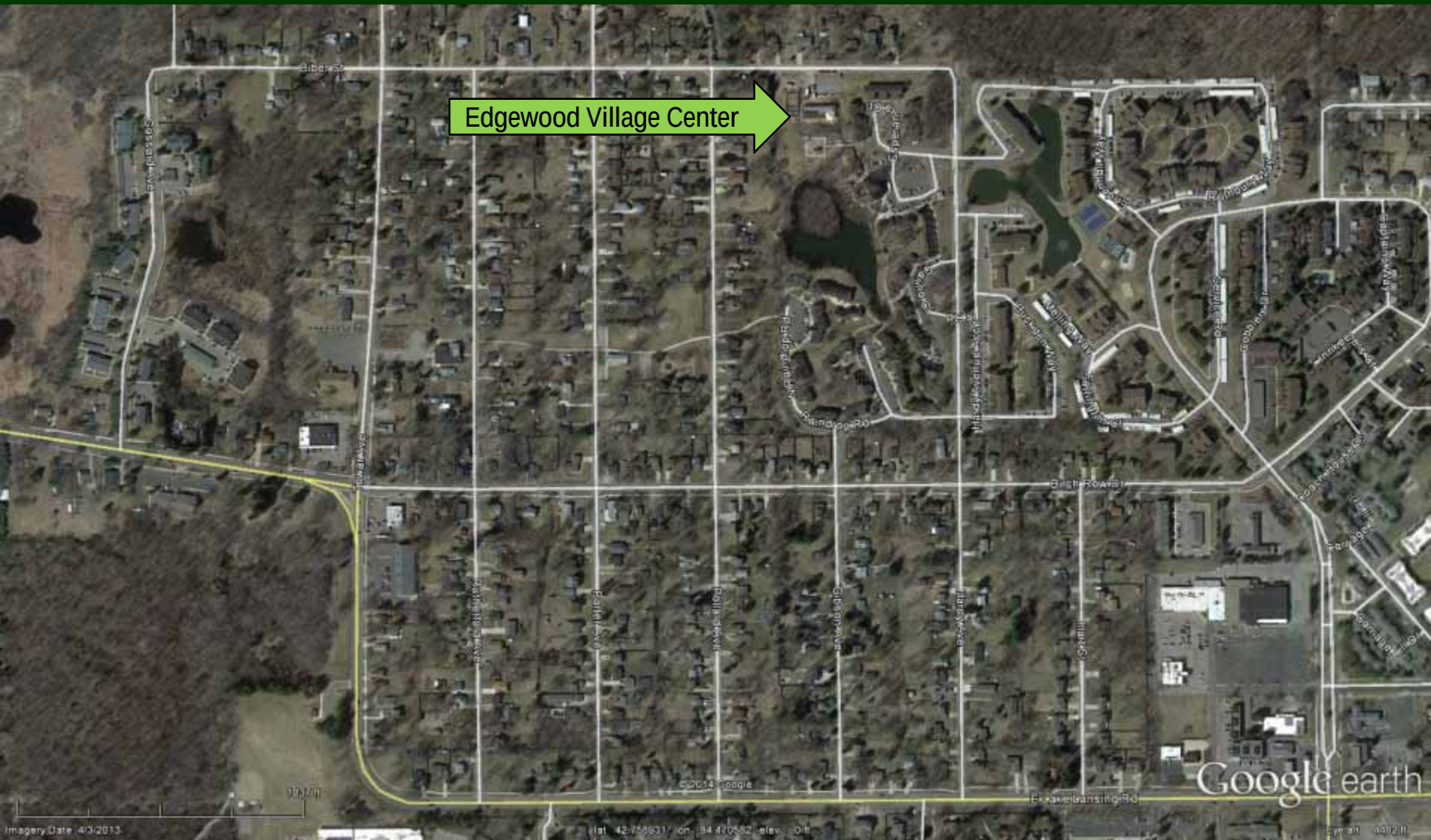
Cedar Street School

Lessons

- Non-standard plumbing permit request, plan for extra time
- Filter requires regular cleaning
- Rainwater harvesting provides
  - 91% of non-potable water demand
  - 4% of the annual rainfall on site
  - 20% of annual rainfall on roof

Rain Water Harvesting and Site Infiltration

Edgewood Village Community Center



Rain Water Harvesting and Site Infiltration

Edgewood Village Community Center

Project: New Community Center for Apartment Complex with Active Community Garden

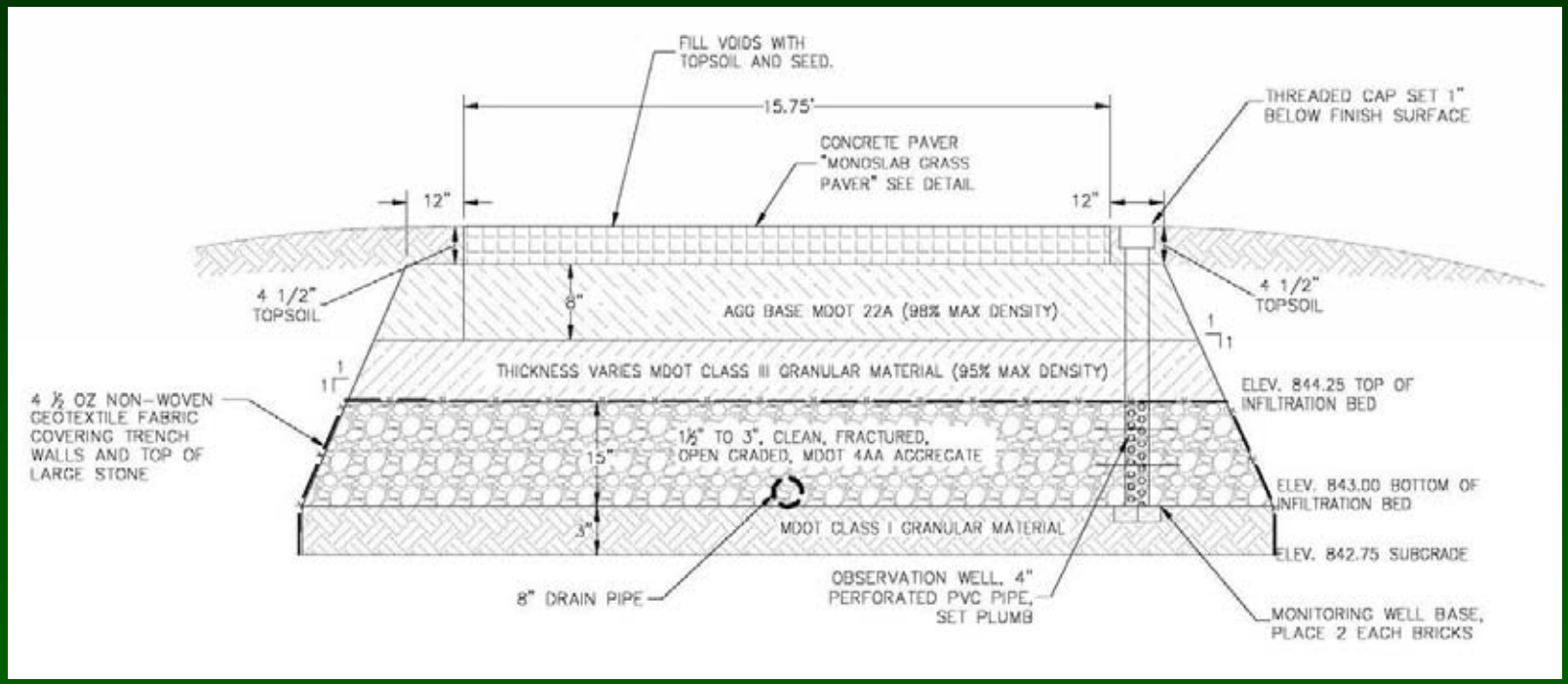
Storm Water Components

- Rain water harvesting 3320 gallon tank (Garden Irrigation, seasonal use)
- Pervious grass pavement
- Subsurface infiltration bed, 1062 cft storage capacity
- No positive drainage until system is full

Captures and infiltrates 90% average annual rainfall

Rain Water Harvesting and Site Infiltration

Edgewood Village Community Center



Design

- Pervious grass pavement
- Subsurface infiltration bed, 1062 cft storage capacity

Rain Water Harvesting and Site Infiltration

Edgewood Village Community Center

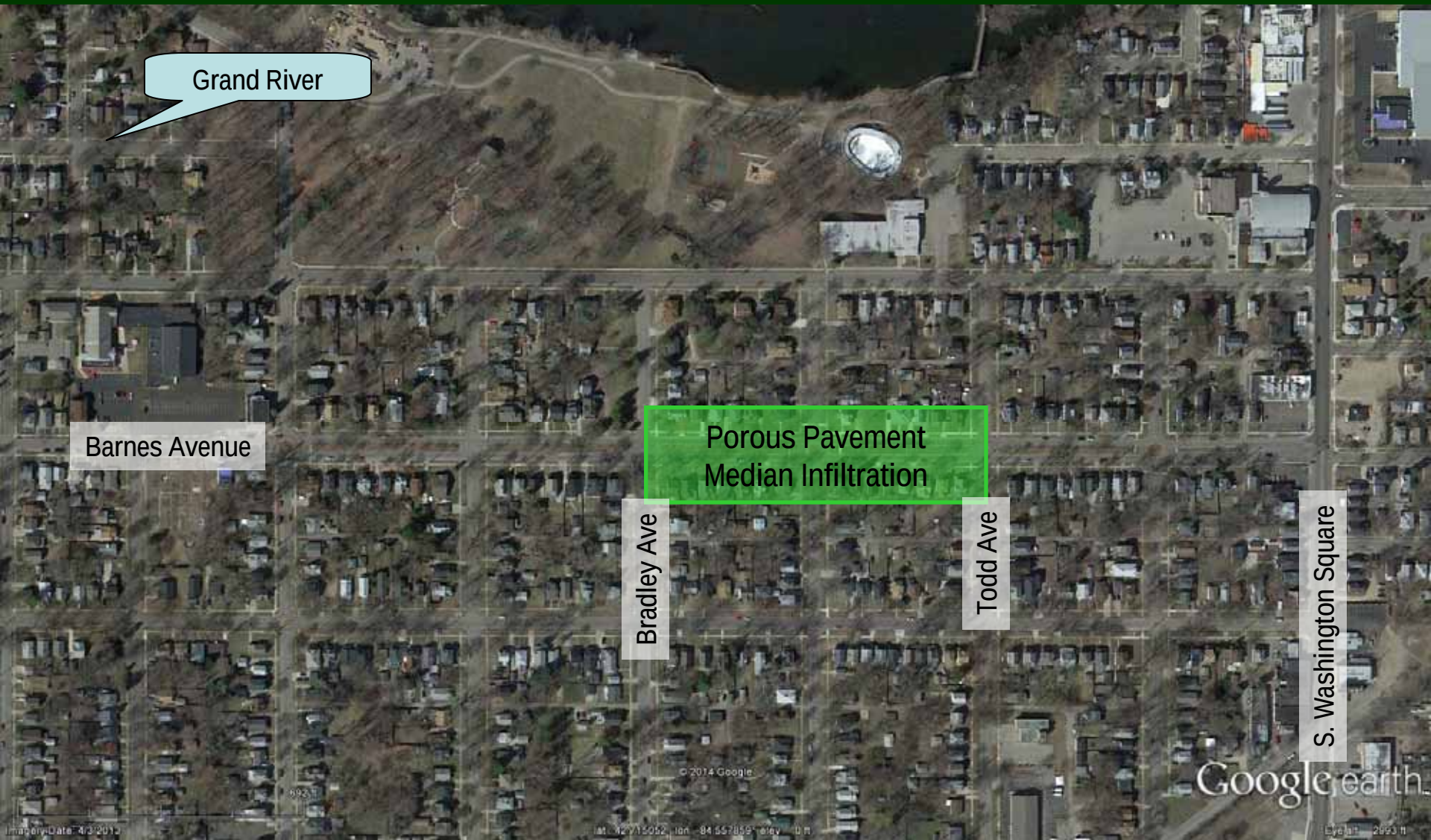
Rain water harvesting

- $37/cft storage within infiltration and collection system
- $18/cft cistern storage and distribution

Project Challenges

- High ground water
- No standing water allowed

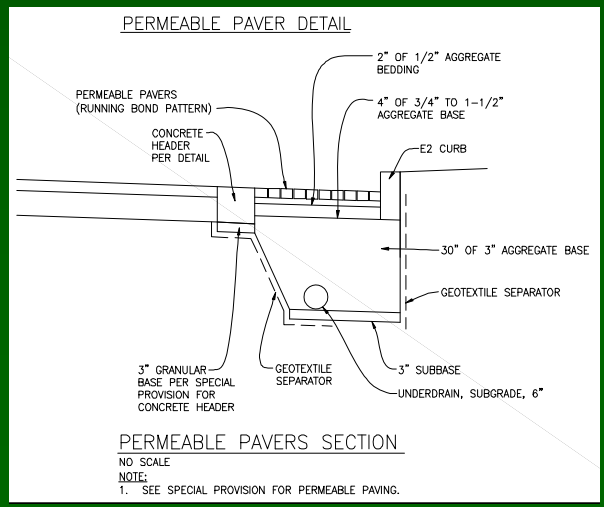
Barnes Avenue
Porous Pavement and Median Infiltration

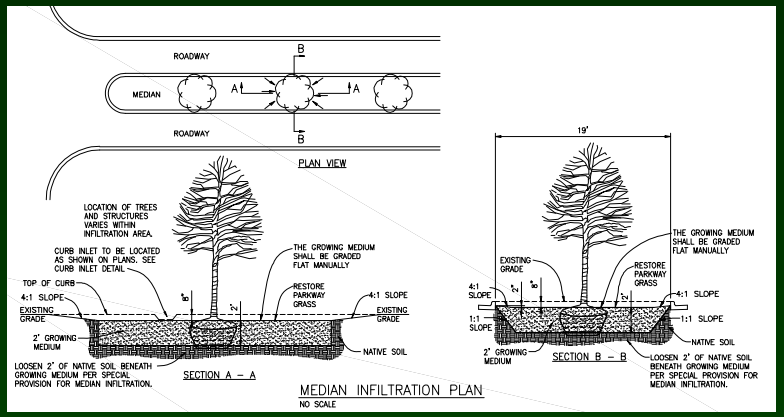


Permeable Pavers Parking Lane

Barnes Ave

- Residential road
- Permeable paver strip in parking lane
- Residents excited
- Storage volume 4.7 cf / sf





Boulevard Median Infiltration

Barnes Ave

- Median depression in select areas
- Targeted tree removal and replacement
- 2-ft soil amendments / replacement
- Construction challenges
- Storage volume 2.0 cf/sf

Curb Extension Bioretention

Washington Square

Curb Extension Bioretention

Washington Square

Storm water components

- 2 acre runoff area @ 100% impervious
- 12 Rain Gardens with total 8300 cft storage.
  - Triple shredded bark mulch
  - 3’ Engineered soil
  - Aggregate layer with underdrain
- Ultra urban setting

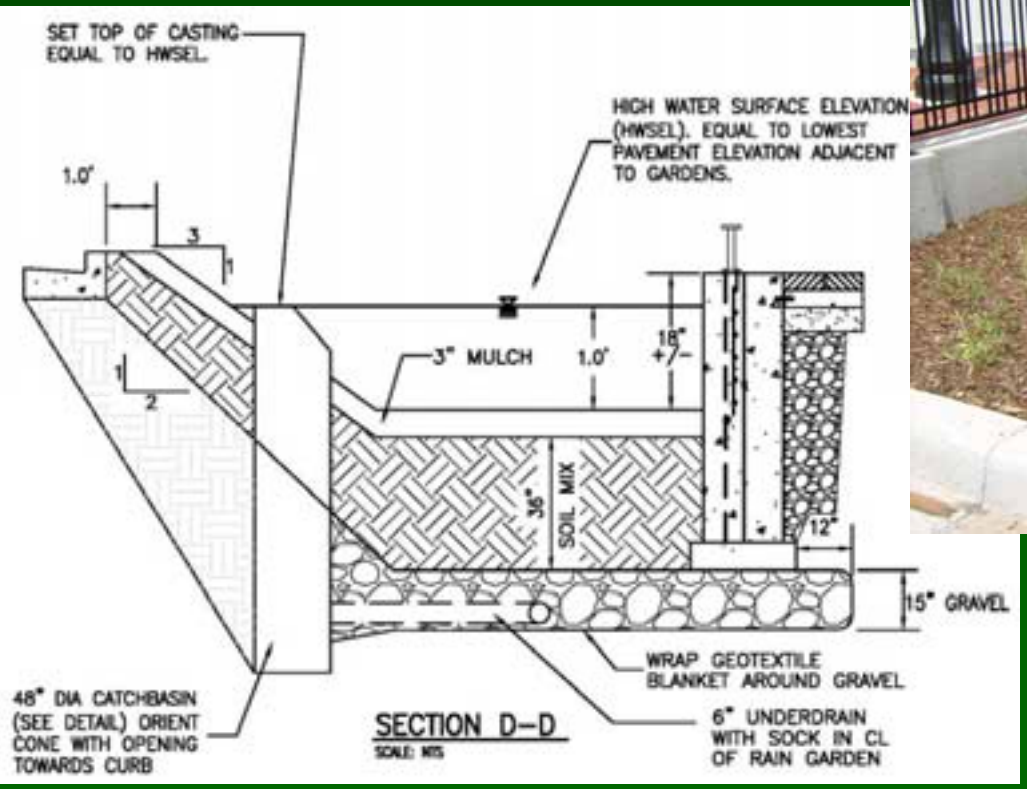
Captures and treats 90% annual rainfall

Curb Extension Bioretention

Washington Square

Curb Extension Bioretention

Washington Square



Curb Extension Bioretention

Washington Square

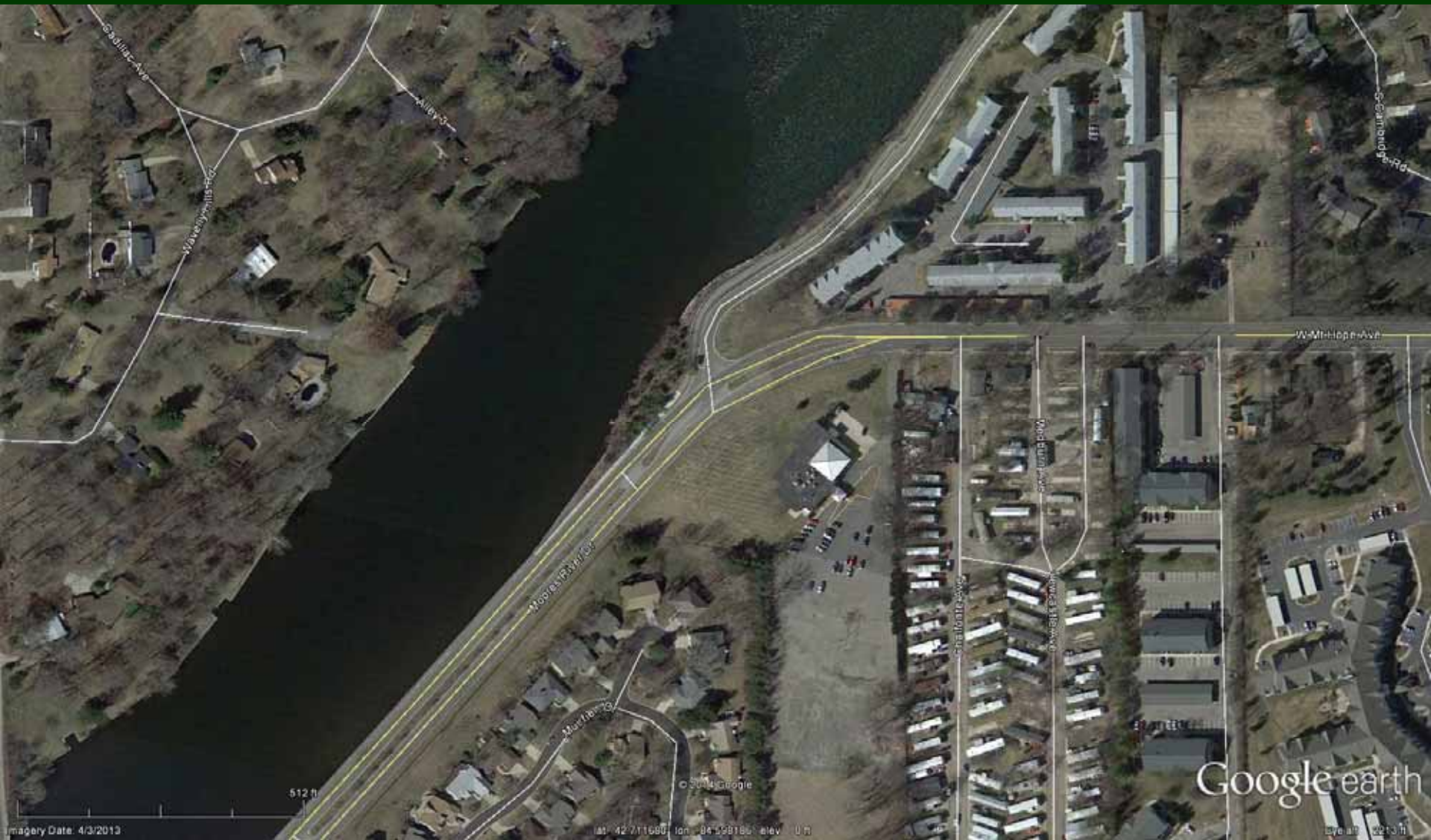
Installation Cost

- $32/cft storage

Lessons

- Pre-treatment not required in all locations
- Riprap spillway needs support
- Maintenance needs vary with age of garden
  - Year One, 20 hours/garden
  - Year Two, 6 hours/garden

Constructed Wetland
Waverly Road Regional Network Connector



Constructed Wetland

Waverly Road Regional Network Connector

Project: Non-motorized trail project currently under construction. Impervious surface reduction of 32%

Storm Water Components

- Three rain gardens
- One constructed wetland

Captures and treats 90% annual rainfall

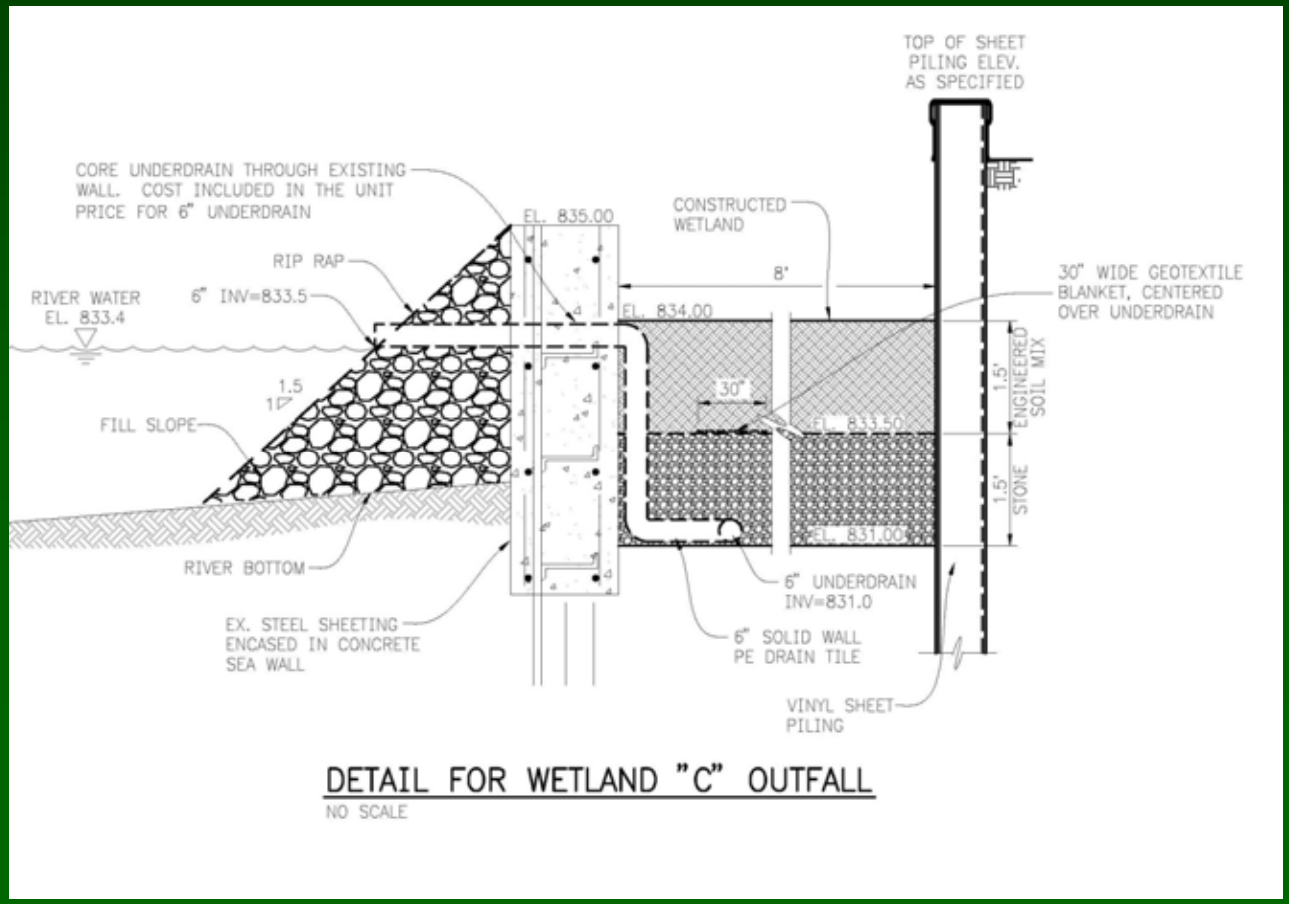
Before Picture

Constructed Wetland

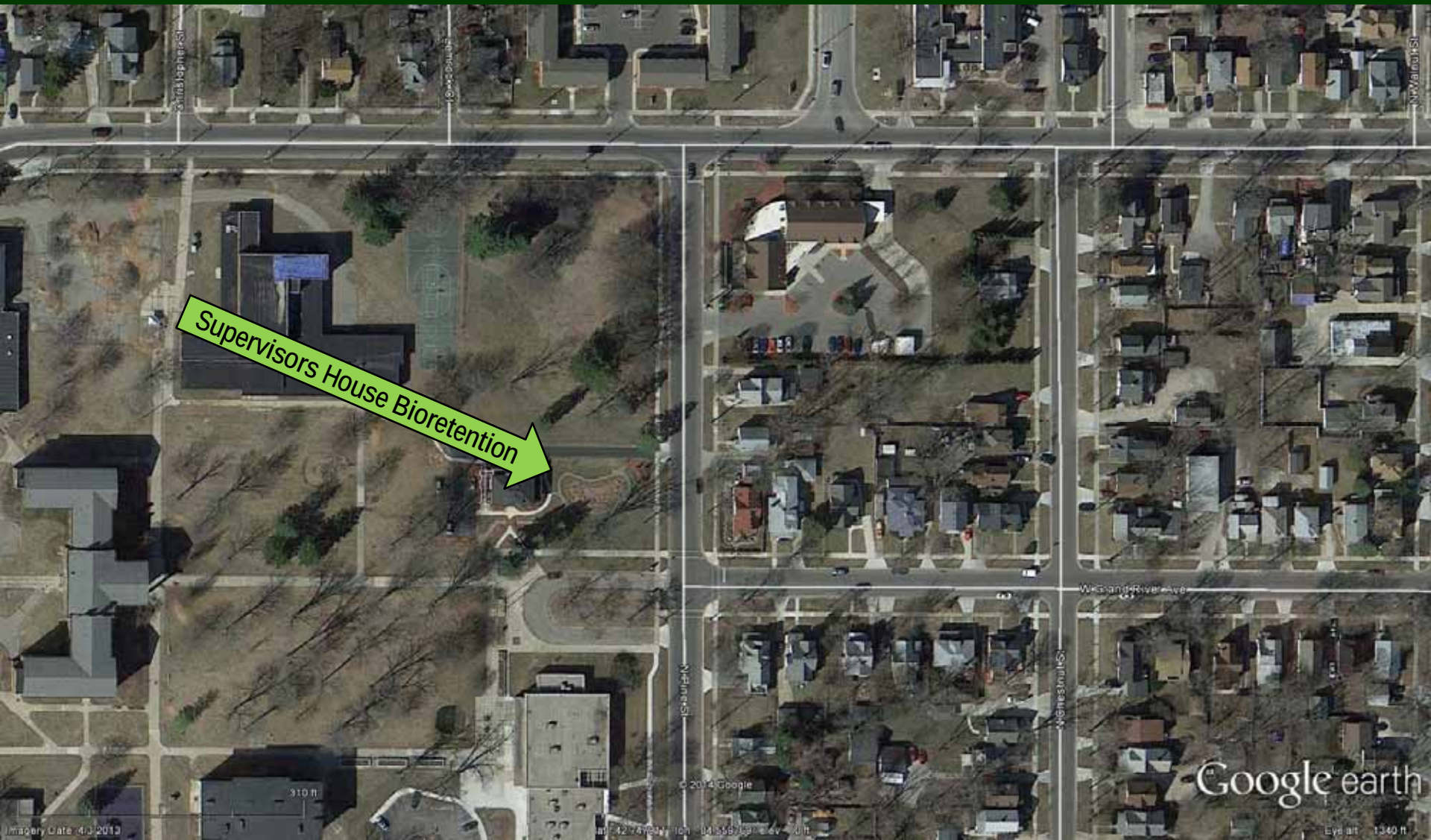
Waverly Road Regional Network Connector

Design

- 7” separation from normal ground water elevation
- Downward water draw
- Wetland Plant Selection



Bioretention
Supervisors House



Bioretention
Supervisors House

Storm water components

- Disconnected impervious surfaces
- Permeable walking path
- Rain garden
  - 24” Engineered Soil Mix
  - Aggregate layer with underdrain
  - Orifice controlled outlet

Captures and treats 90% annual rainfall

Bioretention
Supervisors House

Lessons

- A lot of subsurface water can flow through “dry creek bed”
- Aesthetics of Green Infrastructure is an asset to property

Thanks and Questions

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