Green Infrastructure in the Greater Lansing Area

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Michigan Avenue
Planter Box Bioretention

Grand River
Lansing Lugnuts
Sparrow Hospital
Michigan Avenue
Bioretention Area
Larch Street
Pennsylvania Avenue

YOU ARE HERE
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
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)
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

Estimated Annual Storm Runoff Re-Use
26,364 GPY

Estimated Annual Potable Water Use
2,471 GPY
Rain Water Harvesting
Cedar Street School

Cistern Fill Lines
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
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

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
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

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
Lessons

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