

Use of Bioretention in an Ultra-Urban Setting

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Virg Bernero, Mayor



TETRA TECH



c2ae



Wildtype

Native Plant Nursery

Project Overview

- The City of Lansing, Michigan is incorporating bioretention (rain gardens) into a streetscape design leading up to the Capitol grounds.
- Waterbody: Grand River
- Length of Corridor: 4 city blocks, 1,900 LF
- Bioretention Location: behind curb
- Drainage: roadway and sidewalk

Project Background & Timeline

- January 2004
 - Mayoral Task Force Formed
- July 2004 – Committee Recommendations
 - Create gathering places
 - Highlight pedestrian crosswalks
 - Green Up the corridor
 - Place kiosks and benches where appropriate
- June 2005
 - Commercial Business Meeting
 - No objections – No Comments?? of Businesses
- Spring 2006
 - Detailed Design Begins
 - Mantra “**Green Up the Corridor**”
- Spring 2007
 - Construction Begins



Bioretention Goals

- Beautification
- Stormwater Treatment (~1 inch)
- Public Education
- Pedestrian Friendly





BUILDINGS

RAIN GARDEN (TYPICAL)

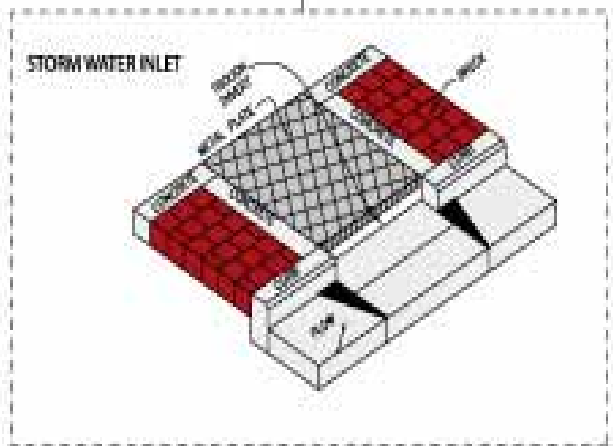
SIDEWALK

METAL PLATE

STREET LIGHT

MICHIGAN AVENUE

SCALE: NONE

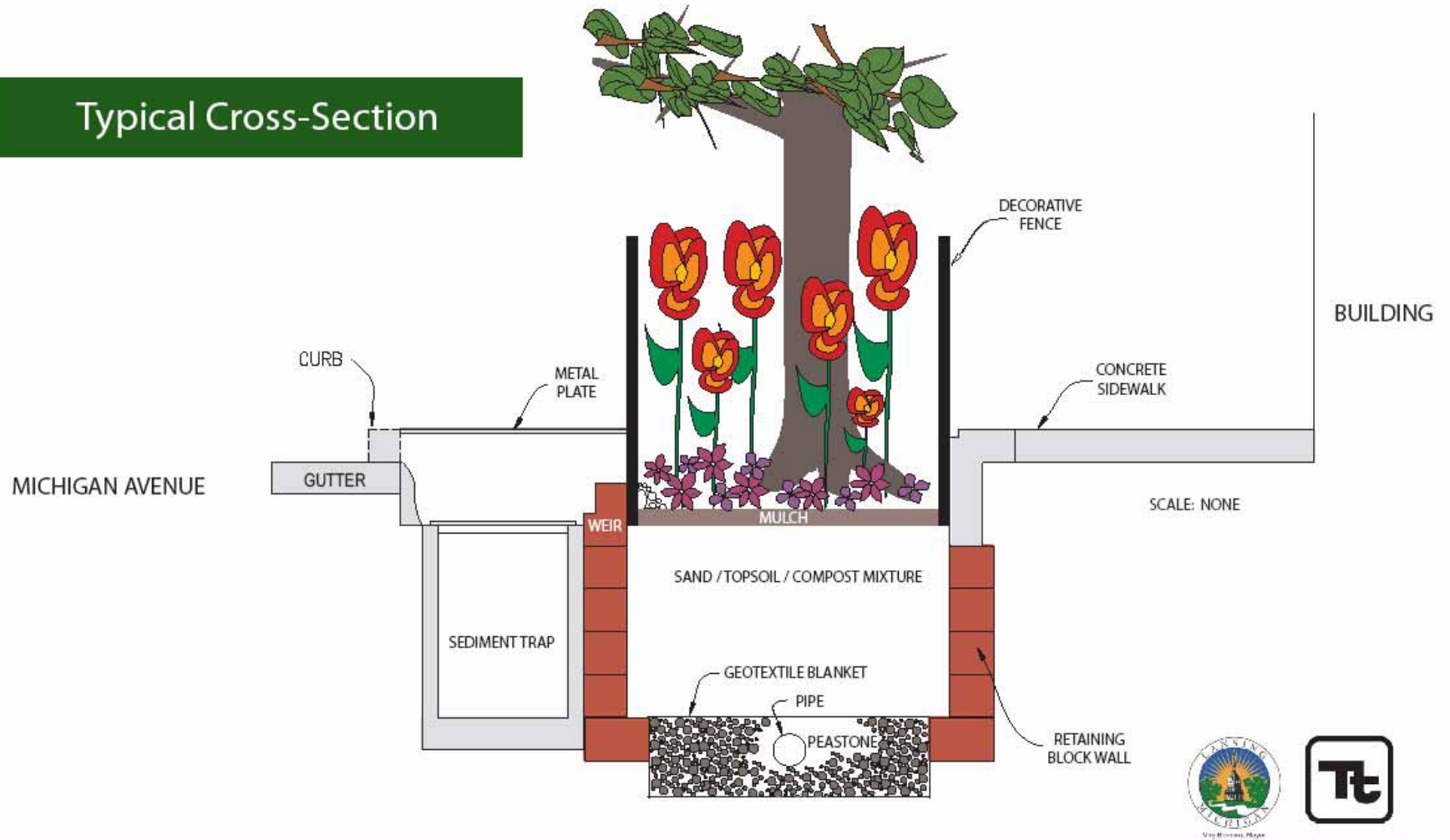


STORM WATER INLET



Michigan Avenue Bioretention Facilities

Typical Cross-Section



Michigan Avenue Bioretention Facilities



Virg Bernero, Mayor



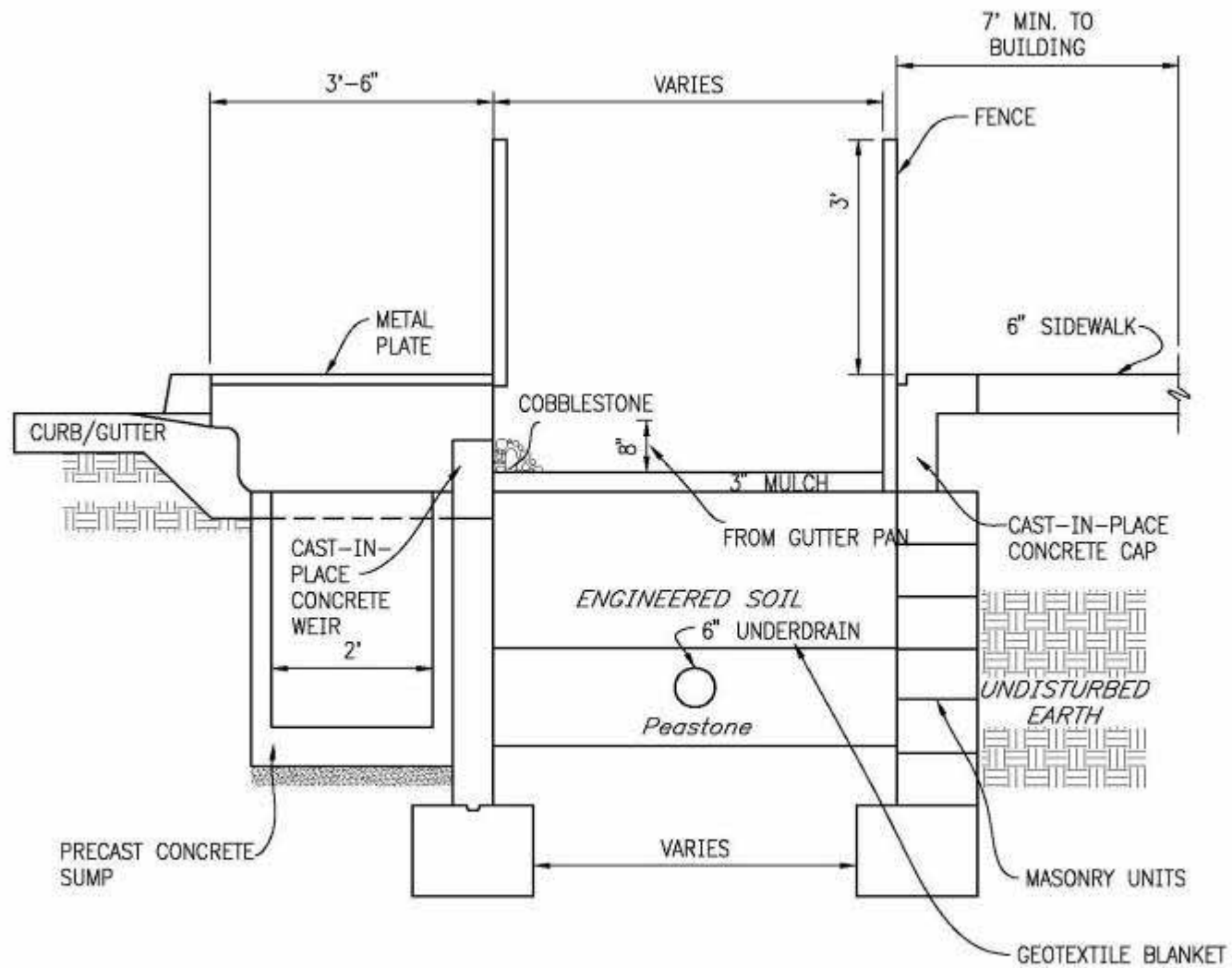
Michigan Avenue Bioretention Facilities



Design Challenges & Solutions

- Public Perception
 - Pedestrian safety
 - Storefront access
- Bioretention Layout
 - Existing utilities
 - Tie-in to Existing Storm System
 - Existing Landscaping and Driveways
- Construction Concerns
 - Constructability/Structural concerns
 - Cost





Design Challenges & Solutions

- Plant Challenges
 - Road Salt
 - Drought
 - Flooding
 - Shade
 - Height
 - Beauty
 - Business Opinion
- Soil Challenges
 - Permeability
 - Compaction
 - Longevity
 - Available Nutrients



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Engineered Soil Specification

- 30% Sand (MDOT 2NS)
- 30% Topsoil (10% sand, 40% silt, 40% clay, 10% organics)
- 10% Coir Fiber (coconut)
- 30% Municipal Compost (aged 12 months)



Maintenance

- City of Lansing
- “Adopt a Rain Garden”

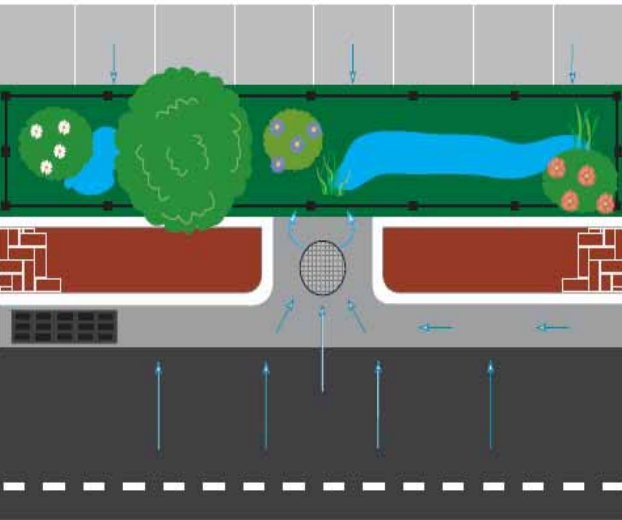


Monitoring

- Before/After Photos
- Trash/Debris Removed
- Plant Health
- Social Survey



STORM WATER DESERVES A TREAT



Trash, sand and soil collect here and are removed and properly disposed of by maintenance crews.

Urban storm water normally flows to a storm drain and enters the river without treatment. Here on Michigan Avenue, storm water is first routed to these engineered rain gardens (bioretention areas) for treatment.

Treatment begins with the removal of trash and sediment (the most common pollutant in runoff.) Storm water then flows to the engineered rain gardens, which contain selected plants and soil that help remove pollutants. Treated storm water not absorbed by the plants flow to an underground pipe that discharges into the Grand River.

You can help by:

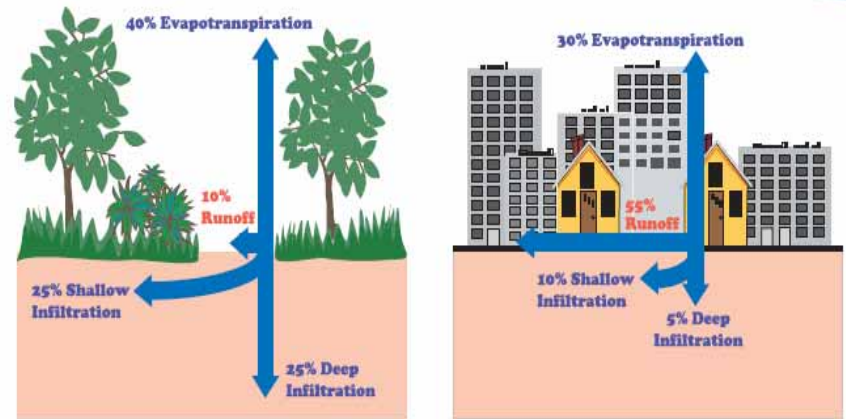
- Throwing trash in the garbage not on the street
- Telling friends about rain gardens
- Keeping your car well maintained and leak free



Public Education

WHERE DOES RAIN GO?

Urban landscapes are mostly hard - pavement and roofs. These are "Impervious" surfaces that rain can't penetrate. Green landscapes are softer - forests and meadows. These "pervious" surfaces easily absorb rainfall.



A typical city block generates five times more runoff than a woodland area of the same size. This polluted water enters rivers, lakes, and wetlands without treatment. Runoff is the number one source of water pollution in the United States!

Engineered rain gardens (bioretention areas) help reduce runoff in urban areas. You can help by directing your roof downspouts away from the road and into a rain garden or rain barrel.



Bid Tabulation

Retaining Wall	\$22/SF
Plants and Watering	\$4.25/SF
Engineered Soil	\$27/CY
Peastone (washed)	\$40/CY
Top Mulch	\$42/CY
Sediment Forebay	\$1700 EA
Metal Plates	\$1.40/LB

➤ **Bid:**
\$1,000,000*

➤ **\$122/SF**
(Ultra-urban)

➤ **\$30/SF**
(Without urban constraints)

* As this was part of a larger project, the total bid cost is an estimated portion of the whole.













CR 34
05/07 05/07-07















City R

Seek ye The Lord while He

HOME
MORTGAGE
SOURCE
702-0000









'Hibiscus moscheutos' Rose Mallow



'Clematis virginiana' Virginsbower



'Eupatorium perfoliatum' Boneset



'Liatris spicata' Marsh Blazing Star



'Aronia melanocarpa' Black Chokeberry



'Hypericum ascyron' Giant St. John's Wort



Virg Bernero, Mayor



'Iris Versicolor' Blue Flag



'Asclepias incarnata' Swamp Milkweed



'Amelanchier sp' Serviceberry



'Potentilla fruticosa' Shrubby Cinquefoil



'Eupatorium maculatum' Joe-Pye Weed

Questions?

Michigan Avenue Bioretention Facilities