

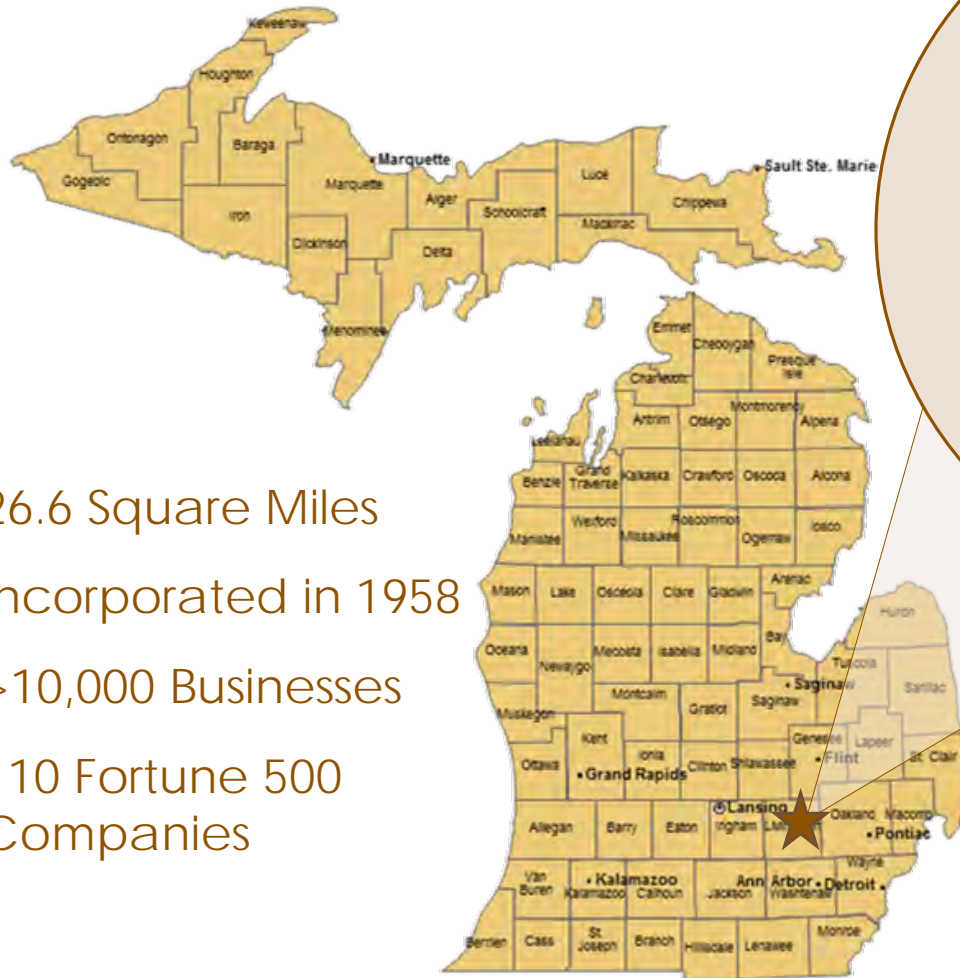
Introducing Green Infrastructure for Coastal Resilience

May 17, 2019

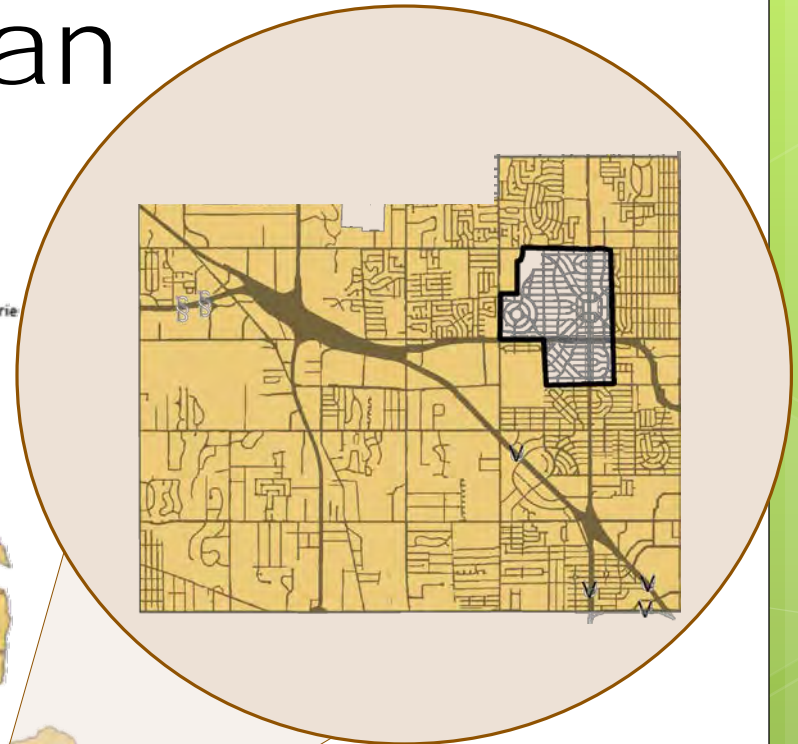
U of M Dearborn



Southfield, Michigan



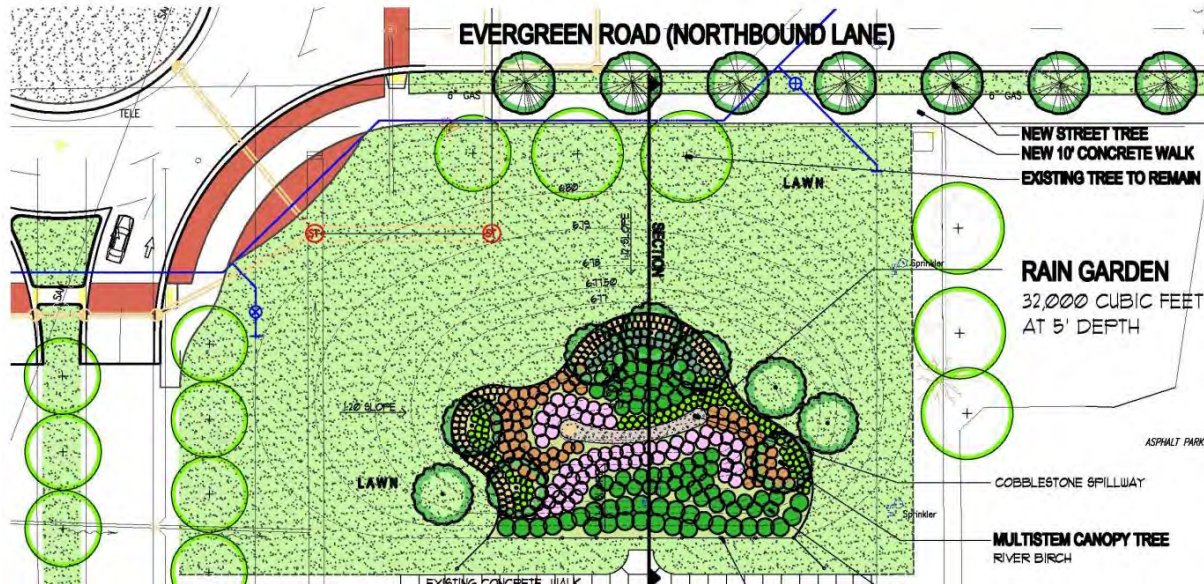
- 26.6 Square Miles
- Incorporated in 1958
- >10,000 Businesses
- 110 Fortune 500 Companies



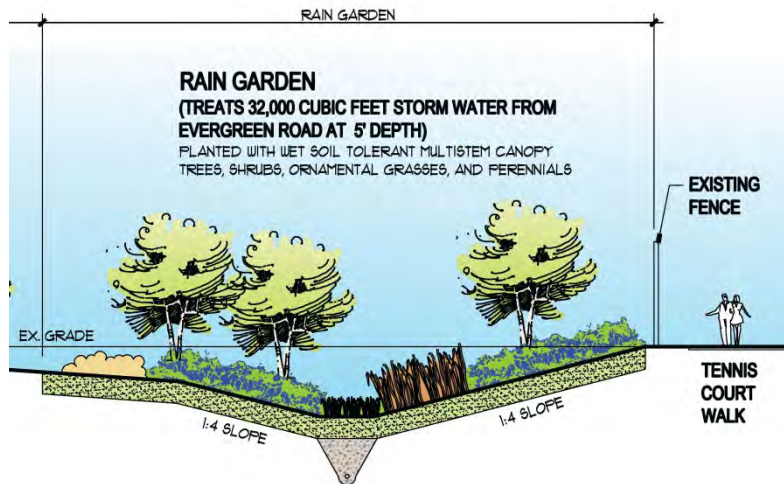
- Population: 80,456*
- Daytime Population: >175,000

*based on July 2018 SEMCOG data

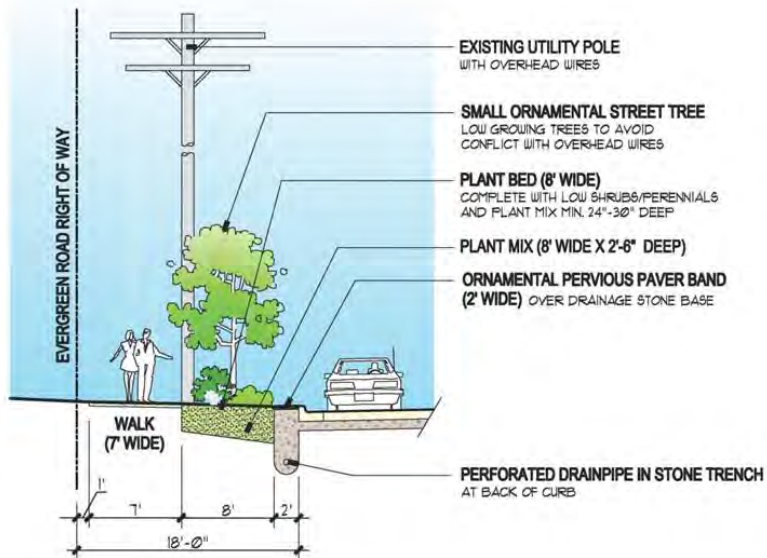
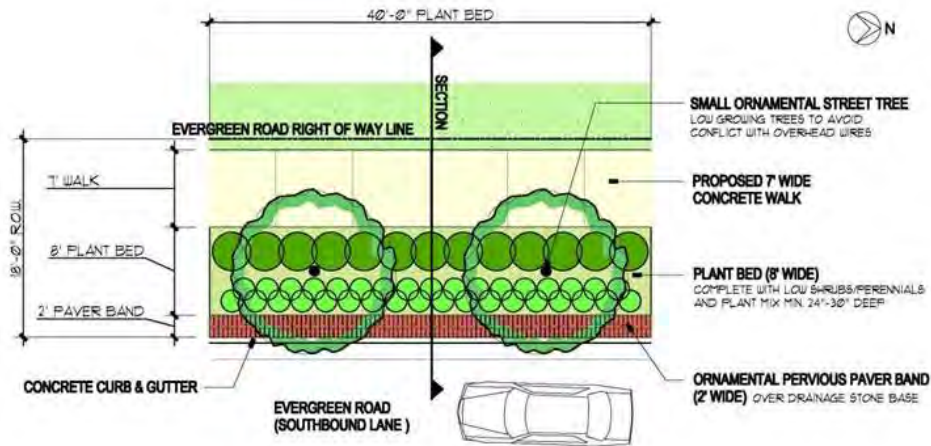
Evergreen Road Redevelopment (2014-2016)



**Bio-Retention
Pond
(Rain Garden)
32,000
Cubic feet**



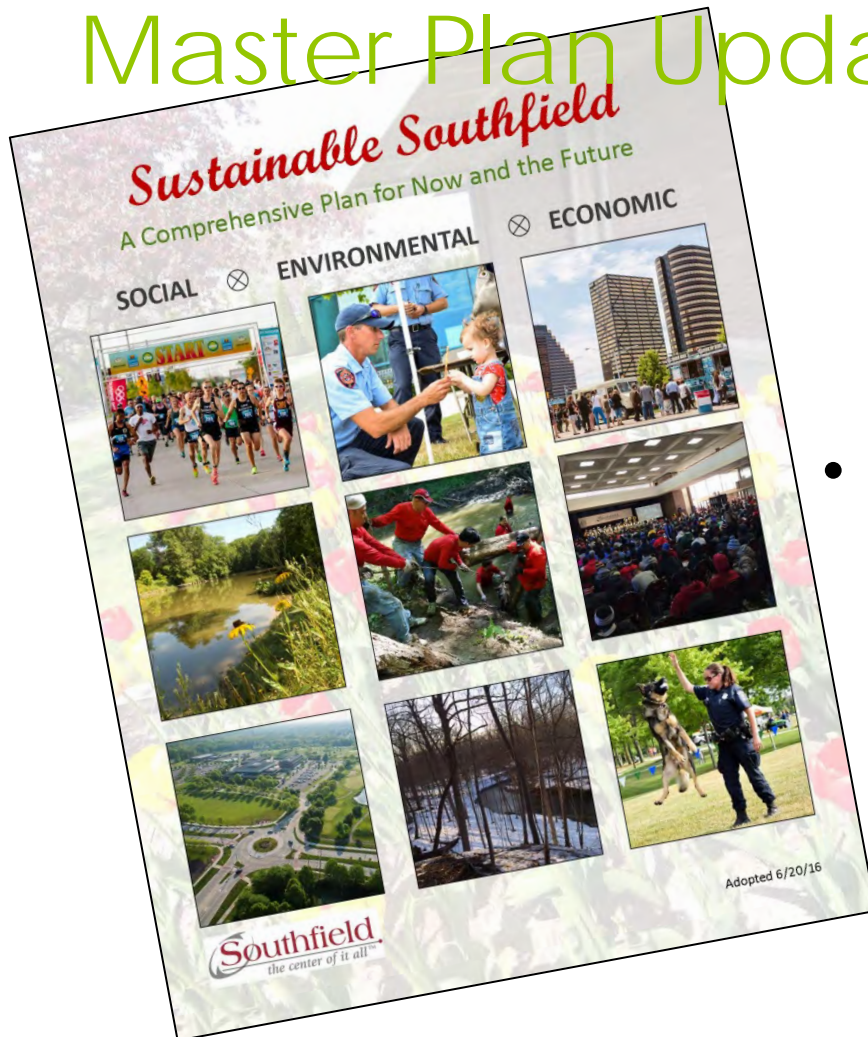
Evergreen Road Redevelopment (2014-2016)



Pervious Pavers



Master Plan Update



Sustainable Southfield

- Adopted by Southfield City Council on June 20, 2016

Sustainability

Sustainable communities are places that balance their economic assets, natural resources, and social priorities so that residents' diverse needs can be met now and in the future.

Sustainable Southfield will take a holistic approach to land use and community planning, which will include environmental, social and economic sustainability.

Sustainability

Sustainable Southfield will strive to incorporate the following six principles compiled from a review of leading comprehensive plans by the APA Sustaining Places Task Force:

- **Livable Built Environment**
- **Harmony with Nature**
- **Resilient Economy**
- **Interwoven Equity**
- **Healthy Community**
- **Responsible Regionalism**



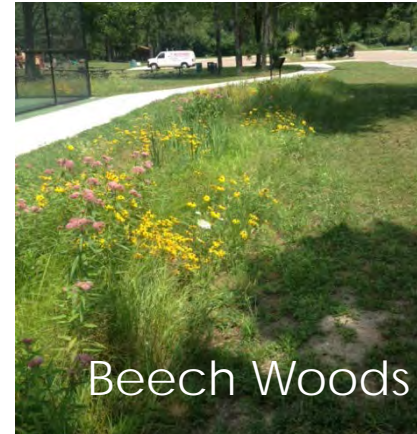
Southfield Zoning Ordinance Updates

Article	Section	Summary
	5.3(8)	Add Bioretention definition
	5.3(12)	Amend Buffer Strip Definition
	5.4(10)	Add Cistern Definition
	5.4(19)	Add Detention Basin Definition
	5.6(4)	Add Green Infrastructure definition
	5.6(5)	Add Green Roof definition
	5.6(9)	Add Impervious Surface definition
2	5.6(11)	Add Infiltration Practice definition
	5.7(1)	Amend Landscaping definition
	5.8(10)	Add Permeable Surfacing definition & example photos
	5.8(12)	Add Planter Box definition
	5.8(16)	Add Rain Barrel definition & example photo
	5.8(31)	Add Stormwater definition
	5.9(9)	Add Vegetated Swale definition
	5.22(7)	Edit landscaping plan info
	5.22-2(C)(2)(d)(iv)	Edit Facilities
	5.22-3(A)(1) par 2	Edit paragraph 2
	5.22-3(A)(2)(b)	Edit LID
	5.22-3(A)(2)(e)	Edit landscaping
	5.22-3(A)(4)(c)	Edit
4	5.22-3(C)(3)(c)(vii)	Add Development/GI
	5.22-3(C)(3)(c)(viii)	Edit pervious surfaces
	5.22-3(C)(3)(e)(iv)	Edit to include Stormwater Mgmt Plan
	5.22-3(C)(3)(e)(iv)	Add specific landscaping
	5.22-3(C)(3)(e)(iv)	Add Stormwater Mgmt Plan
	5.22-3(C)(3)(e)(iv)	Excluding stormwater measures from utilities

***Adopted
July 6, 2017***



Educational Signage



Beech Woods

Bioswales



Inglenook Park



Carpenter Lake



Pervious Pavers



Beech Woods



Inglenook Park

Tiered Structure to Retain Storm Water



Valley Woods
Trail Head

Green Roofs



Lawrence Tech



Carpenter Lake Boat Shed

Natural Lawns



Natural Lawns

Defined per Section 9.50B, Article X of the Southfield City Code

- **Natural lawn**, as used in this section, shall include **common species of plants and wild flowers native to the Great Lakes region** which are designed and purposely cultivated and **may exceed eight (8) inches in height** from the ground. Specifically **excluded** in natural lawns are the **noxious grasses and weeds** identified in [section 9.41](#) of this [chapter 111](#). "Natural lawn" shall also **not include a turf-grass lawn left unattended** for the purpose of returning to a natural state. Turf-grass lawn means a lawn **comprised mostly of grasses** commonly used in regularly cut lawns or play areas (such as, but not limited to, bluegrass, fescue, and ryegrass blends) intended to be maintained at a height of **no more than eight (8) inches**. The growth of a natural lawn in excess of eight (8) inches in height from the ground surface **shall be prohibited unless a natural lawn management plan is approved** and a permit is issued by the city as set forth in this section. Natural lawns **shall not contain litter or debris, and shall not attract or harbor rodents or other vermin.**

Natural Lawns

Defined per Section 9.50B, Article X of the Southfield City Code

- Native Landscape Plans



- Written Management Plan
- Existing Natural Features
- Species of Plants

Barton Malow Rain Garden

26500 American Dr, Southfield



PROPOSED PLANTINGS FOR STORM WATER MANAGEMENT
- EXISTING SITE BURMS TO REMAIN

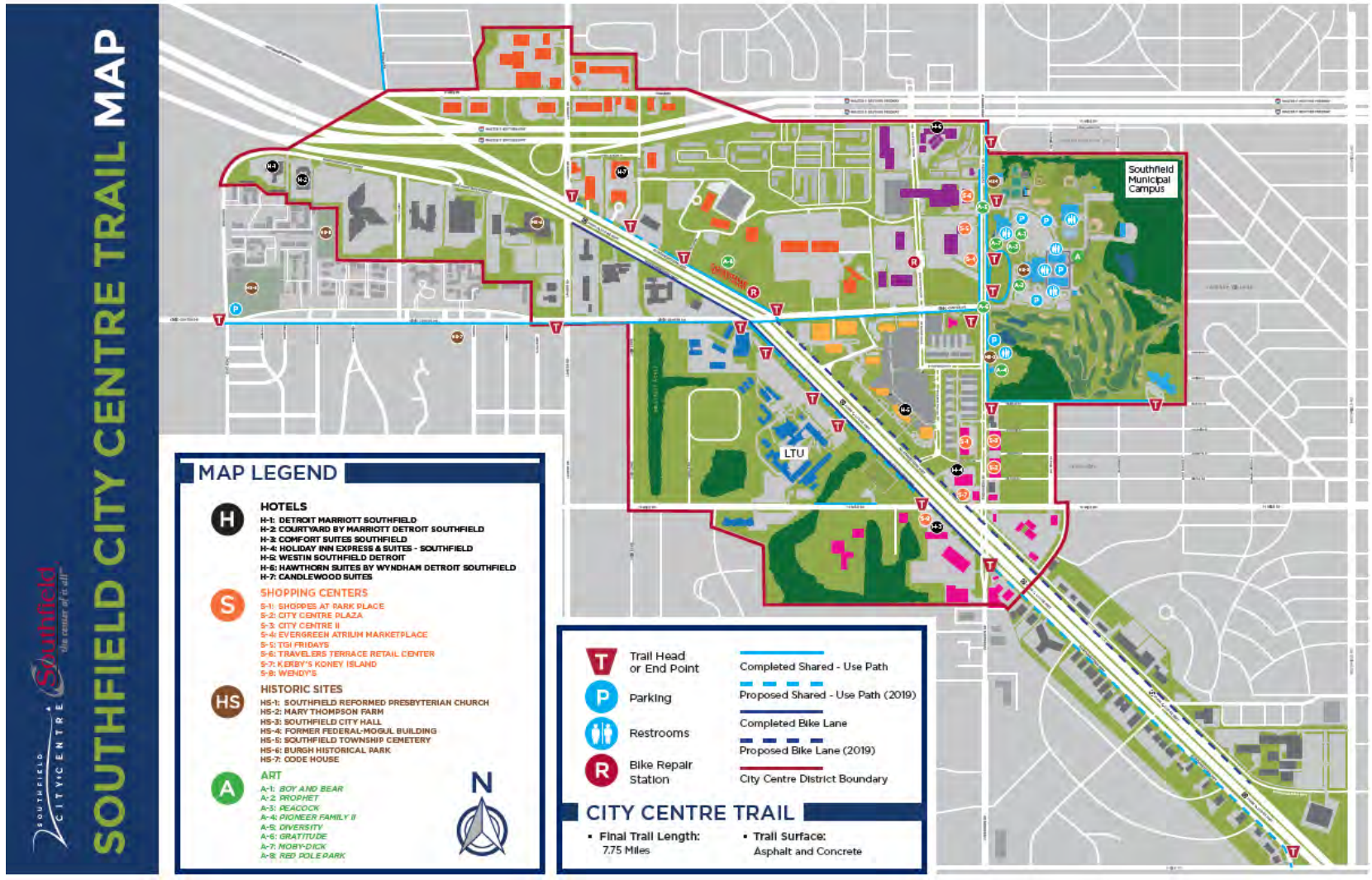


Barton Malow Rain Garden

26500 American Dr, Southfield



Southfield City Centre Trail Map



Red Pole Park Trail Segment



Natural Interpretive Panels

“Helping Our Urban Ecosystem”



HELPING OUR URBAN ECOSYSTEM

Even in Southfield, we are surrounded by the natural world. In fact, cities are in a unique position to help our ecosystem. In 2014, white-nose syndrome, a deadly disease affecting North American bats, was confirmed in Michigan. This disease affects bats during hibernation and spreads easily in moist caves. By providing dry, safe houses for bats to sleep in our cities and backyards, we can help our bat population. Since 2005, 30% of all honey bee colonies in the US have been lost each year, a condition known as Colony Collapse Disorder. We can help the honey bees by planting native flowers in our public spaces to attract and feed the bees. We know these small actions work because bluebirds have benefited from similar concerted efforts and now have a restored population.



TRI-COLORED BAT

BATS

Michigan bats feed on a variety of moths, flies, beetles and other insects. Bats can eat up to 1,000 mosquitoes per hour. Without a healthy bat population, crops are placed at risk from invasive insects, and the number of mosquitoes will rise. By providing dry, safe houses for bats to sleep, we can help them thrive.



HONEY BEE

BEEES

Following a national pattern, Michigan's honey bee populations are declining rapidly. Because honey bees pollinate nearly all of the fruits, vegetables, and nuts grown in Michigan, this population decline is emerging as a significant threat to the state's food production. We can help the honey bees by using less chemicals and pesticides.



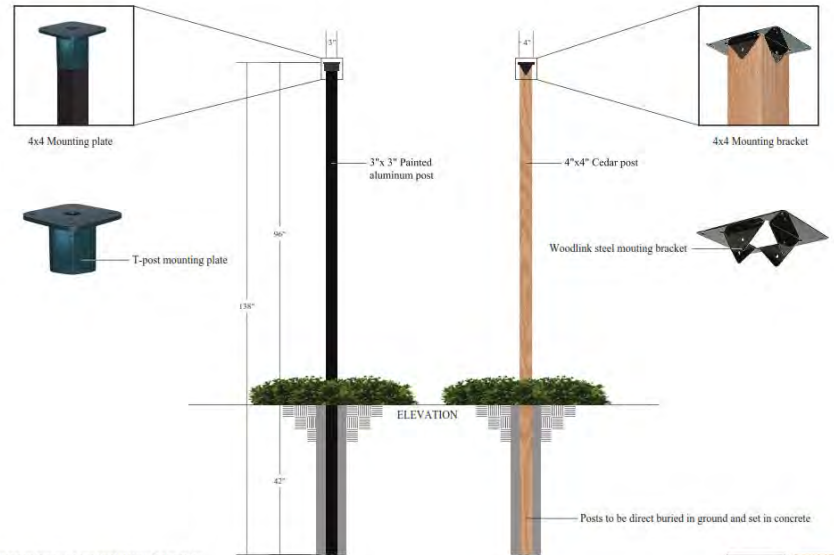
EASTERN BLUEBIRD

BIRDS

Because of habitat loss, pollution, and competition of non-native species, bluebirds have suffered large declines. Through the efforts of many people providing bluebird houses over the last 10 years, the bluebird population has begun to thrive again. Bluebirds prove our actions have positive results.



Northwestern Pathway Birdhouses



EXTERIOR POSTS AND MOUNTING MATERIAL
Scale: 3/8" = 1'-0"

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www.signgraphix.net

City of Southfield

26000 Evergreen Road Southfield, MI 48076

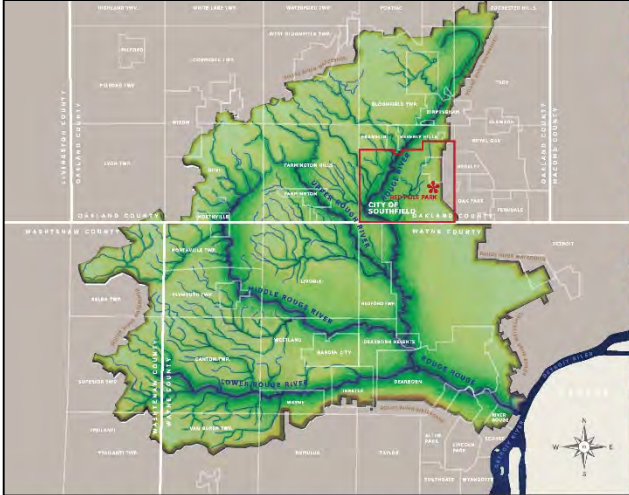
DRAWING: A-1503 03-26-19
JOB: 24232

CLIENT SIGNATURE:
DATE:

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Natural Interpretive Panels

“Living in the Rouge River Watershed”



LIVING IN THE ROUGE RIVER WATERSHED

When it rains, the water that falls here begins a journey towards the lowest point in the watershed, the Rouge River. The Rouge River Watershed is 467 square miles in size, includes 126 miles of river, and numerous tributaries. During a storm, rainwater flowing from roads, parking lots, rooftops and other hard surfaces travels rapidly to drain pipes that carry it to the river. Too much rainwater all at once can cause flash-flooding, stream bank erosion, and destruction of fish and wildlife habitat. It is better to slow or even prevent the water from draining directly to the river to reduce flooding and to help keep the water clean. The City of Southfield is implementing these design elements in our public areas.

PLANTS

Rain gardens made up of native plants capture water and allow it to soak into the ground instead of running off into storm sewers. Allowing storm water to soak into the ground while the native plants filter out pollutants reduces pollution and slows down water going directly into our lakes, rivers and waterways.

BLACKEYED SUSAN

THAT

Plants like Blackeyed Susans, Purple Coneflowers and Swamp Milkweed have dense root systems and are native to Michigan. The deep root systems of these plants help filter pollutants from the water before it reaches the river or the groundwater. The extensive root systems of native plants help them survive fires, winters, droughts and flooding.

PURPLE CONEFLOWERS

ABSORB

Along with filtering water, these plants attract pollinators. Honey bees, butterflies and other insects play a critical role in maintaining the natural ecosystem. Crop plants grown for their fruits, vegetables, nuts, seeds, and fiber cannot survive without these pollinators. Pollination cannot survive without their native habitat.

SWAMP MILKWEED & MONARCH BUTTERFLY

Southfield City Centre Sponsored by **DENSO**
Crafting the Core



Urban Forestry

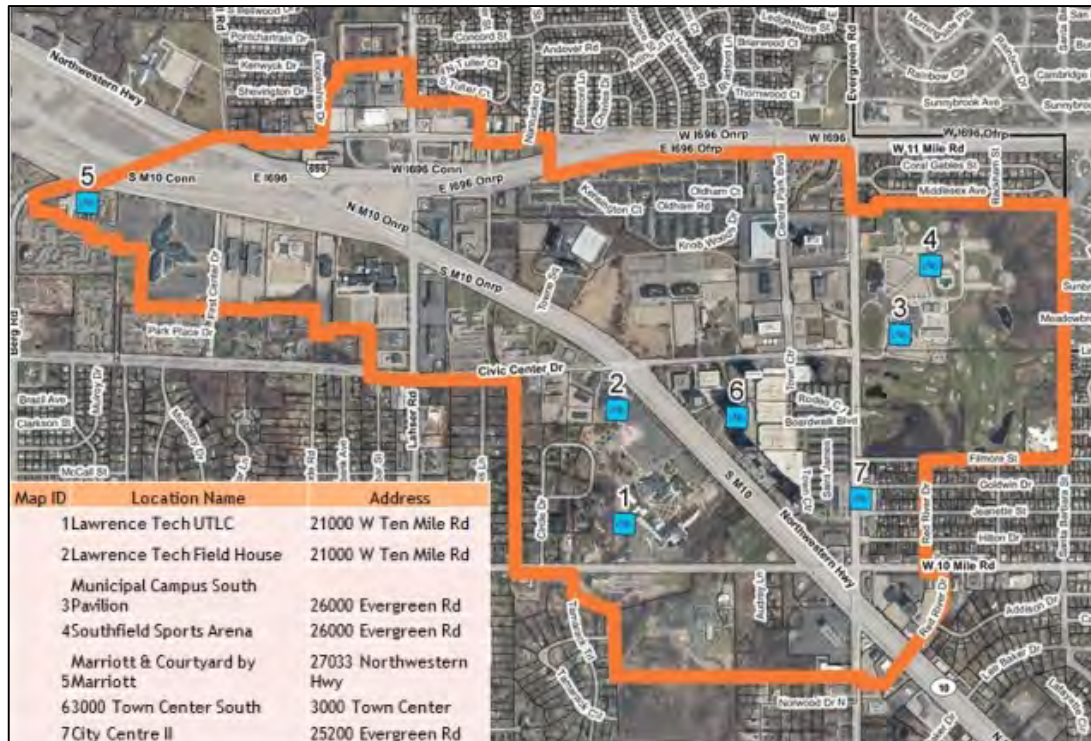
DTE Tree Grants

- Improved Air Quality
- Stormwater Management
- Carbon Storage
- Energy Savings
- Economic Benefits
- Wildlife Habitats



Reduce Carbon Footprint

Bike Share Program



7 Stations, 27 Bikes



Reduce Carbon Footprint

- Education
- Promote Heart Healthy Activity

Southfield Pavilion

9.5 Laps = 1 Mile

"Walk to Health"

Southfield
the center of it all™



Reduce Nature Deficit Disorder

- “Nature Bathing”
- Promote Connection to Nature



Oakland Commons/Truck-Lite



Storm Water Management Study



In 2012, The City prepared a ***Storm Water Master Plan*** update with assistance from Environmental Consulting & Technology, Inc. (ECT)

Storm Water Management Study

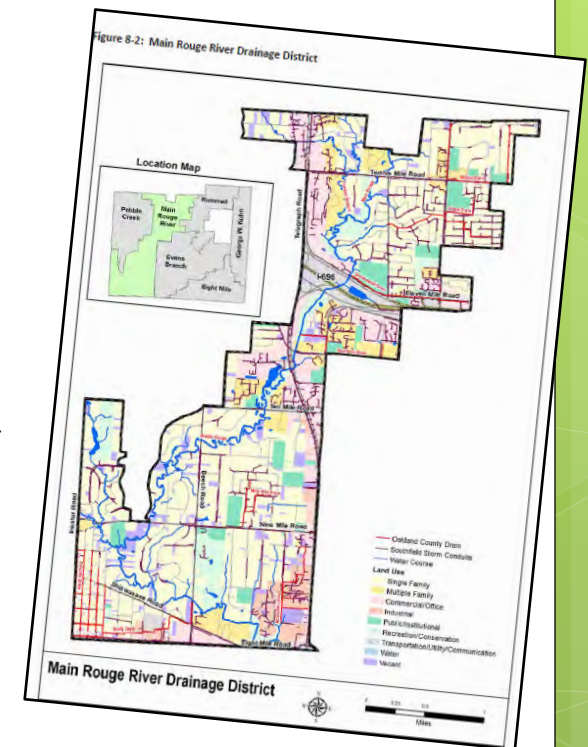
First storm water master plan 1969:

- Flood control and managing peak flow

The overall purpose of the Storm Water Master Plan is to provide a **long-range strategy for managing storm water runoff** in the City and **improving the overall health of the watershed.**

Updated storm water master plan: In support of the overall goals for the Storm Water Master Plan, specific objectives include:

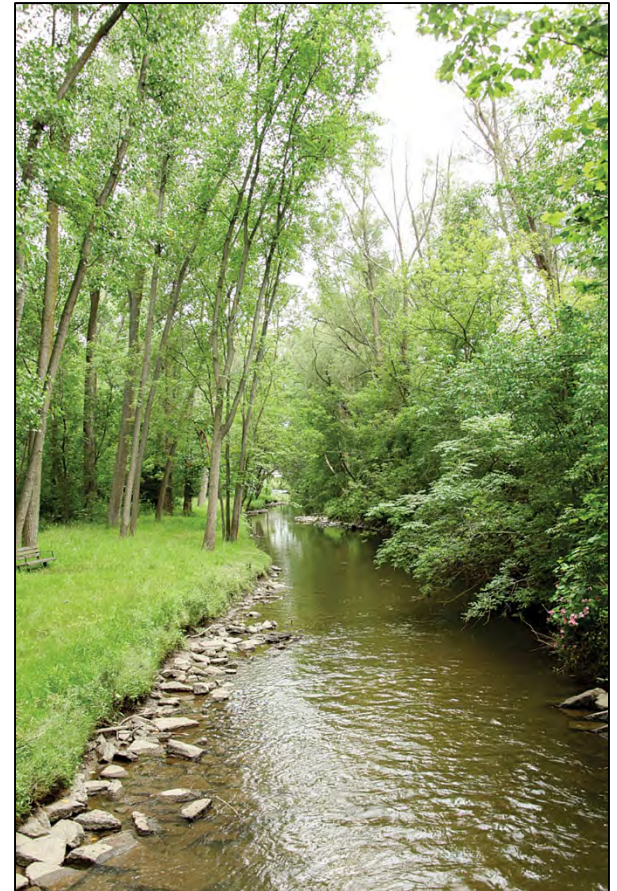
- Incorporate **sustainable design** into storm water projects.
- Plan with nature.
- Use storm water as a resource.
- Low impact development techniques.



Storm Water Management Study

In support of the overall goals for the Storm Water Master Plan, specific objectives include (continued):

- **Improve** storm water **quality**, **reduce** storm water runoff **volumes** and reduce **impacts** of storm water flows through better storm water management policies, engineering design standards and operational practices.
- **Work with** upstream and downstream neighbors.
- **Prioritize projects** to make efficient use of the City's financial resources.
- **Identify** mechanisms and opportunities and for **funding** storm water projects.



Capital Planning with Green Infrastructure

- No dedicated funding source for storm water projects.
- Funding for Parks and Recreation, General Fund, Water Fund.
- Over five million dollars in grant funds received for green infrastructure projects.



THE ROUGE RIVER PROJECT
A WORLD CLASS EFFORT



BRINGING OUR RIVER BACK TO LIFE



Incorporating Green Infrastructure in City Projects Where Feasible


- Where do projects make sense?
 - Park Development
 - Road Projects
 - Redevelopment Projects



Improving Storm Water in Southfield Through Green Infrastructure

Inglebrook Park Storm Water Improvement Project

Inglebrook Park is located within the City of Southfield, Michigan and offers an excellent opportunity to bring together the City, the State, and the private sector. The project is a multi-phased design and construction project to improve the parking capacity of the existing parking lot and to provide a new and existing parking lot.



Installation of drainage and curb flow structure.

Installation of drainage and curb flow structure.

Installation of drainage and curb flow structure.

Installation of drainage and curb flow structure.

Valley Woods Wetland Restoration and Storm Water Improvement Project

The Valley Woods Wetland is located within the City of Southfield and is bounded by commercial and residential development and the Rouge River. Valley Woods is recognized for its site-specific urban wetland and has a flow-through structure that is better than average wetland/pond land within the state. Many preservation sites and plans exist in the area.



The purpose of the storm water improvement project was to create an attractive and functional storm water structure as a component of a new park entrance for Valley Woods Nature Preserve. Valley Woods Nature Preserve is a 100-acre linear park along the Main Branch of the Rouge River. The project included storm water quality and retention from water in storm water and a site and aesthetic access point to the Valley Woods Nature Preserve.

The open concrete channel adjacent to the concrete was meticulously sized and installed down the slope to a small culvert under a road, directly into the river. The concrete structure then channel continued into the adjacent steep slope, flooding the parking lot.


New trees were installed for the park wall building. The buildings were placed, and the walls were built and painted. Buildings and signs were then placed at the park.

Over the site with soil pads were in place, a flat case and permit plans roadway and building were installed.

The native plants for both the wet area to the park and the other areas outside the park were installed.


Beech Woods Park Greening Project

The goal of the project was to implement green, sensitive site development methods while retaining the positive impacts of site development on the Rouge River. The project was to install a demonstration of storm water runoff to an existing facility can be utilized for site visit by storm water best management practices (BMP) such as porous pavements, bioswales, and native plantings.



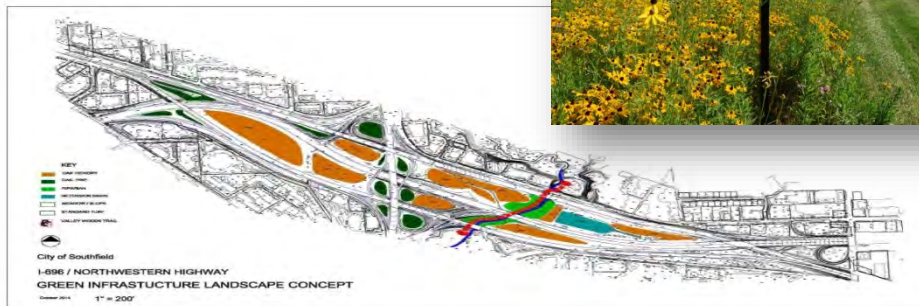
An existing traditional parking lot was demolished and a new porous pavement parking lot was installed. The porous pavement parking lot was installed in the parking lot to accommodate site use up to the top park storm water.

A traditional forest cover was installed as part of the project and bioswales and permeable paving were installed to treat storm water and provide a buffer to the Rouge River to the existing storm water.



Partnerships

- Residential rain gardens
- No mow zones
- Tree plantings



Rain Gardens of Southfield

Southfield
the center of it all!

★ Rain Garden Locations

Rain Gardens work for us in several ways:

- Helping sustain adequate flows in streams during dry spells;
- Providing valuable wildlife habitat;
- Enhancing the beauty of your yard and the neighborhood;
- Helping protect communities from flooding and drainage problems;
- Spring protect streams and lakes from damaging flows and reducing wear of the streambanks and fishery; and,
- Reducing the need for costly municipal storm water treatment structures

Rain Garden
City of Southfield, Oakland County, Michigan August 2015





Questions?