Climate Resiliency and Flooding Mitigation Study

October 29, 2020

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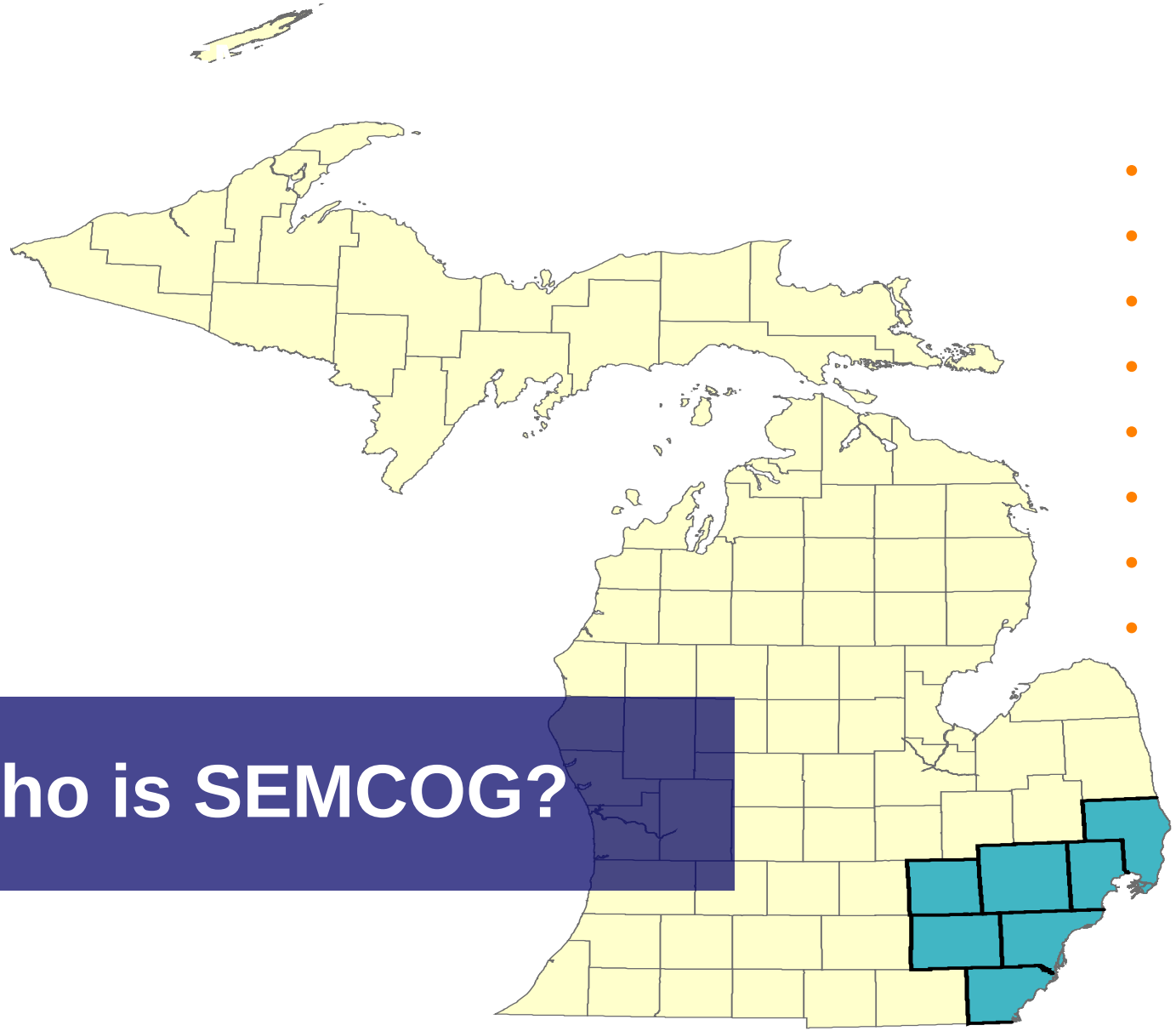
AGENDA

- Background
- Flooding Risk Tool Methodology + Results
- Implementation at MDOT
- Q&A

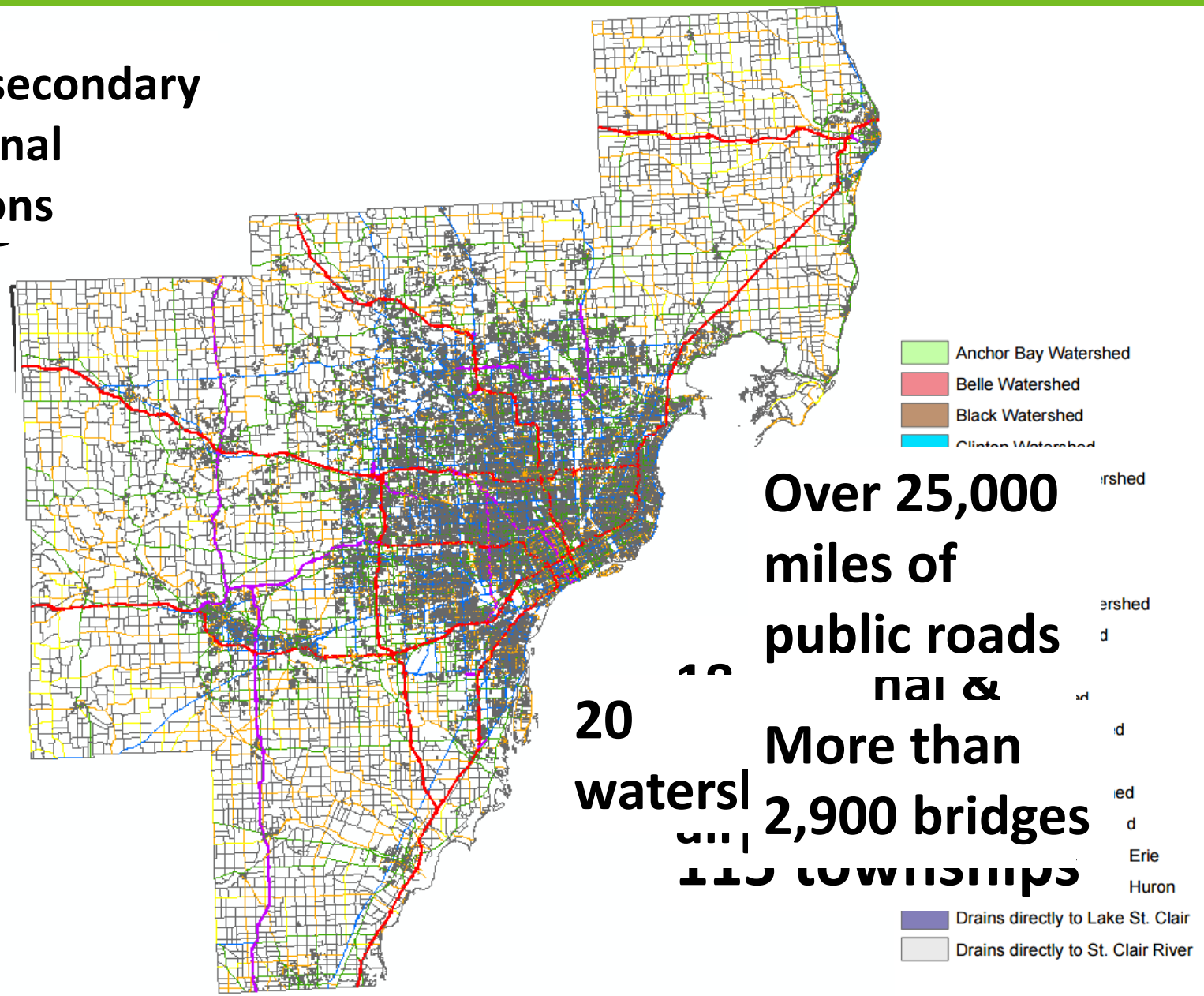
Who is SEMCOG?



- 7 counties
- 4,700 square miles
- Population 4.7 Million
- 44% Residential
- 26% Agricultural
- 15% Impervious
- 30% Tree Canopy
- 50% Open Space

Southeast Michigan has…

49 post-secondary educational institutions



Over 25,000 miles of public roads

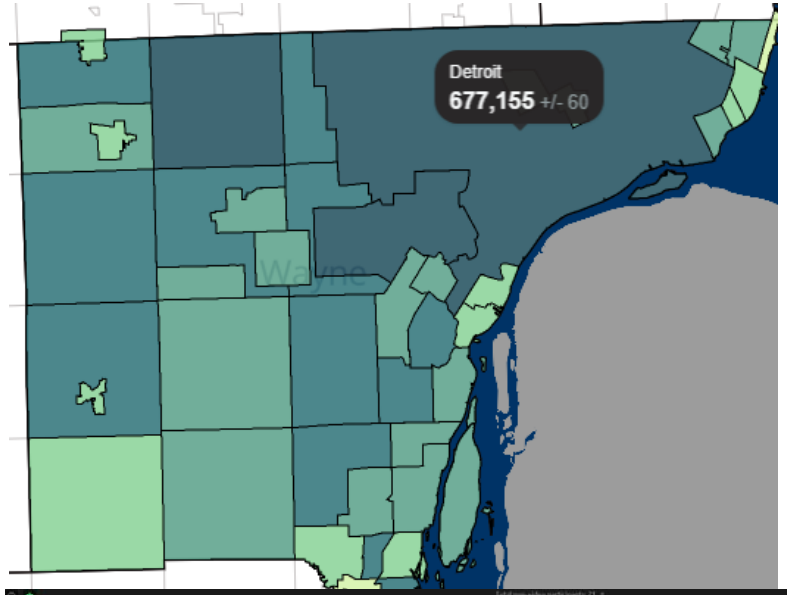
20 watersh

nal &

More than 2,900 bridges

townships

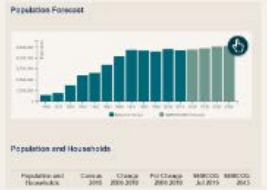
Data, Technical Assistance, Public Input



Data and Maps

SEMCOG provides insightful data analysis and direct assistance to member governments. Local governments and other planning organizations depend on SEMCOG for up-to-date information on demographics, socio-economics, housing, land use, and transportation related data. SEMCOG's data collection, analysis, forecasting, and reporting are designed to meet those needs.

Community Profiles



Delve into data about how people live, work, and travel in your community.

Map Gallery

Explore SEMCOG's full suite of maps for regional, county, community, and local planning.

Open Data Portal

Explore and download SEMCOG's open data.

Economic Indicators

Explore trends in economic data for Southeast Michigan.

Aerial Imagery

Learn about SEMCOG's regional aerial imagery and LiDAR data.

Census 2020

United States Census 2020

Prepare for the 2020 census.

GIS

Join the Southeast Michigan GIS Users Group.

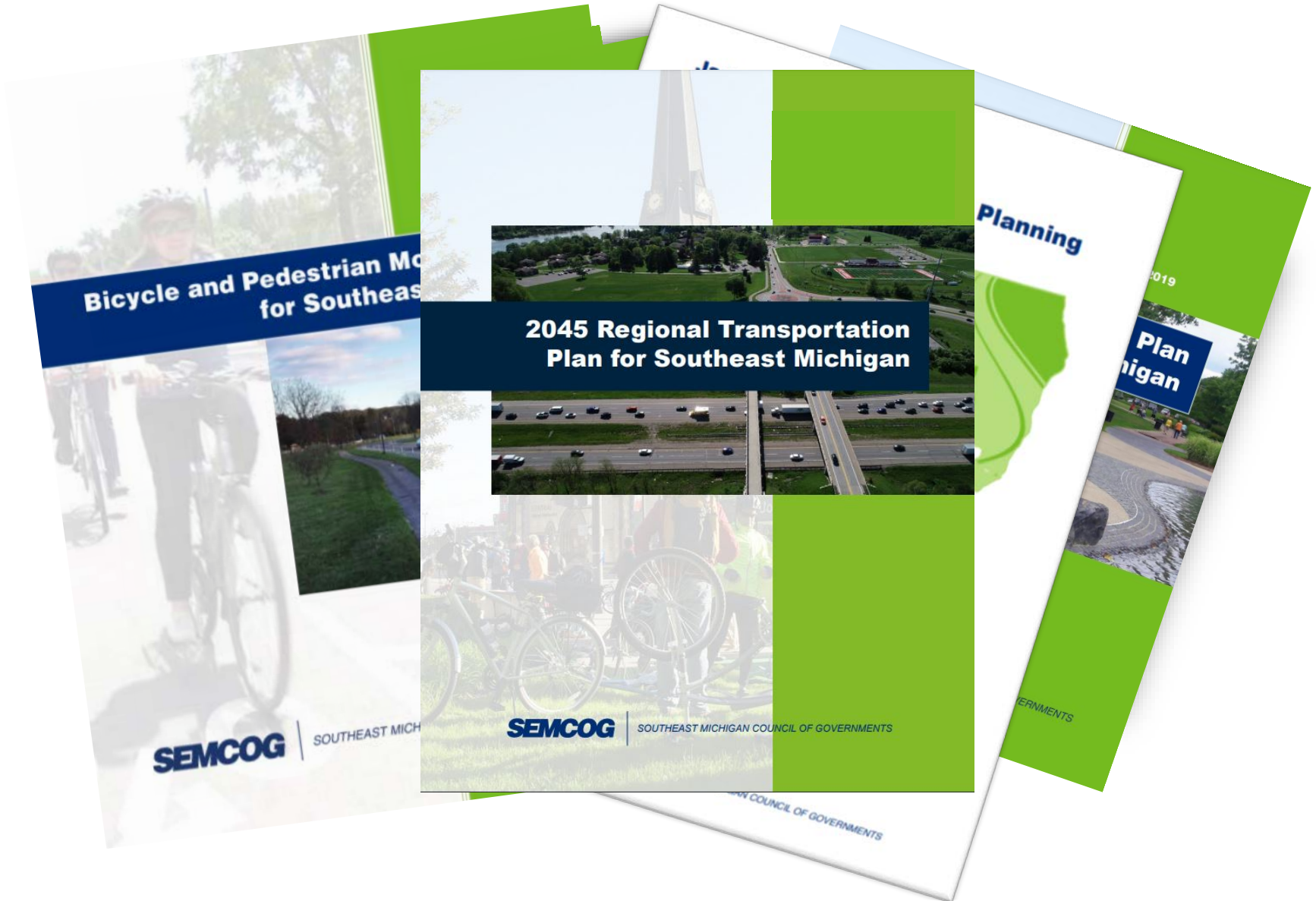
Development Reports

Monitor residential and nonresidential development.

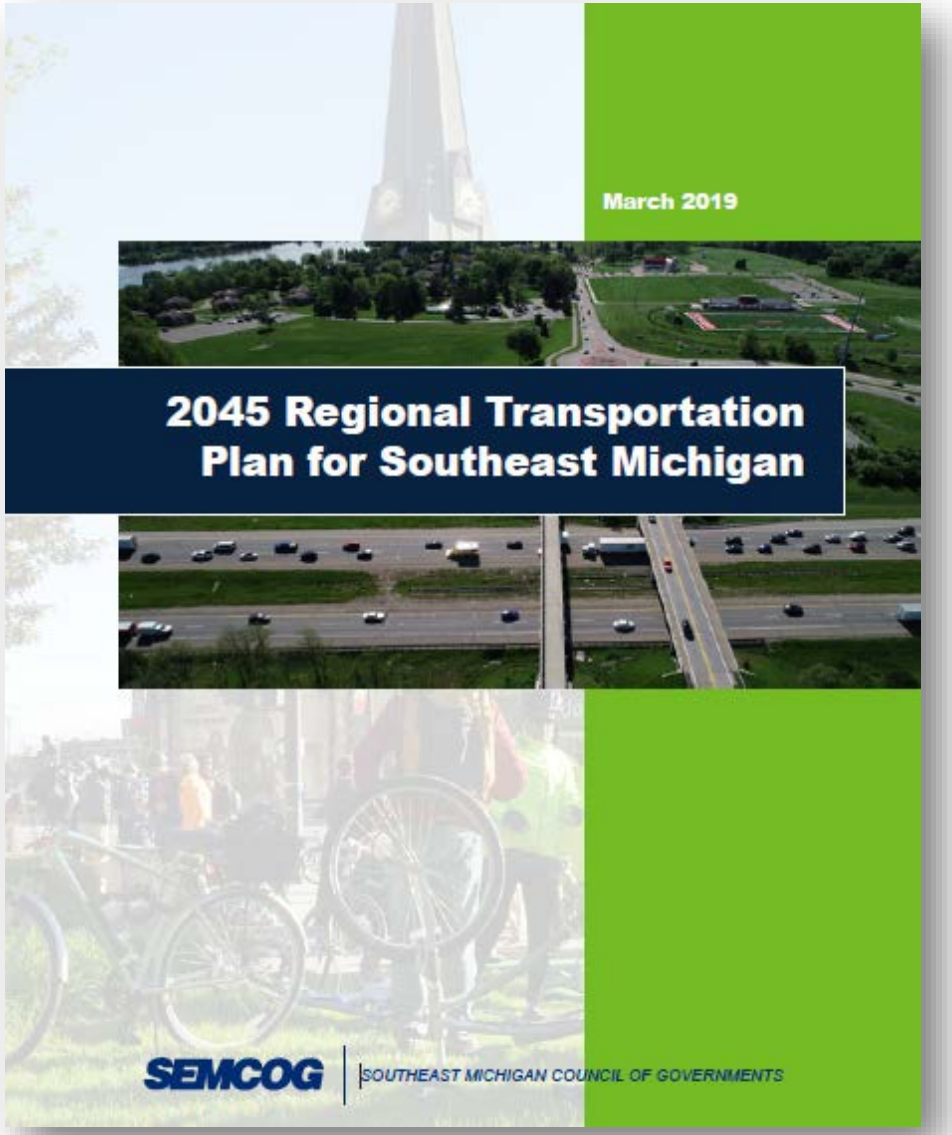
Transportation Data

Access various tools for searching road, traffic, and crash data.

SEMCOG Regional Plans



2045 Regional Transportation Plan (RTP)



Region's long-range plan for investing federal, state, and local transportation funding

Purpose:

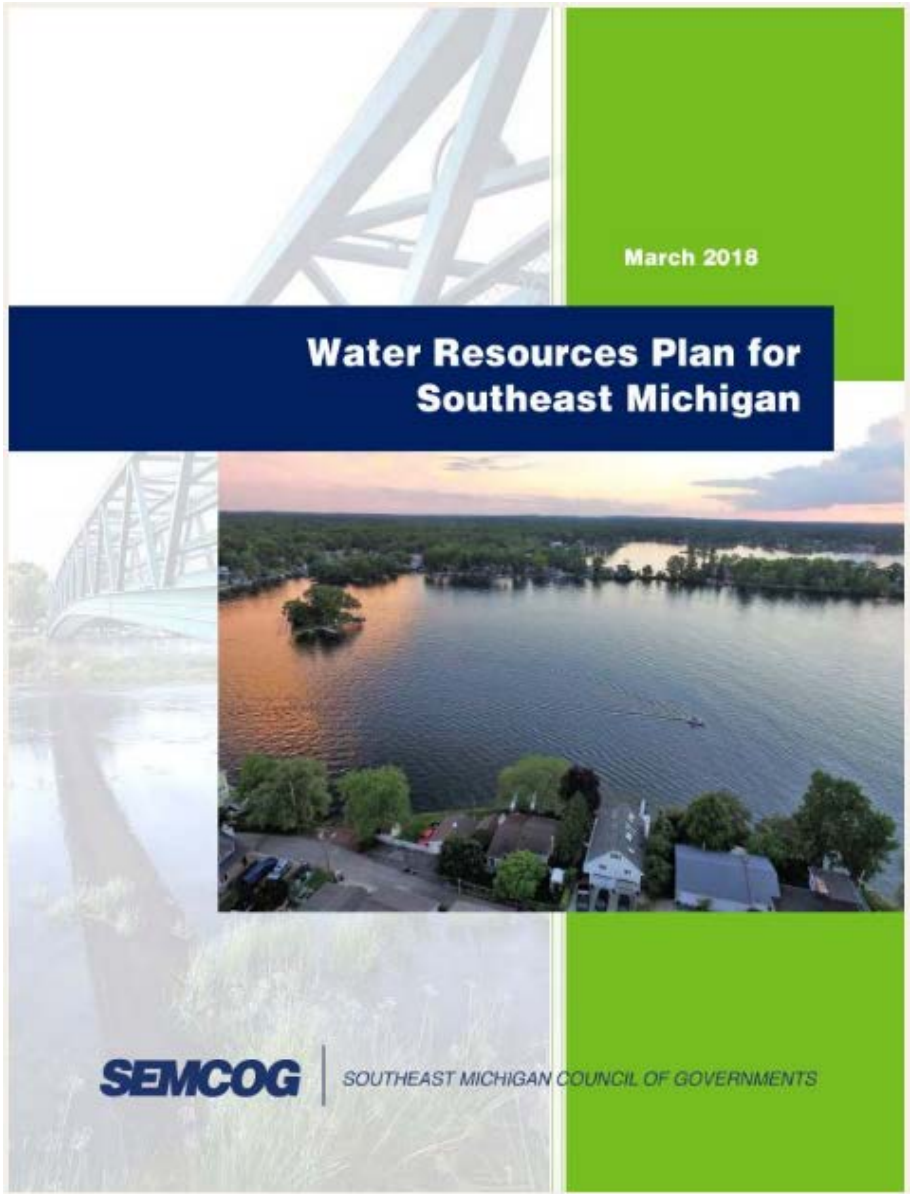
- Establish regional goals
- Identify present and future needs; deficiencies and constraints
- Analyze potential solutions
- Estimate available funding
- Propose projects (TIP)

"Complete a climate resiliency analysis for regional transportation assets"

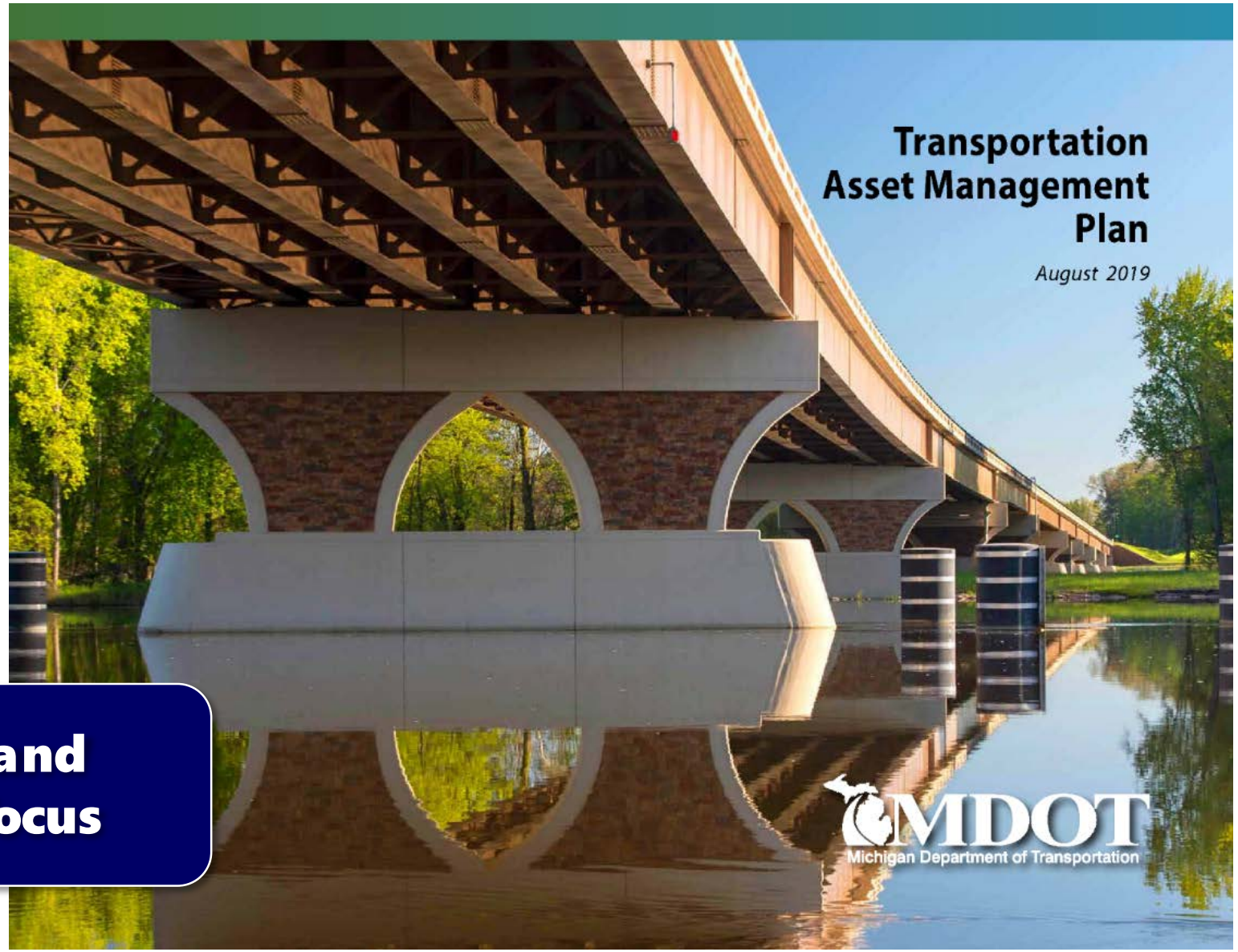
Water Resources Plan

"Enhance community readiness for changing precipitation patterns to ensure resiliency of infrastructure and natural resources"

- Identify vulnerable assets
- Update precipitation frequency estimates
- Integrate resiliency priorities
- Evaluate opportunities to reduce runoff using natural resource areas



MDOT Transportation Asset Management Plan



Risk Management and Resiliency is a key focus

2019 Climate Resiliency Analysis: Context

August 2014 storm

- **6 inches** of rainfall, **8-hour** period
- **$1.8 billion** in damages
- Federal disaster declaration

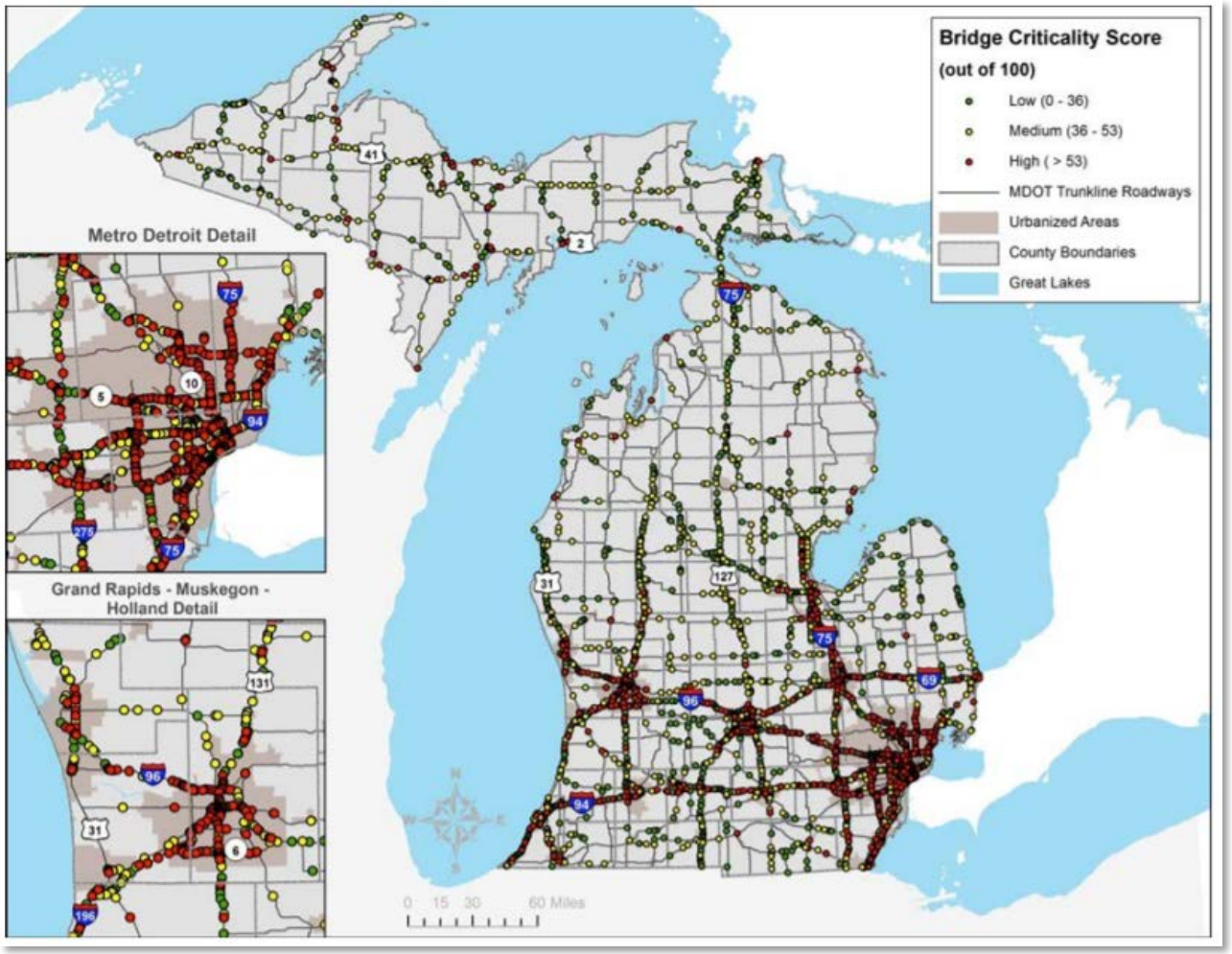
Avg Annual Rainfall Increase

- **7-10%** by 2050
- Upwards of **13-23%** by 2100

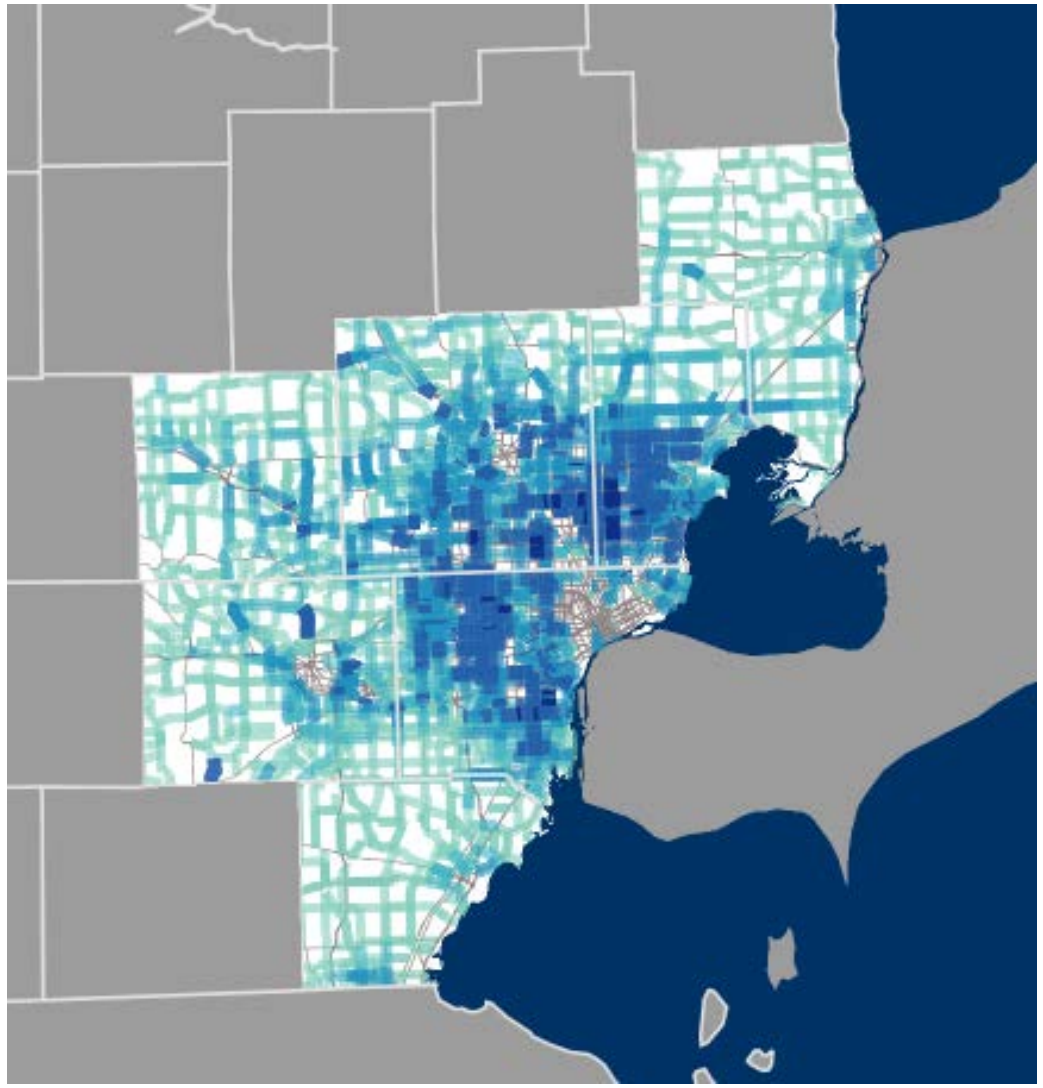
Climate Resiliency Analysis: Context

Michigan DOT Climate Vulnerability Assessment Pilot Project (2015)

- 1/19 FHWA-funded pilot projects
- Statewide flooding analysis of MDOT roads, bridges, culverts, and pumps
- Robust criticality assessment. Limited vulnerability analysis due to exposure data limitations



Scope



Geography

- SEMCOG 7-county region

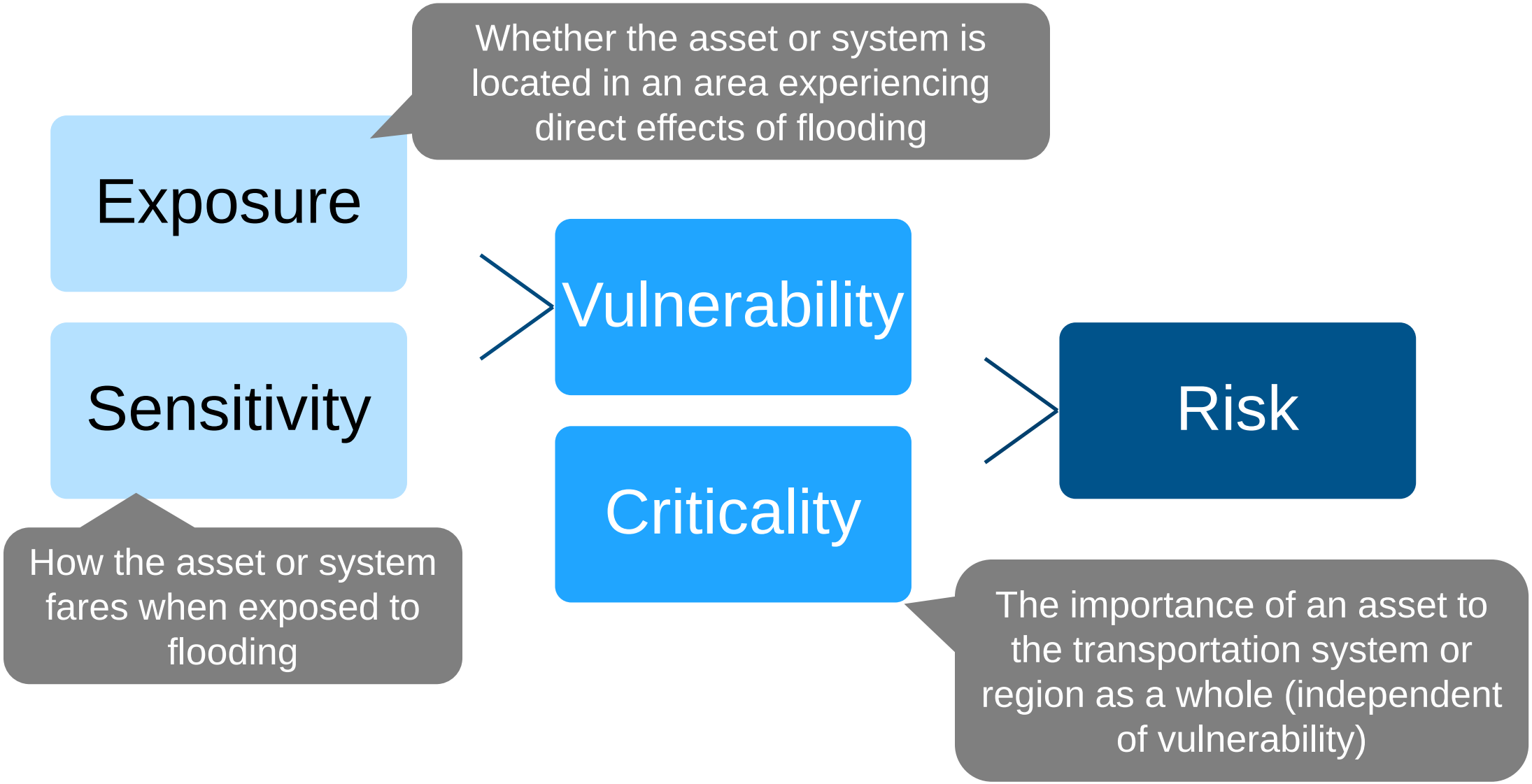
Asset types

- Bridges
- Culverts
- Roads
- Pump stations

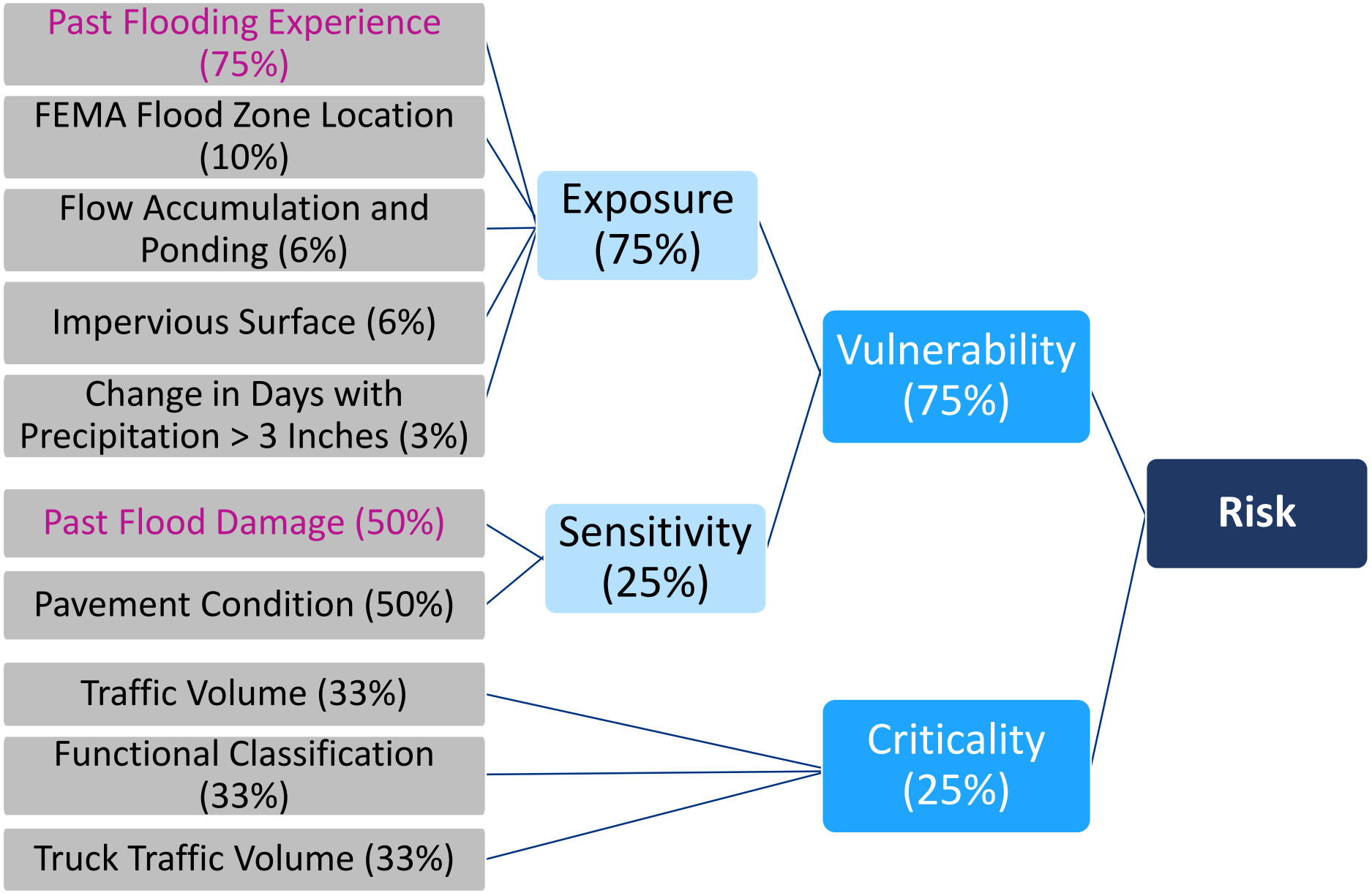
Hazards

- Flooding

Components of Flooding Risk



Example Flooding Risk Methodology: Roads



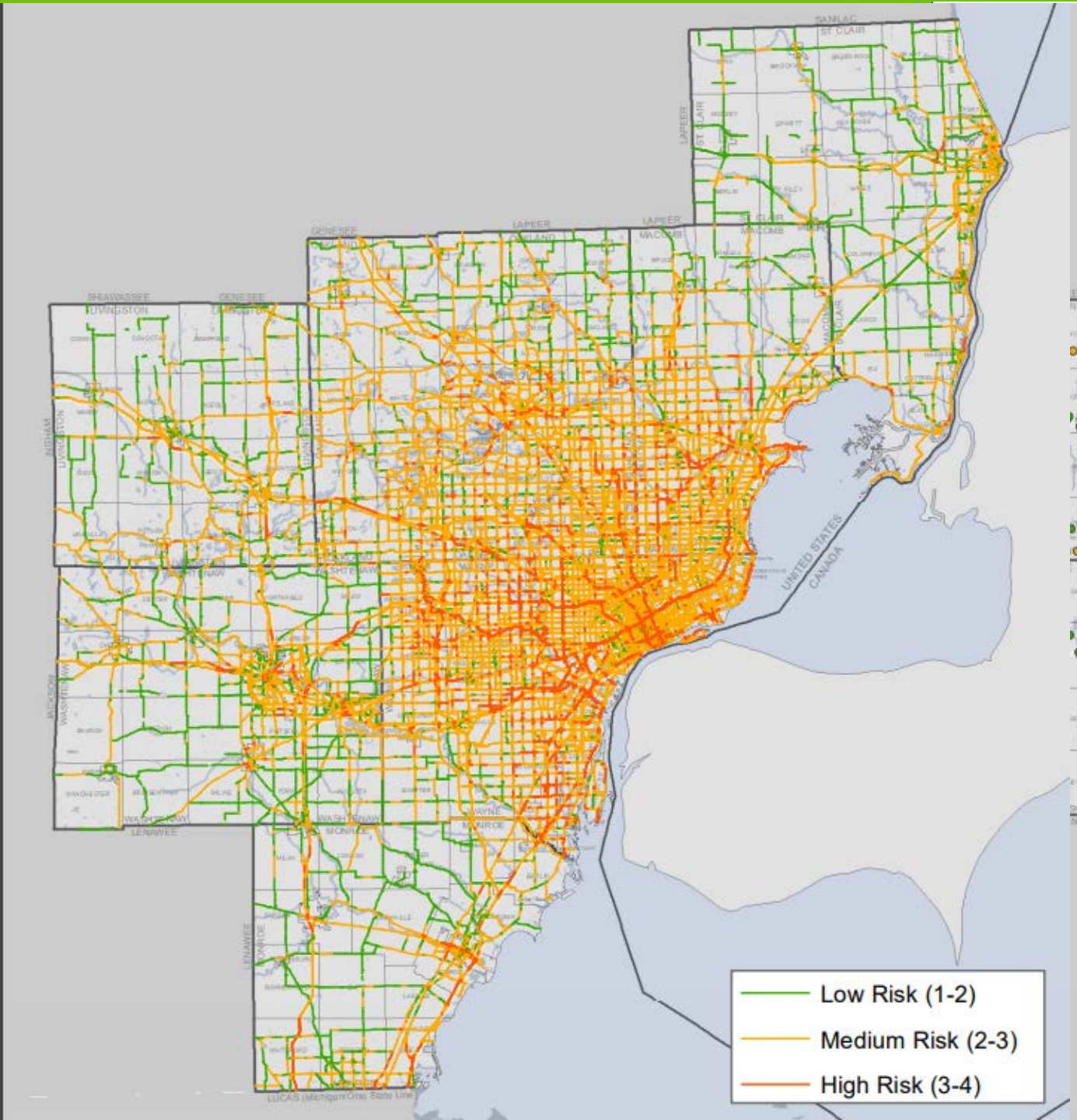
Culvert Methodology

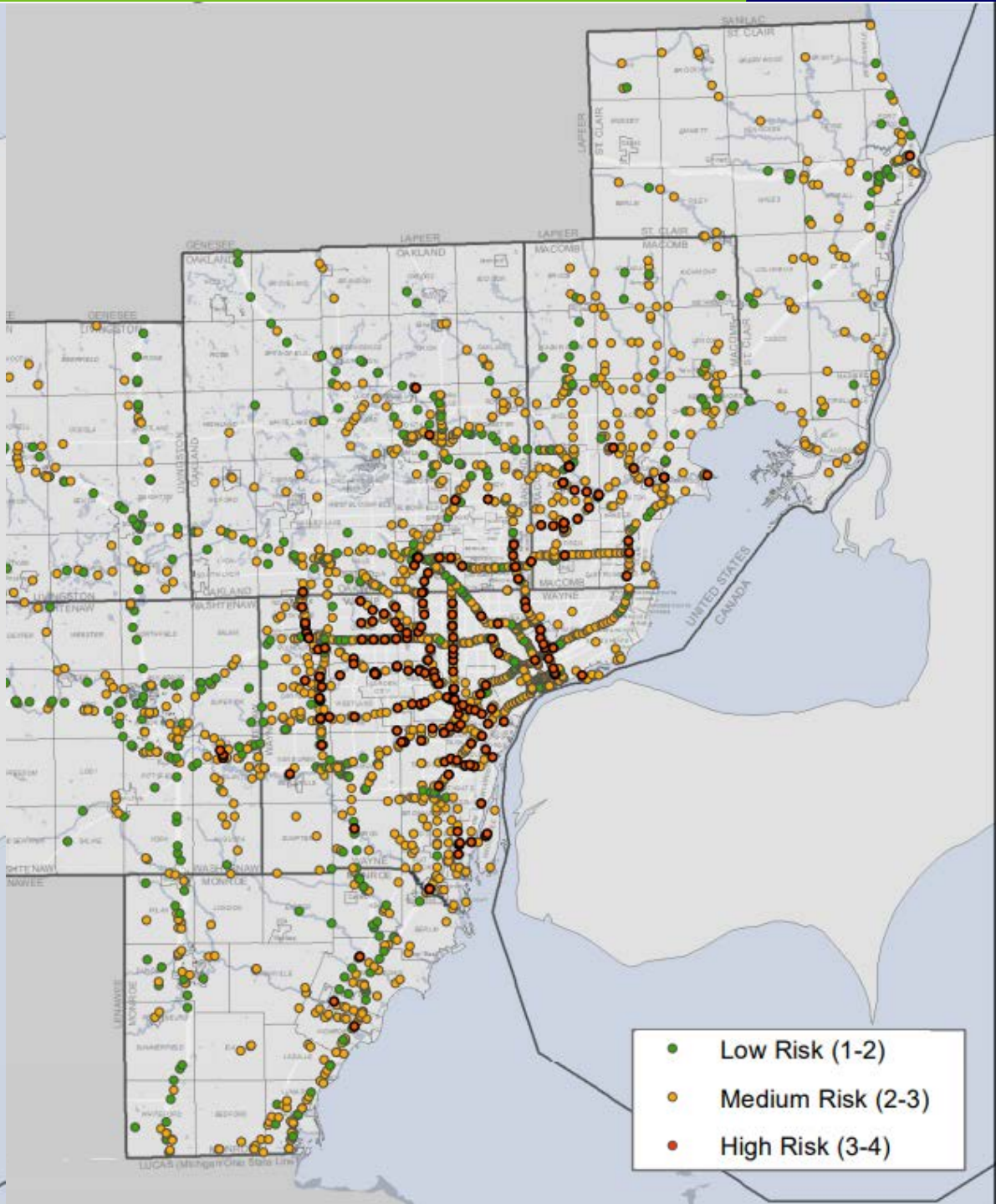
Culvert Analysis

- Only done for sensitivity analysis (exposure based on road segment)
- Condition, age, inspection comments (buried, full), water height in culvert, stream substrate, past flood damage
- Need more information here
  - 2k culvert risk scores vs. 13k road stream crossings
  - Lack of available data for the 2k culverts we have

Exposure Indicator	Data Availability			
	Roads	Bridges	Culverts	Pump Stations
Past experience with flooding	0.5%	0.7%	0.0%	0.0%
Location relative to FEMA Flood Zones	100.0%	100.0%	100.0%	100.0%
Flow accumulation and ponding	100.0%[1]	100.0%	100.0%	100.0%
Impervious Surface	100.0%[2]	100.0%	100.0%	100.0%
Change in days with precipitation > 3 inches	100.0%	100.0%	100.0%	100.0%

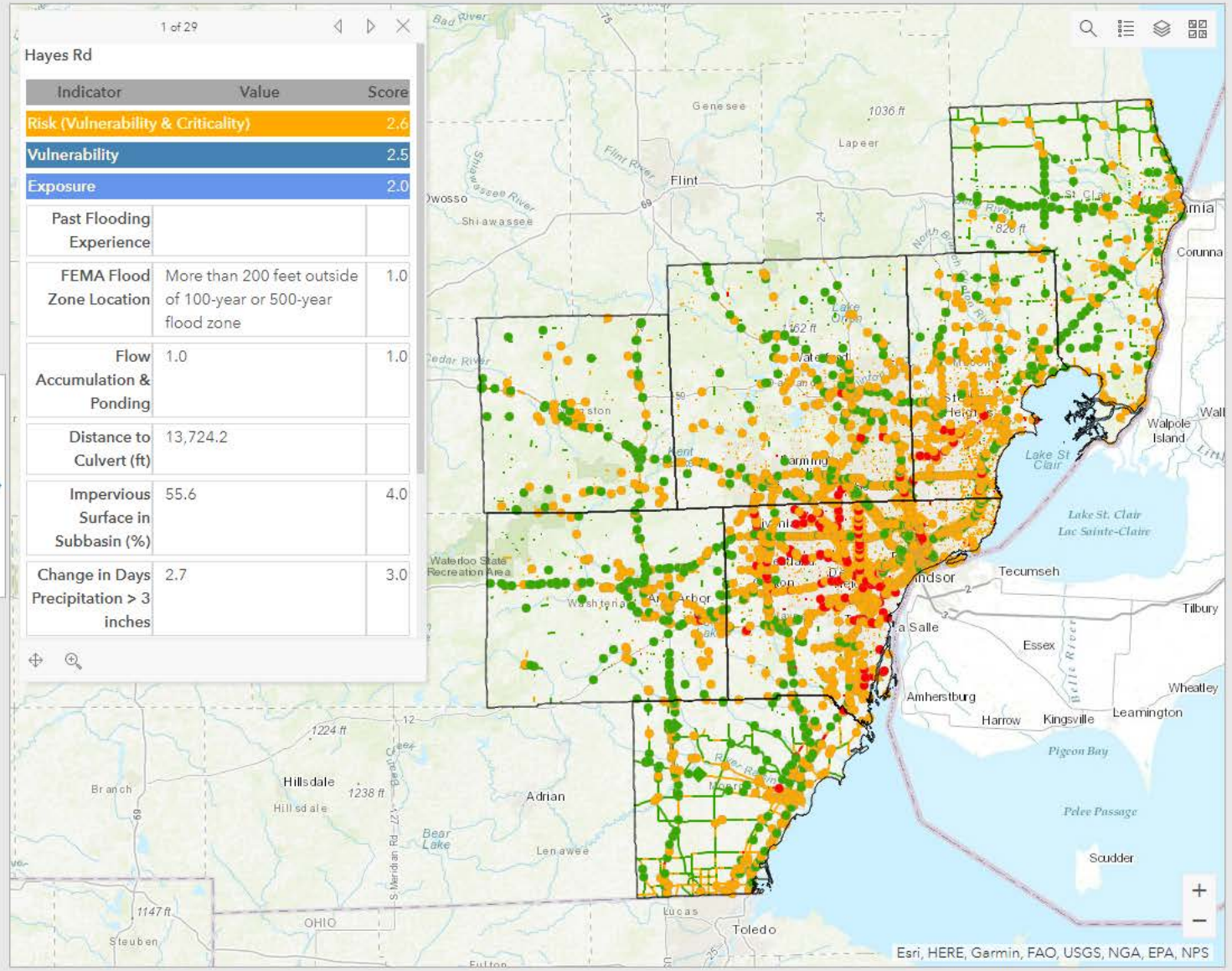
Sensitivity Indicator	Data Availability			
	Roads	Bridges	Culverts	Pump Stations
Past flood damage	0.1%	0.1%	0.0%	0.0%
Condition	N/A	N/A	< 0.1%	N/A
Age	N/A	N/A	< 0.1%	N/A
Inspection comments	N/A	N/A	100.0%	N/A
Proportion of the culvert height filled with water	N/A	N/A	100.0%	N/A
Stream substrate	N/A	N/A	62.9%	N/A

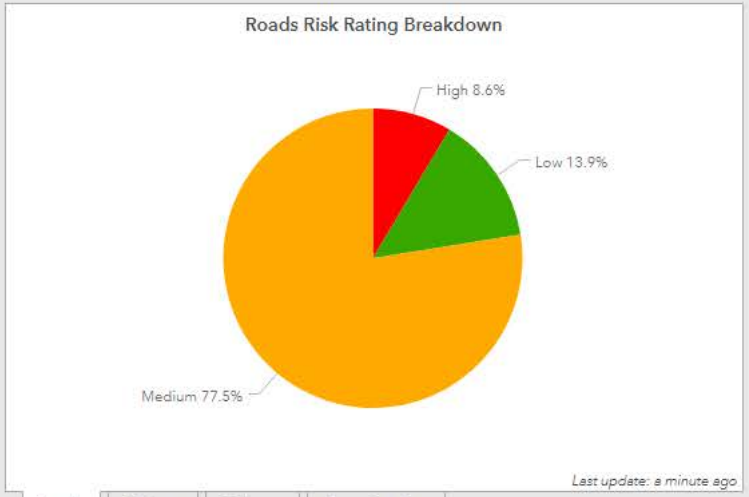

Low Risk (1-2)
Medium Risk (2-3)
High Risk (3-4)


Low Risk (1-2)
Medium Risk (2-3)
High Risk (3-4)

Tool Dashboard

SEMCOG Flooding Risk Tool Dashboard





Top 5 Road Segments at Risk

Within Filtered Assets

- **Road Name:** **From:** Outer - **To:** Outer/S I 75 **Criticality Score:** 4 **Vulnerability Score:** 3.9
- **Road Name:** Inkster Rd **From:** Edward N Hines Dr - **To:** Inkster/Edward Hines Cutoff **Criticality Score:** 3.7 **Vulnerability Score:** 4
- **Road Name:** Inkster Rd **From:** Clairview Dr - **To:** Edward N Hines Dr **Criticality Score:** 3.7 **Vulnerability Score:** 4
- **Road Name:** Telegraph Rd **From:** Shiawassee Dr - **To:** N US 24/E M 102 RAMP **Criticality Score:** 3.7 **Vulnerability Score:** 3.9
- **Road Name:** Telegraph Rd **From:** Shiawassee Dr - **To:** N US 24/E M 102 RAMP **Criticality Score:** 3.7 **Vulnerability Score:** 3.9

Last update: a minute ago

Roads | Bridges | Culverts | Pump Stations

Road Asset Count
71,599
Last update: a minute ago

Bridge Asset Count
2,634
Last update: a minute ago

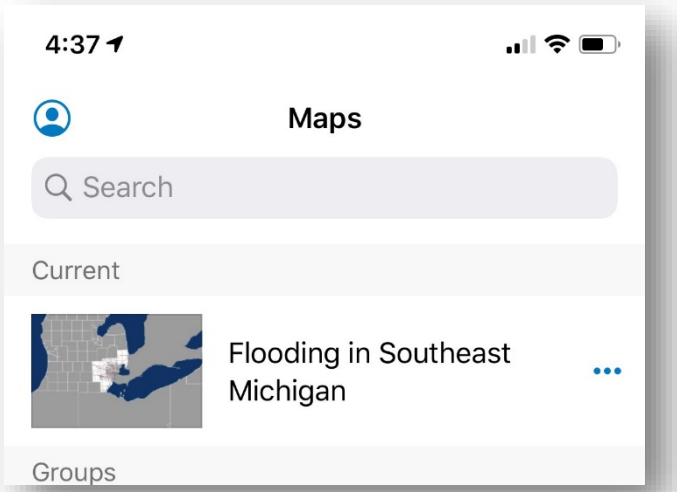
Culverts Asset Count
2,634
Last update: a minute ago

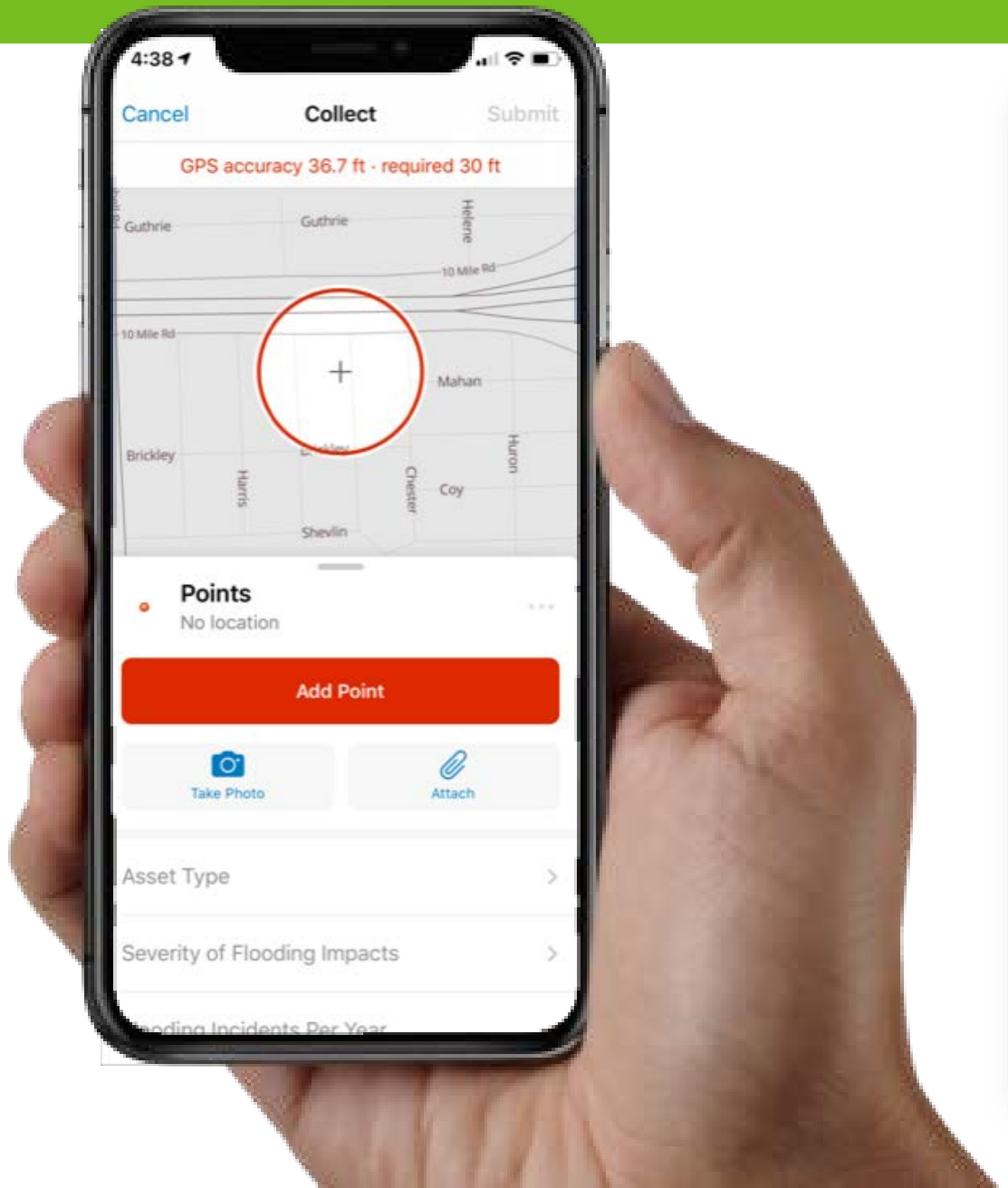
Pump Stations Asset Count
143
Last update: a minute ago

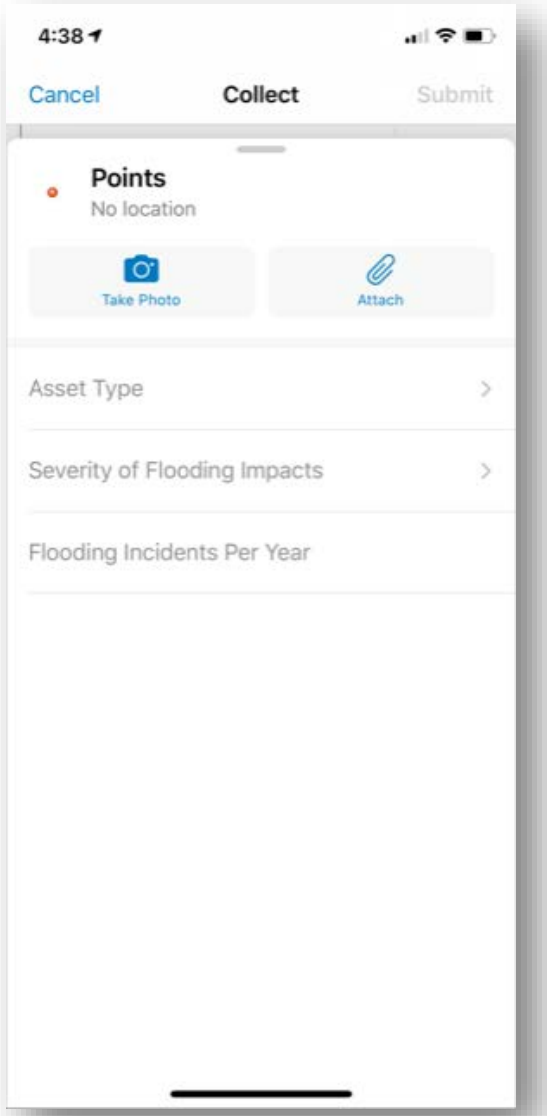
Products

- Flooding risk assessment methodology for each asset type
- Database of risk ratings for each asset
- Repeatable tool/model for risk rating calculations
- Final report and integration strategy
- Results Dashboard
- Flooding app

Flooding App







Implementation at MDOT

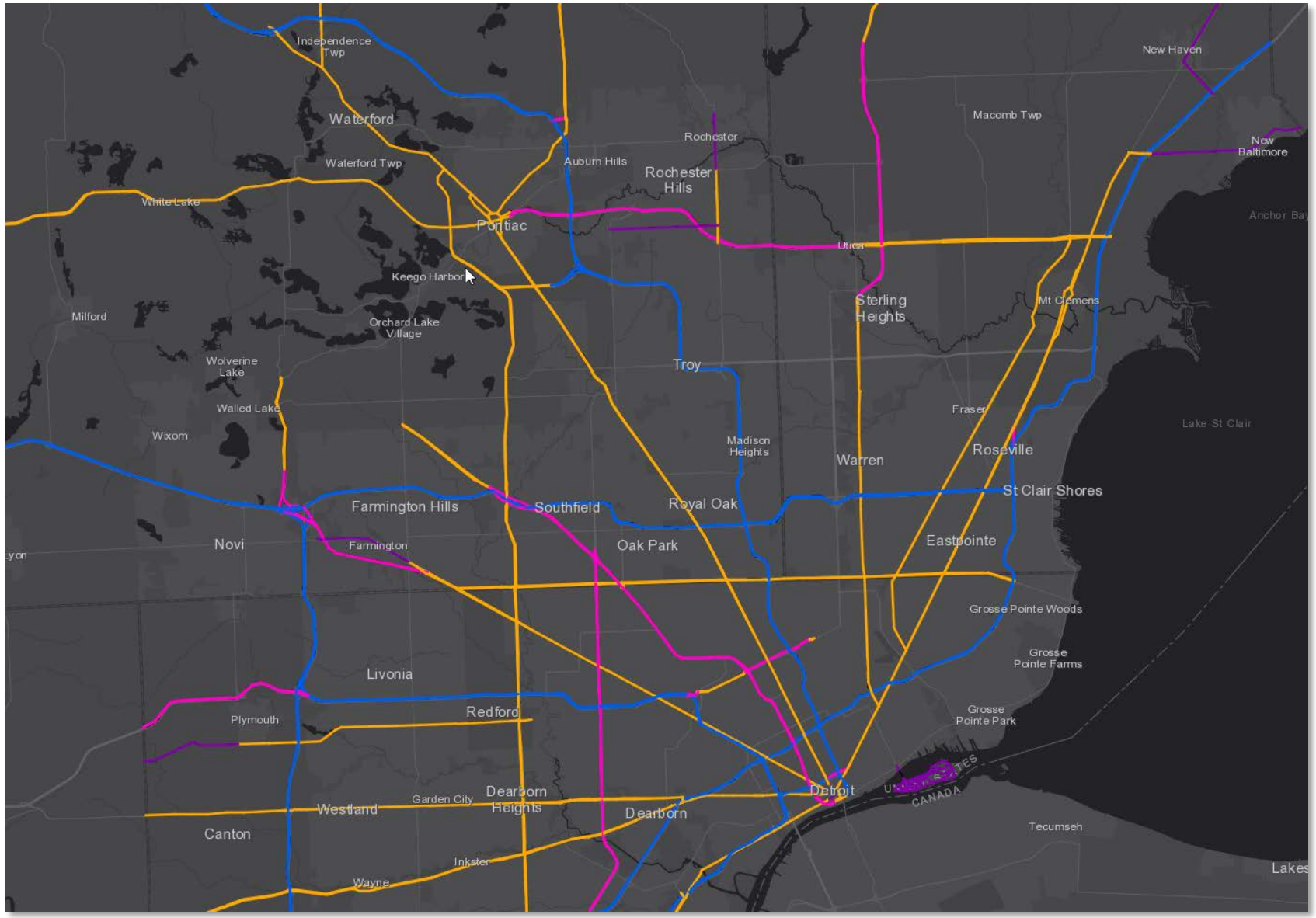
IMPLEMENTATION AT MDOT

- Project Selection
- Scoping
- Design
- Construction

Project Selection

- How does MDOT select projects?
- How does MDOT use the outcomes of the Climate Resiliency and Flooding Mitigation Study and results of the Flooding Risk Tool to influence project selection as we manage our assets?

Project Selection



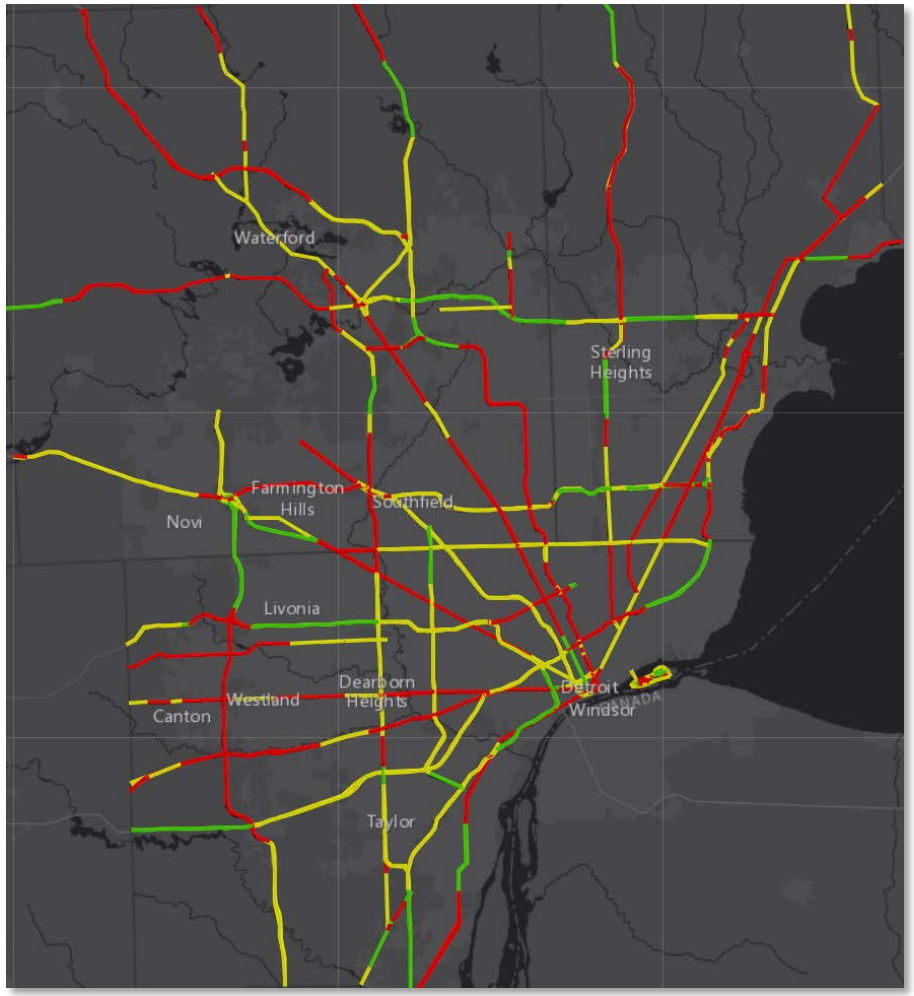
Project Selection

Percent Investment Based on Pavement Condition[1]*

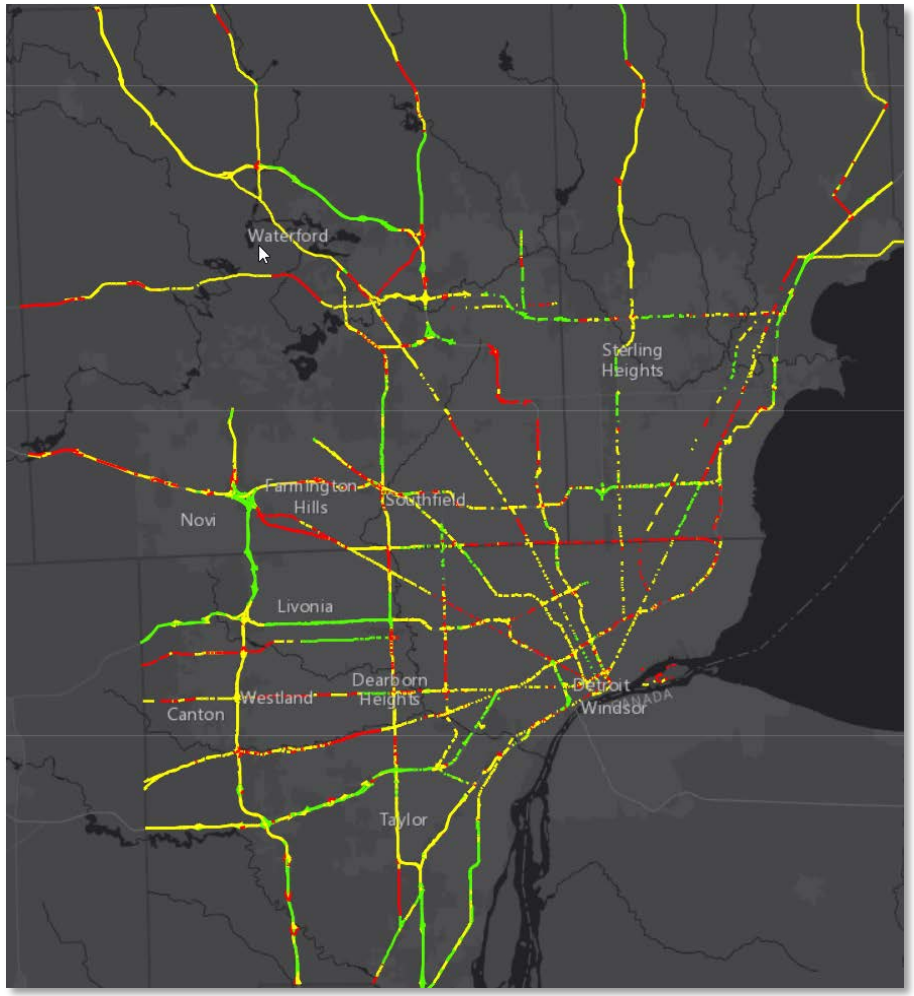
Region	Interstate (Minimum)	Non-Interstate Freeway (Minimum)	Non-Freeway NHS (Maximum)	Non-NHS (Maximum)
Bay	52%	11%	27%	10%
Grand	42%	24%	24%	10%
Metro	66%	7%	22%	5%
North	25%	4%	51%	20%
Southwest	71%	5%	14%	10%
Superior	3%	0%	77%	20%
University	68%	16%	12%	5%
Source: 2017 Pavement Condition File				

*% may not equal 100 due to rounding

Project Selection

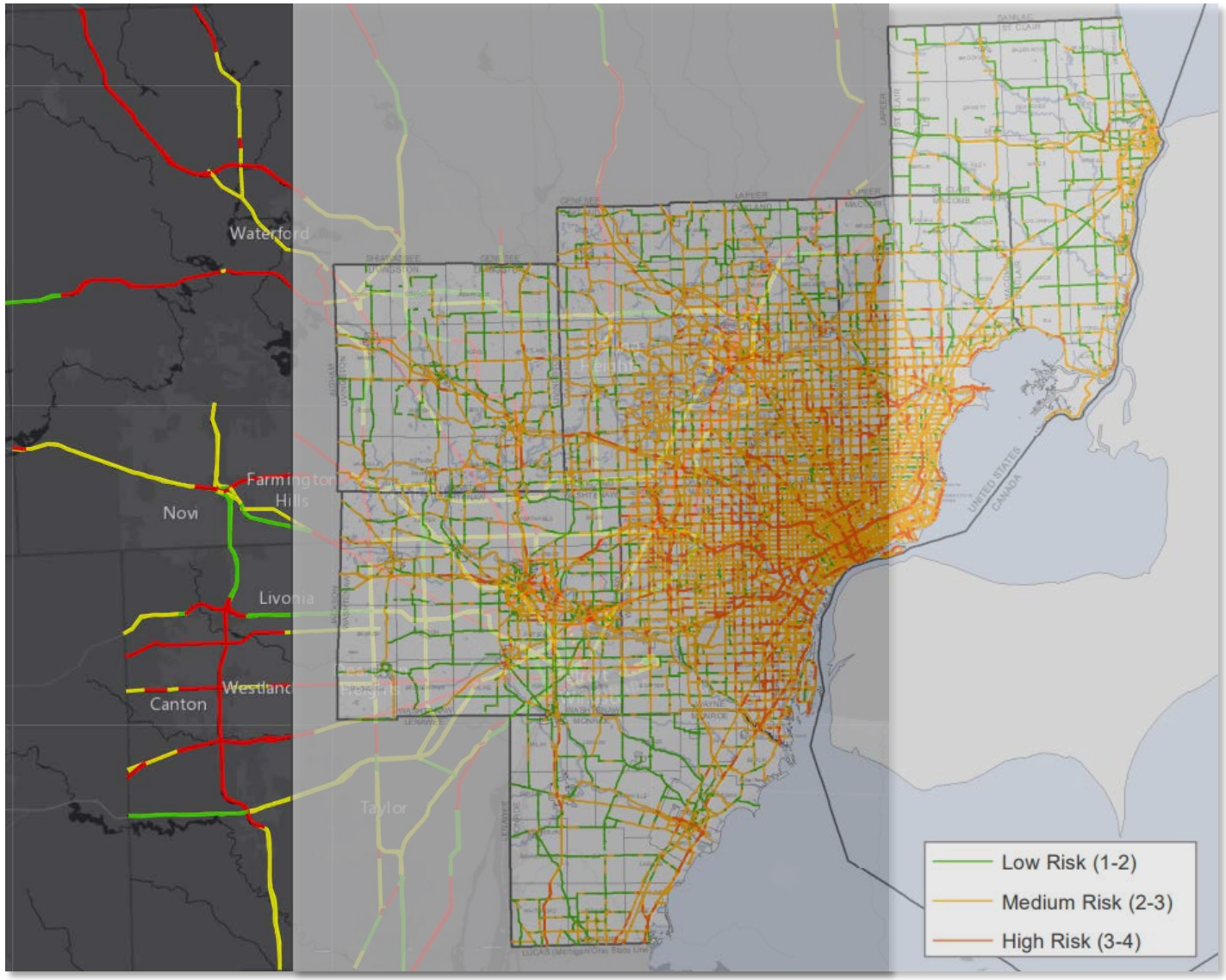


Remaining Service Life (RSL)



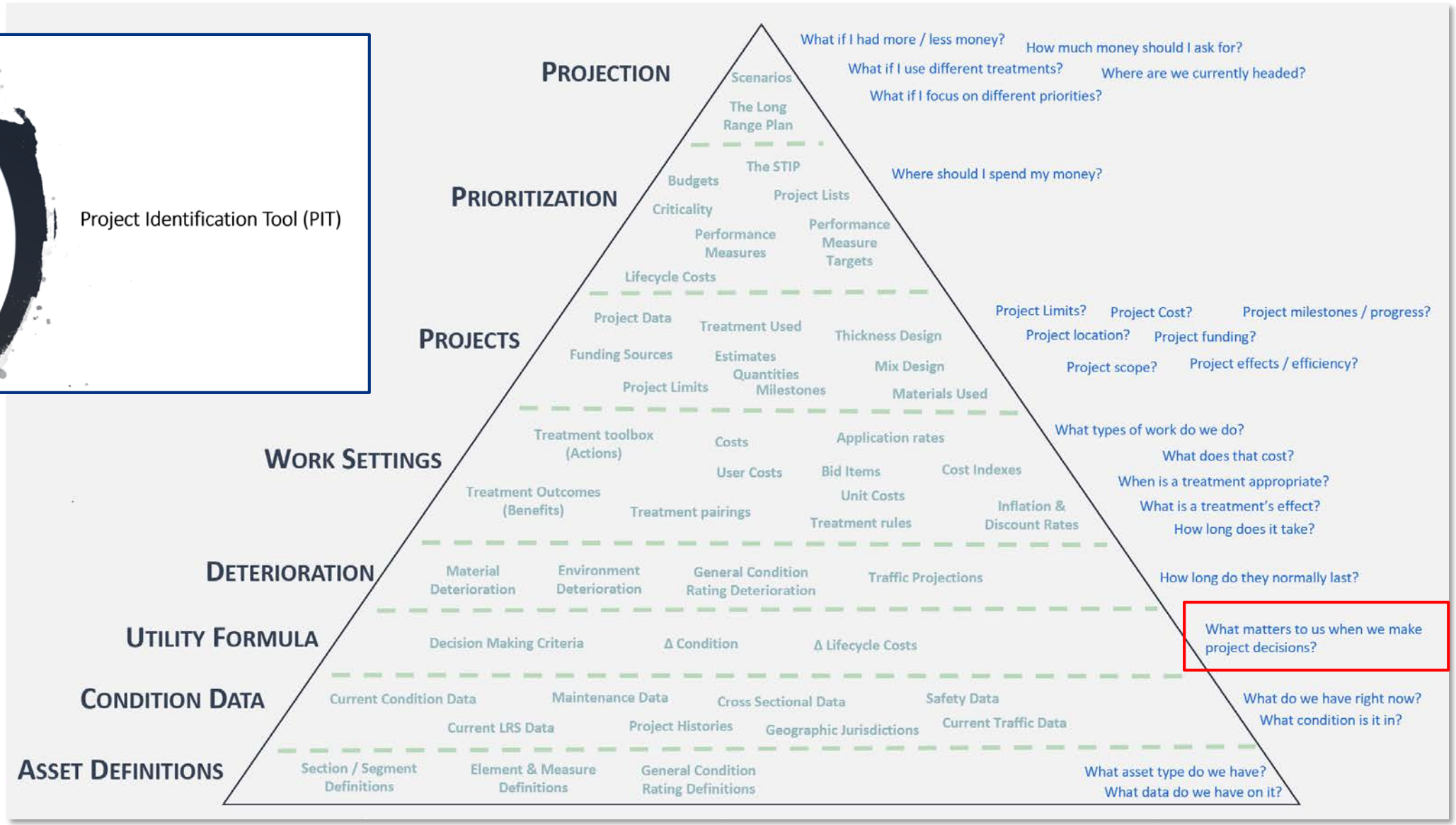
PASER

Project Selection



Project Selection

Project Identification Tool (PIT)



Scoping

- Projects with high flood risk will need to be scoped differently
- Alternative solutions for resolving recurring flooding will need to be considered
- Additional project costs

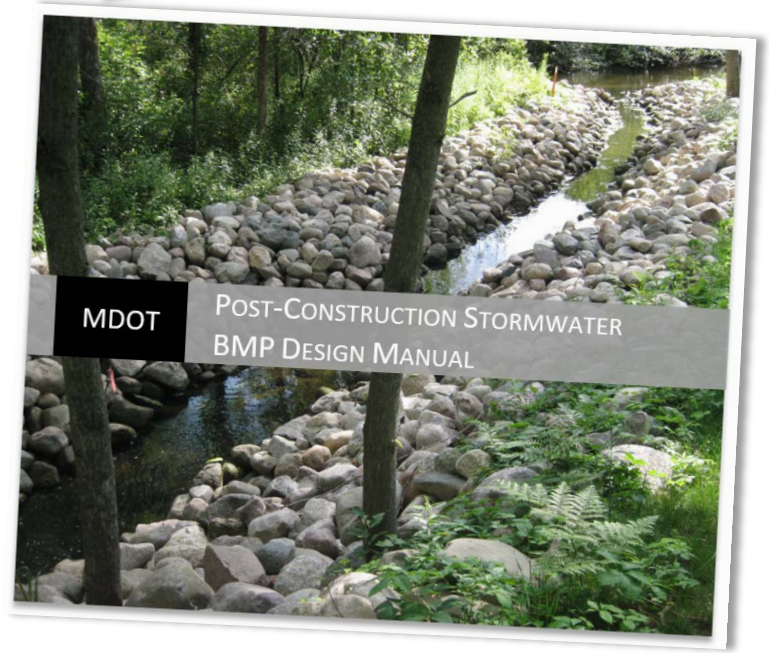
Scoping


MODERNIZE 75 SEGMENT 3
OAKLAND
MI 75 Constructors, LLC
AECOM
Our work underground makes the surface world more livable
Joy Dee


Pump Station
Pump Station Shaft
Gardenia Drop
Tunneling Direction
11-Mile Drop
I-696 Launch Shaft
Lincoln Drop
Shevlin Drop
Tunneling Direction
Woodward Hts. Drop
John R. Drop
Meyers Shaft
East 13 Mile Road
East 12 Mile Road
Twelve Mile Rd
Gardenia Ave
E Eleven Mile Rd
Madison Heights
E Lincoln Ave
696
Woodward Heights
E Woodward Heights Blvd
Ferndale
E 9 Mile Rd
Woodward Ave
102
East 8 Mile Rd
Google

Design

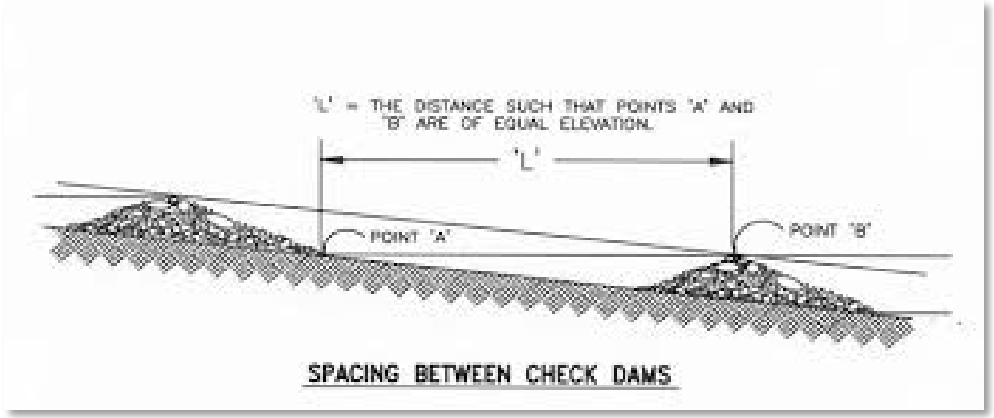
- MDOT will need to reconsider our stormwater methodology
- Do we need to enhance pipe, culvert, and channel sizing and other hydraulic specifications?



Construction

- Heavier and more frequent rain events increases risk of sediment entering the waters of the State during construction

- Need to modify MDOT's Soil Erosion and Sedimentation Control Standards?



QUESTIONS

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