#### Flooding Dynamic Modeling for Optimized Planning of CORE MPO Transportation Infrastructure Systems

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Coastal Ocean Analysis and Simulation Team

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# **Presentation Outline**

- 1. Project Team
- 2. Project Goal & Overview
- 3. Project Update
  - Committees and Engagement
  - Stormwater Modeling



# Team

- College of Engineering
  - Matt Bilskie
  - Brian Bledsoe
  - Felix Santiago-Collazo
- Skidaway Institute of Oceanography
  - Clark Alexander
- Carl Vinson Institute of Government
  - Scott Pippin
  - Shana Jones
- Goodwyn Mills Cawood
  - Ed DiTommaso





# **Project Goal**

To develop a <u>Project Prioritization Tool</u> that assists with optimizing the planning of new and existing infrastructure to improve reliability and resiliency with additional consideration to economic constraints and social inequities.

The <u>Project Prioritization Tool</u> will be synergized with an updated <u>Road Vulnerability Assessment</u>.

#### Road Vulnerability Assessment & Project Prioritization

- 1. Equity & Livability Objectives
  - Include social vulnerability data
  - Critical Infrastructure
  - Major transportation routes (emergency services)
- 2. Evaluation
  - Develop metrics to inform the Project Prioritization Tool
  - Compound flooding (coastal and rainfall)
  - Sea Level Rise
  - Road classifications & critical facility access
- 3. Financial Stewardship & Project Prioritization
  - Prioritize projects to increase resiliency of transportation infrastructure
  - Include cost, land use, access, and environmental justice

# SWMM (Stormwater Management Model

- Simulate runoff quantity & quality
- Good for small homogeneous sub-basins
- Rainfall on a basin  $\rightarrow$  Runoff  $\rightarrow$ Pipe network  $\rightarrow$  Routed to the outfall





# **SWMM** Application

- Assess current vs future conditions
  - How might SLR creep upstream into the stormwater system?
  - How future land use can alter runoff and discharges?
- Develop a toolset to examine stormwater impacts to transportation infrastructure





# Data Collection

- Stormwater Infrastructure
  - Outfalls, canals, ditches, pipes, reservoirs, pump stations, tide gates, headwalls, manholes, green infrastructure, etc.
  - Stormwater drainage basins
- Road centerlines
- Land Use Land Cover
- Soil Types



## Fell Street Basin

#### **Stormwater Network**





# Fell Street Basin

- Basin Information
  - 15 sub-catchments
  - 64 junction nodes
  - 2 outfalls
  - Curve numbers: 88-94
- Model Forcing
  - Type 2 cumulative rainfall 24-hr
    - 6.51 in depth,  $T_R = 10$ -yr
    - 8.1 in depth,  $T_R = 25$ -yr
  - Tide conditions
    - Average amplitude
    - Average amplitude + Intermediate SLR



Average tidal conditions and a 10-yr rainfall event

#### Fell Street Basin – Example Outfall Hydrograph



# Storm Surge Model Domain



## 1% AEP Water Level (100-yr Return Period)



# **DEM & Road Network (Elevation, ft)**



## Road Network (Elevation, ft)



## 1% AEP Simulated Storm Surge



## 1% AEP Simulated Storm Surge



#### Roadway Vulnerability Assessment (348 miles)



#### Roadway Vulnerability Assessment + 4 ft SLR (627 miles)







Select a category

None

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#### Solomo Solomon Ave Depth Above Road Q Search... € Zoom to ↔ Pan Legend X CHATHAM AVE ^ X POLK ST Arterials 1.205280 Depth Above Road Live Oak L PALMWOOD CT 2.444650 Road Name: POLK ST PALMWOOD CT County: Chatham Depth Above Road 2.482190 Elevation of Water Relative to Road (FT): POLK ST High 2.115320 2.115320 Moderate Laurel Ave BEACHWOOD CT General Vulnerability: Low Brewers Ld 2.174050 High **BEACHWOOD CT** 2.184710 11TH ST 1.378870 US Highway 80 VILLAGE PL US Highway 80 2.323030 Old Highway 80 LOVELL AVE 1.169820 VILLAGE PL 2.369190 CHATHAM AVE 2.377130 7TH ST 0.208170 LOVELL AVE 1.976120

#### Steering Committee, Stakeholder, and Community Engagement

• MPO Technical Coordinating Committee will serve as the Steering Committee ultimately directing and accepting the project deliverables.

 Other interested organizations have been invited into a Stakeholder Group to provide data and technical support as well as direction and input.

• Will also engage the general public through at least one public input session.

# Thank You

#### Matt Bilskie mbilskie@uga.edu



### Sub-basins of interest



# General Flowpath





# Filling the Gap

Correct invert elevation at pipe junctions using an automated approach to fill gaps in data using the minimum pipe slope and surrounding manholes



Missing elevation values in zero and adverse pipe slopes