City of St. Augustine –

Resiliency and Stormwater Program Update

SANDS Meeting – February 18, 2025

Jessica L. Beach, P.E.
Chief Resilience Officer
Deputy Director, Utilities & Public Works Department




CITY OF ST AUGUSTINE EST. 1565

Presentation Outline

- Why do we flood? A look at our challenges…
- Overview of the Resilience Program and Strategy
- SANDS Projects Update

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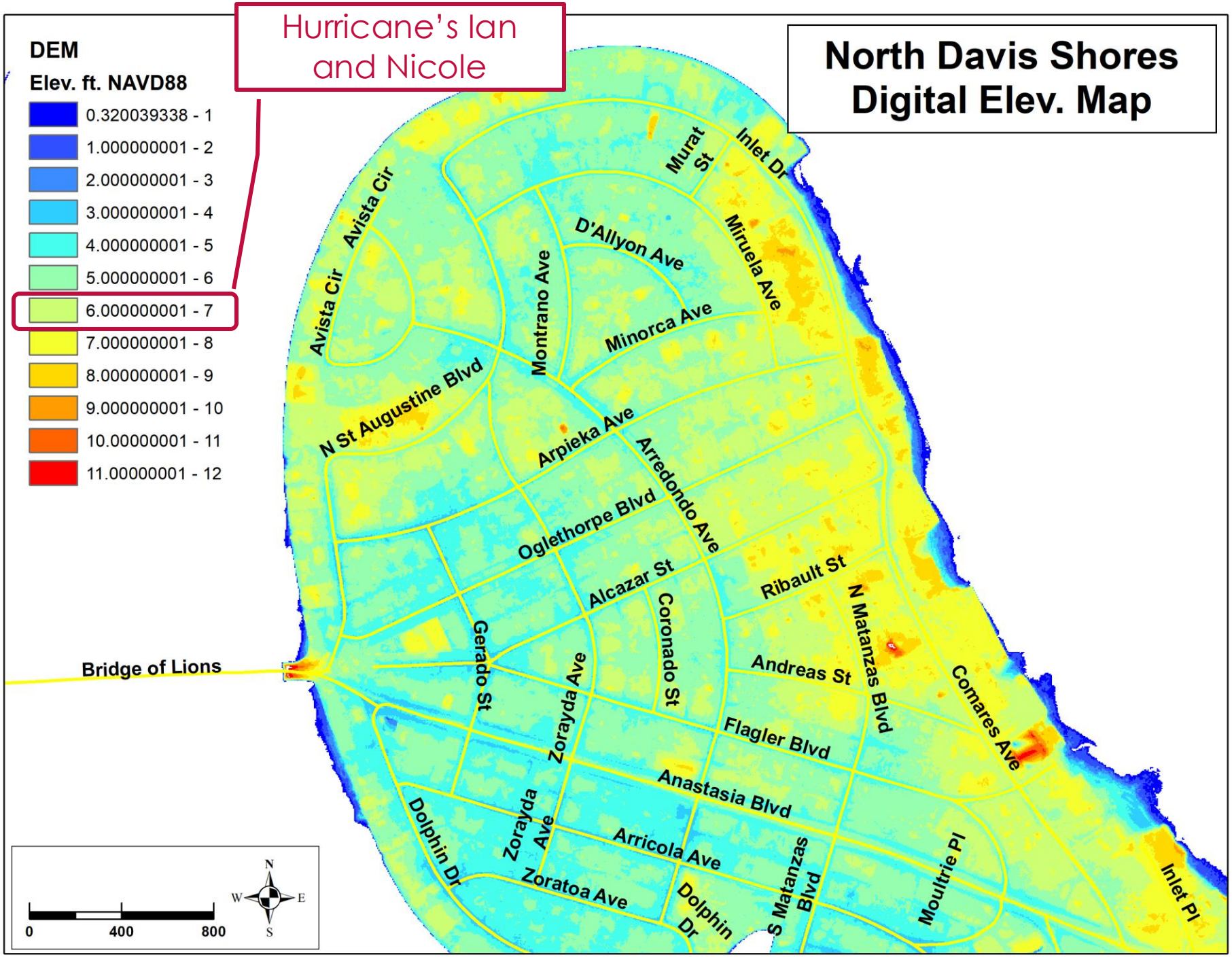
EST. 1565

Why Do We Flood ?

Flooding is not new to the City

However, the frequency of "sunny day" flooding is on the rise


Hurricane's Ian and Nicole
North Davis Shores Digital Elev. Map
DEM
Elev. ft. NAVD88
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Montrano Ave
Minorca Ave
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Oglethorpe Blvd
Alcazar St
Ribault St
Coronado St
N Matanzas Blvd
Comares Ave
Bridge of Lions
Gerado St
Zorayda Ave
Andreas St
Flagler Blvd
Anastasia Blvd
Dolphin Dr
Zorayda Ave
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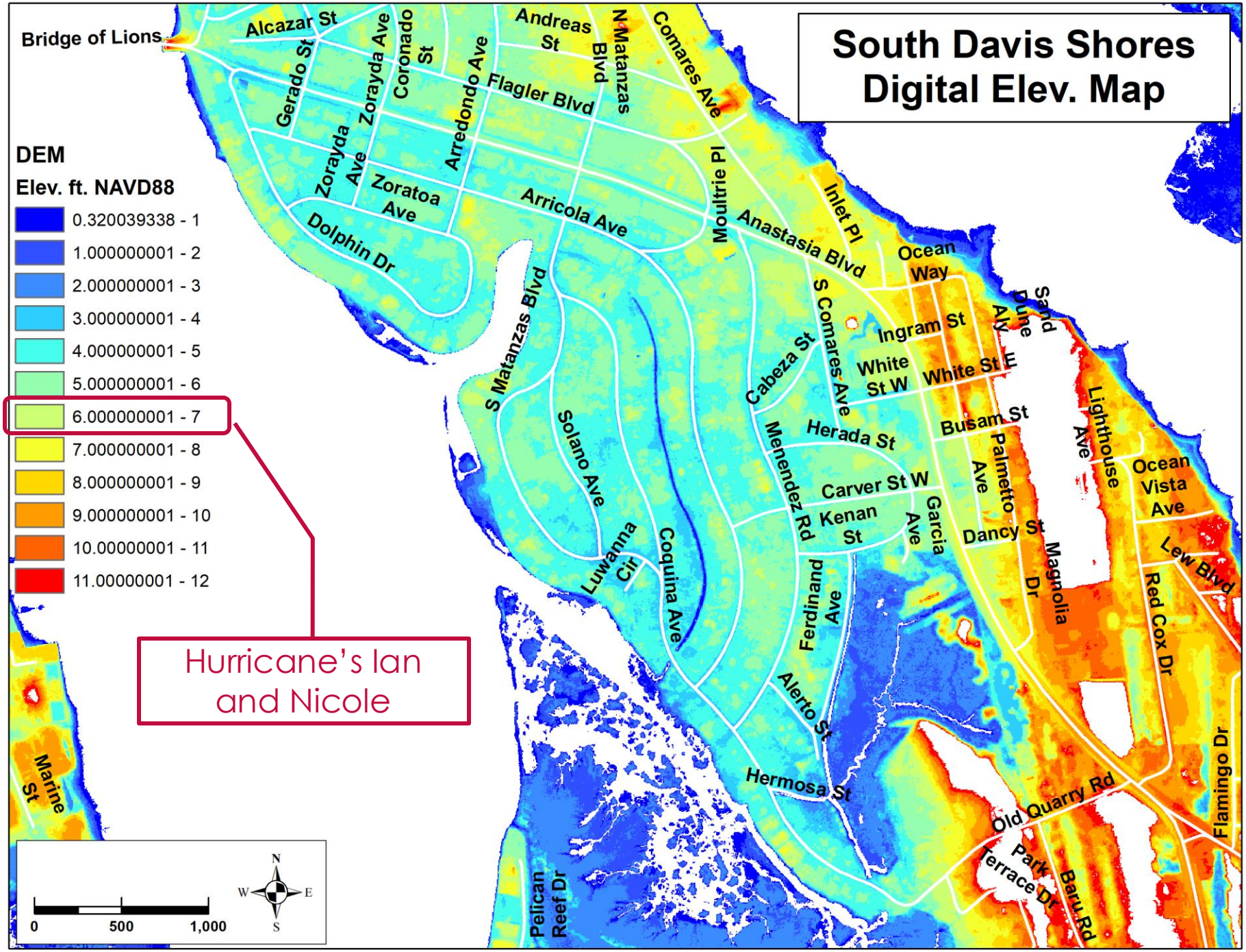
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Dolphin Dr
Moultrie Pl
Inlet Pl
Anastasia Blvd
Ocean Way
Sand Dune Aly
S Matanzas Blvd
S Comares Ave
Cabeza St
Ingram St
White St W
White St E
Herada St
Busam St
Menendez Rd
Solano Ave
Luwanna Cir
Coquina Ave
Carver St W
Kenan St
Garcia Ave
Palmetto Ave
Dancy St
Magnolia Dr
Lighthouse Ave
Ocean Vista Ave
Lew Blvd
Red Cox Dr
Ferdinand Ave
Alerto St
Hermosa St
Old Quarry Rd
Park Terrace Dr
Baru Rd
Flamingo Dr
Marine St
Pelican Reef Dr
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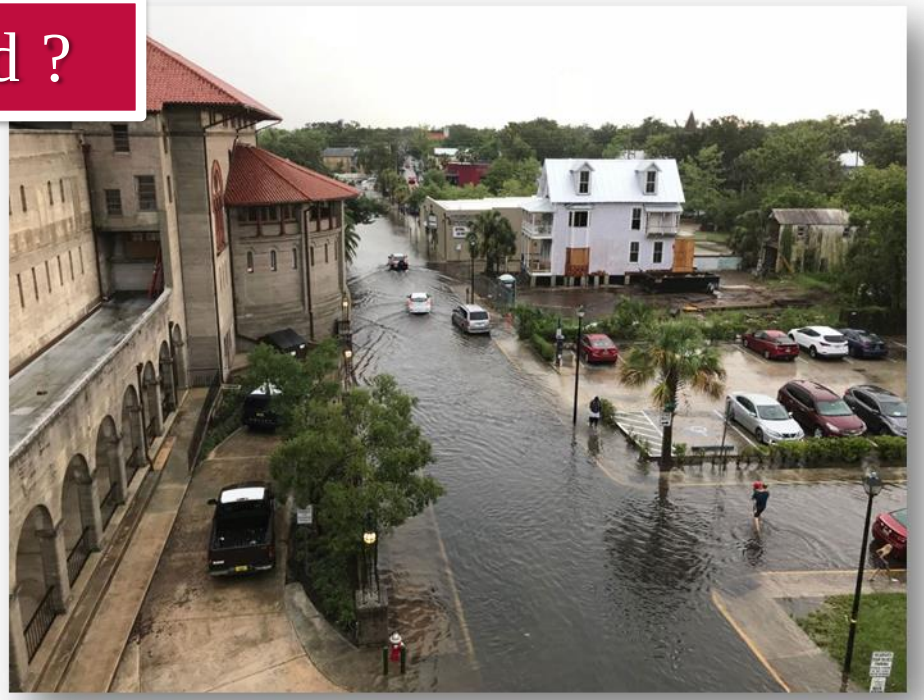
Why Do We Flood ?

Current City Challenges (stormwater):

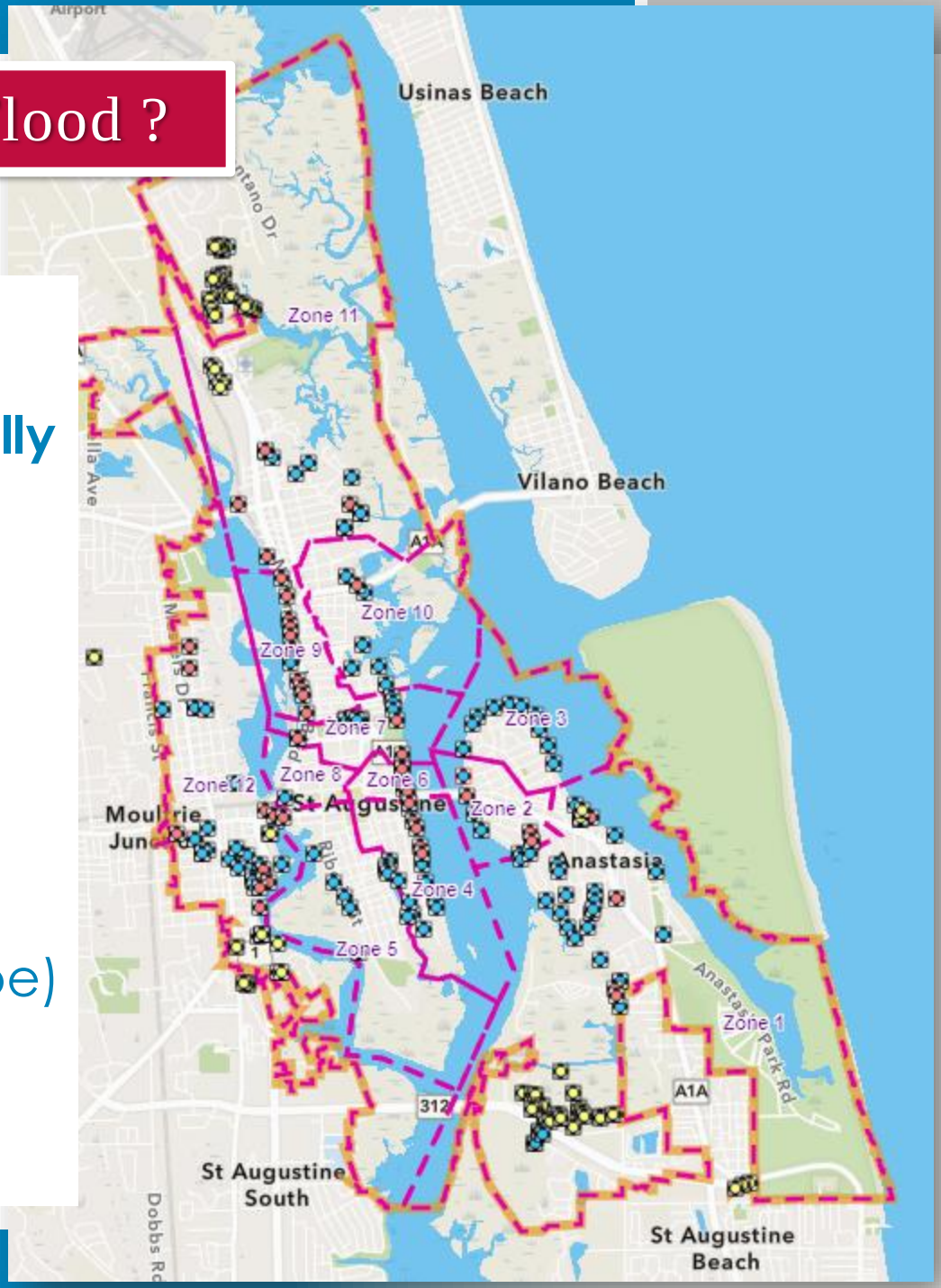
- Aging infrastructure
- Undersized collection system
- Low-lying and coastal location
  (90% of the City is within a flood zone)
- Highly developed (high impervious area)
- **Subject to flooding – both from rainfall and tidal/coastal influence (compound flooding)**



Why Do We Flood ?

Stormwater Infrastructure:

- 140 Outfalls – many are **Tidally Influenced** (includes **FDOT**)
- **110 City Outfalls** (we've installed 48 one-way tide check valves)
- 1,155 Storm Inlets
- 116,760 feet (22 miles of pipe)
- Twelve (12) maintenance zones



Types of Flooding

"Nuisance" Flooding or King Tides

Caused by heavy rainfall and urban runoff (San Sebastian)

High Tide Flooding

Matthew (7.07 NAVD88)

Ian (6.5 NAVD88)
Nicole (6.53 NAVD88)

Irma (4.9 NAVD88)

Riverine (Fluvial) Flooding

Compound Flooding

Coastal Storm Flooding

Nor'easters Hurricanes

Stormwater (Pluvial) Flooding

Rainfall induced urban runoff

Overview of the Resilience Program and Strategy

www.citystaug.com/resiliency

Overview of the Resilience Program and Strategy

PROJECTS

Completed

- ✓ Avenida Menendez Seawall
- ✓ Fullerwood Watermain Replacement
- ✓ North City Watermain Improvements
- ✓ San Marco Watermain Replacement
- ✓ Lincolnville Utility and Drainage Improvements
- ✓ South Dixie Highway Box Culvert Replacement
- ✓ FEMA 13 Lift Station Hardening and Rehabilitation
- ✓ WWTP Flood Proofing
- ✓ Bayfront Park (Harbormaster Park)

Current

- ✓ Avenida Menendez Floodwall
- ✓ South Whitney West King Street Flood Mitigation and Drainage Improvements
- ✓ Court Theophelia Drainage Improvement Project
- ✓ **Inlet Drive Shoreline Stabilization Project**
- ✓ **South Davis Shores Drainage Improvements Project**
- ✓ **City-wide Tide Check Valve Retrofitting**
- ✓ Lake Maria Sanchez Flood Mitigation and Drainage Improvements
- ✓ King Street Streetscape
- ✓ MLK Streetscape

Partnerships

- ✓ FDOT Bayfront Seawall
- ✓ NPS Castillo de San Marco Seawall
- ✓ FDOT King Street Bridge Replacement
- ✓ FDOT –Bridge of Lions Intersection Improvements
- ✓ SMART St. Augustine
- ✓ University of Florida - Thin Layer Placement Feasibility Project
- ✓ GTMNERR – various research related projects

PLANNING/STUDIES

Completed

- ✓ **Stormwater Master Plan (2013)**
- ✓ Planning for Sea Level Rise in the Matanzas Basin (2015)
- ✓ **Community Resilience Initiative – Pilot Project (2016- 2017)**
  - ➢ **Coastal Vulnerability Assessment**
  - ➢ **Strategic Adaptation Plan**
- ✓ Resilient Heritage in the Nation's Oldest City (2021)
- ✓ **South Davis Shores Resiliency Study (2021)**
- ✓ Septic Tank Vulnerability Assessment (2022)
- ✓ **Stormwater Outfall Resiliency Retrofit Masterplan (2022)**

Current

- ✓ **Updated Vulnerability Assessment**
- ✓ **Adaptation Plan**
- ✓ **USACE Back Bay Feasibility Study**
- ✓ Fullerwood Drainage Study

Partnerships

- ✓ Northeast Florida Regional Council – Resilient First Coast Collaborative
  - ➢ Regional Resilience Action Plan
- ✓ South Atlantic Salt Marsh Initiative – State of Florida Implementation Team

Overview of the Resilience Program and Strategy

Policy

- ✓ Comprehensive Plan 2040
- ✓ **Building Code Task Force**
- ✓ **Adoption of Ordinance 2021-26**
  - ➢ **Establishes an impervious surface ratio (ISR) for single family residential properties**
- ✓ **Implementation of Residential Lot Grading Plan Requirement**
- ✓ **Resilient Shoreline Ordinance**
- ✓ **Building for Flood Mitigation and Resilience**

Programs

- ✓ National Pollutant Discharge and Elimination System (NPDES)for Municipal Separate Storm Sewer System Permit (MS4)
  - ➢ Governs the City's Stormwater Program
- ✓ Community Rating System
- ✓ **Flood Mitigation Assistance (FMA) Program through FEMA**
- ✓ Outreach and Education
  - ➢ Flood Mitigation Resources for the Community
  - ➢ Flood Mitigation Site Visits

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RESILIENT ST AUG

www.citystaug.com/FMA

for more info

❖ Flood Mitigation Assistance (FMA) Program

- ✓ **Cost share program with FEMA to elevate and/or reconstruct flood prone, at-risk structures**
- ✓ FY 22 – Application Cycle:
  - Over 80 properties interested in the program, **61 properties had complete applications that met the program requirements**
  - Eligible applications have been submitted to FEMA for consideration
  - Total funding request of **$12,353,474** submitted that would be cost shared with FEMA if selected
- ✓ FY 23 – Application Cycle:
  - Over 40 properties were interested in the program
  - 10 applications submitted to the State for consideration and have been selected "for further review"
- ✓ FY 24 – Application Cycle:
  - Pending application with the State

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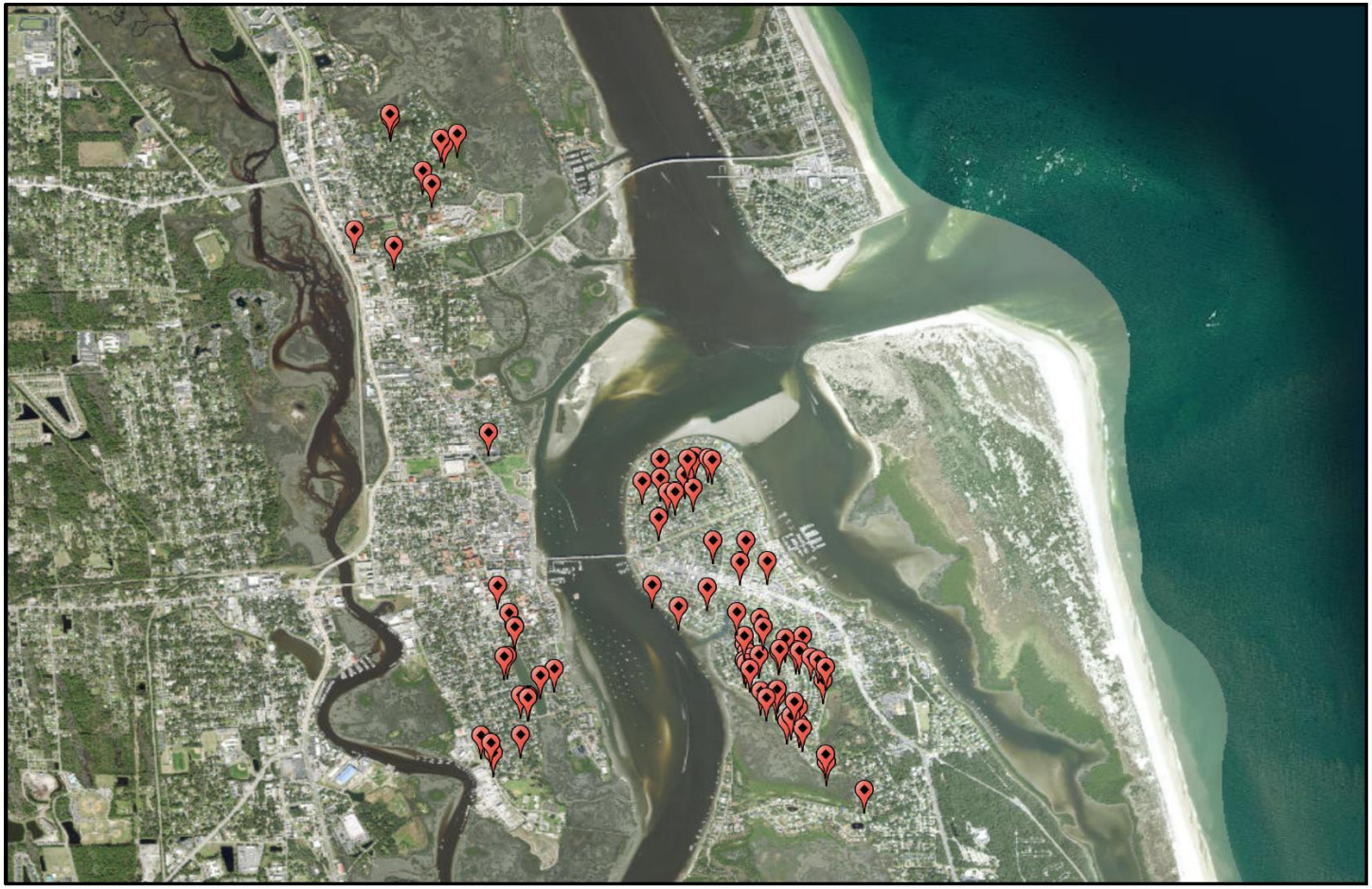
❖ Flood Mitigation Assistance (FMA) Program

Location Map of Properties Submitted for FY 22 Cycle

Master Map St. Augustine, FL



Master Map Exhibit for St. Augustine, FL

Map Symbology

Property Location

41 Coquina Ave Coords:
29.886381 -81.296849

Date:	11/2/2022
Project Number:	N/A
Drawn By:	JDR
Checked By:	N/A

General Notes:
1. The information presented herein is for planning purposes only. Further detailed due diligence MUST be completed prior to making decisions regarding the site.
2. No attempt has been made by QES to verify site boundary, title, actual legal ownership, deed restrictions, servitudes, easements, or other burdens on the property, other than that furnished by the client or his representative.
3. Transportation data from 2018 TIGER datasets via U.S. Census Bureau.
4. 2015 aerial imagery from ESRI Basemap and may not reflect current ground conditions.

Scale 1:216,826
0 10,000 20,000 Feet

QUALITY ENGINEERING & SURVEYING

Project – Inlet Drive Shoreline Stabilization

INLET DRIVE

Shoreline Stabilization

What is this project?

This project would look to include a combination of structural and non-structural based solutions (living shoreline enhancement) to elevate and protect a section of shoreline that is subject to coastal erosion that would provide a higher level of flood protection for a critical residential road in the North Davis Shores neighborhood. This would also include upgrading the existing storm infrastructure and installation of a tide check valve.

Why is this project needed?

The existing shoreline has eroded over time, with acceleration of that erosion during Hurricane's Matthew and Irma. It's existing elevation is around 5.0 feet NAVD88, which during the previous hurricanes, the top of bank of the shoreline overtopped, causing flooding throughout this segment of roadway. There are two existing storm inlets and pipe that are in need of replacement and proper sizing to also better collect any rainfall driven flooding. The existing storm outfall pipe is also tidally influenced and can allow for tidal water to back up through the storm pipe, causing road flooding. This project would address the erosion, undersized drainage and tidal flooding issues, taking into account sea level rise with the elevation of the shoreline revetment.

How is this project being funded?

The City of St. Augustine (COSA) has received a grant from the Federal Florida Department of Environmental Protection (DEP) under the Resilient Florida Grant Program for the estimated full project cost of $1,109,650.56

How will this project benefit the community?

The proposed improvements will help to protect the critical infrastructure for the neighborhood. Given its existing elevation already being below the current base flood elevation, the vulnerability of this area will continue to increase with sea level rise if no action is taken. The City had an opportunity to evaluate the shoreline for flood mitigation options as a result of the hurricane impacts and also address vulnerable infrastructure that was identified in the Coastal Vulnerability Assessment. Updates about the project can be found at the project website:

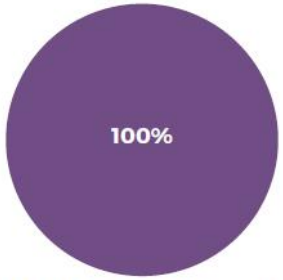
www.CityStAug.com/InletDr

City of St. Augustine | Public Works Department | 904.825.1040 | Stormwater@CityStAug.com

INLET DRIVE

Shoreline Stabilization

ESTIMATED CONSTRUCTION COST: $1,109,650.56



Resilient Florida Grant
$1,109,650.56

PROJECT SCHEDULE 2023-2026

PROJECT PHASE	PROJECT STATUS
PHASE 1	DESIGN AND PERMITTING OF PROJECT
PHASE 2	BIDDING/LOCAL PROCUREMENT
PHASE 3	CONSTRUCTION OF PROJECT

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Project – Inlet Drive Shoreline Stabilization

PROJECT NEED AND OJBECTIVES

- ✓ City-owned property along Inlet Drive and Salt Run
- ✓ Shoreline has sustained repeated damages over the years through erosion from coastal events
  - Existing wall and "living shoreline"
- ✓ Existing road is critical infrastructure that is currently at risk
  - Major ingress/egress for the Neighborhood
  - Identified in the Vulnerability Assessment
- ✓ City applied for funding to stabilize the shoreline to protect the road
  - Primary objective – protect the road
  - Secondary benefit – reduce coastal flood surge, reduce depth and duration of coastal flood event, replacement of existing storm inlets and retrofit with tide check valve
  - Enhance the existing living shoreline

https://www.citystaug.com/1096/Inlet-Drive-Shoreline-Resiliency

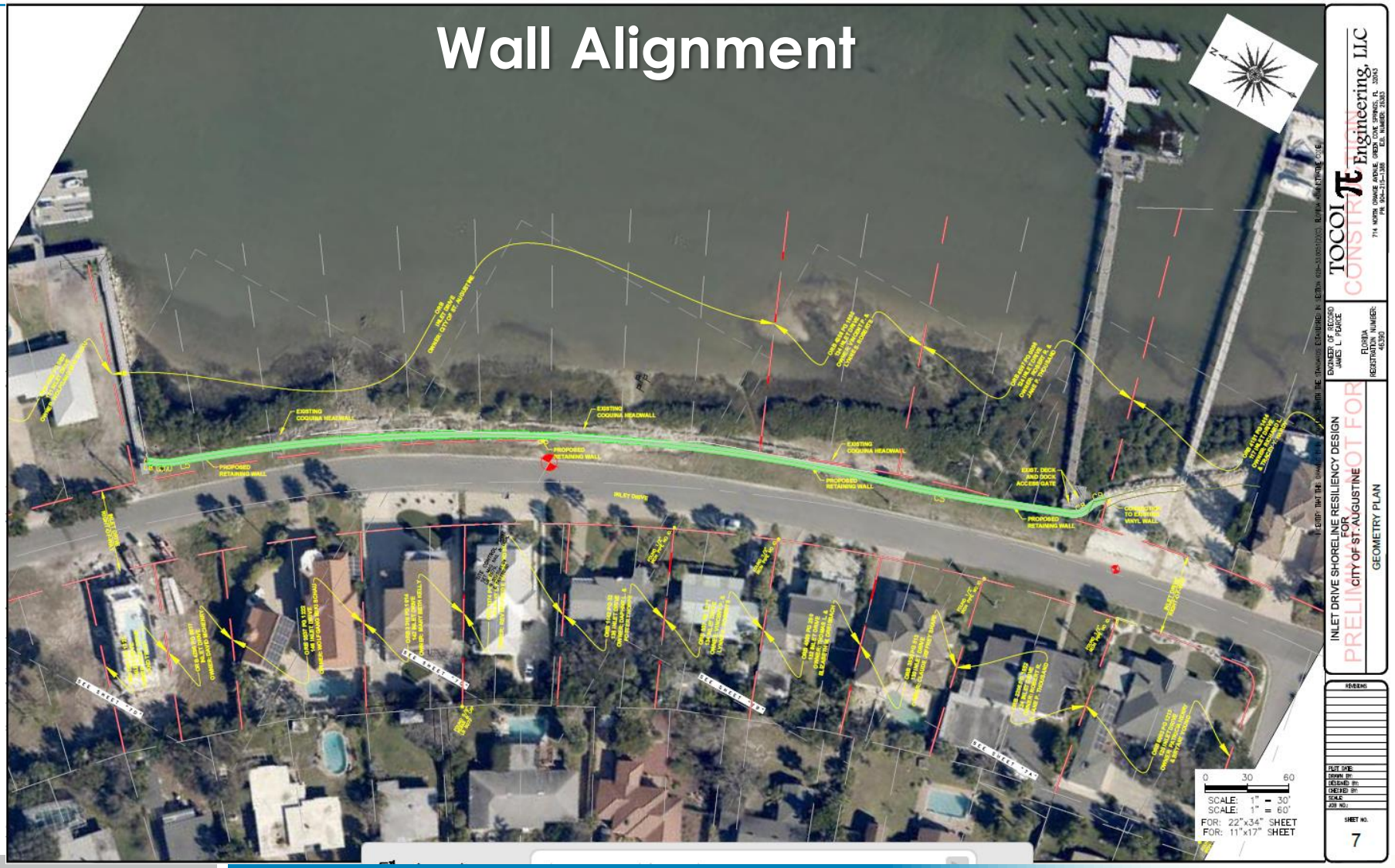
Project – Inlet Drive Shoreline Stabilization

PROJECT SCOPE OF WORK

- ✓ Install bulkhead on the grass (land side) of the existing wall
- ✓ Match north and south elevations of existing walls
  - Existing grade is around 5 ft NAVD88
  - Proposed bulkhead height will be 8-8.75 NAVD88
- ✓ Avoid impacts to the existing mangroves
- ✓ Work is above "Mean High Water"
- ✓ Replace existing storm pipe and inlets, reset for proper drainage, install tide check one-way valves
- ✓ Will help reduce depth and duration of coastal flood
- ✓ Reduce the coastal surge impacts
- ✓ Help facilitate rainfall drainage within the roadway

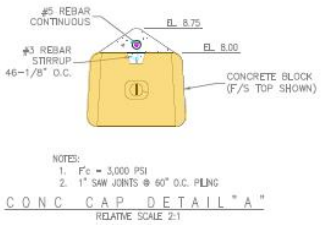
https://www.citystaug.com/1096/Inlet-Drive-Shoreline-Resiliency

Project – Inlet Drive Shoreline Stabilization



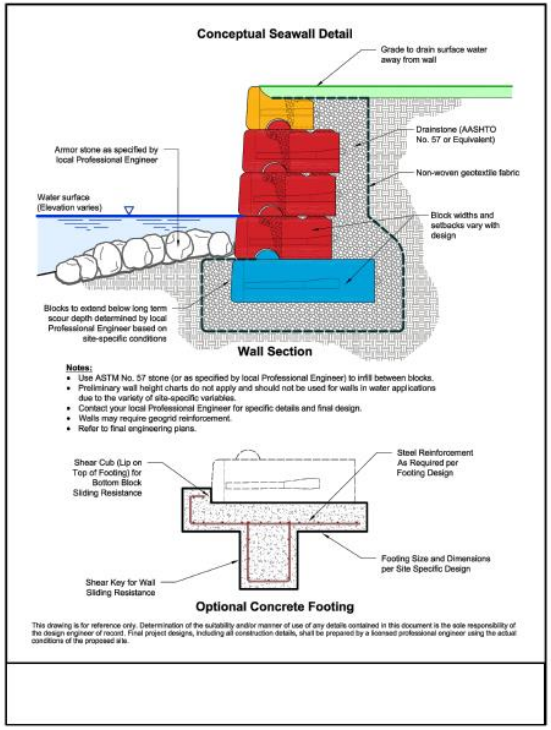
Project – Inlet Drive Shoreline Stabilization

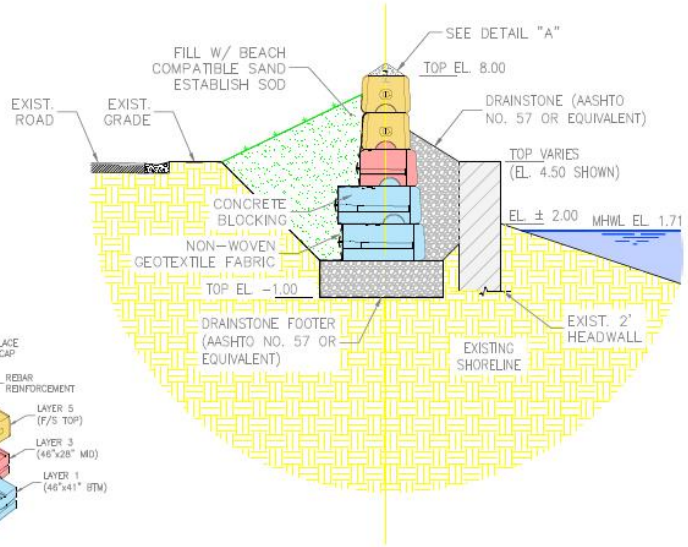
Wall Cross-Sections

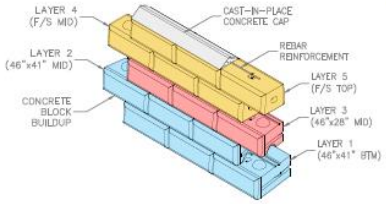


CONC CAP DETAIL "A"

RELATIVE SCALE 2:1







ISOMETRIC SECTION

RELATIVE SCALE 1:1.5

TYPICAL RETAINING WALL DETAIL - CONCRETE BLOCKING

ALL BOLTS, COUPLERS, AND NUTS SHALL BE LOCKED TO PREVENT LOOSENING
CONCRETE: F'c = 4,000 PSI
REBAR: Fy = 60 KSI ZINC COATED
SAW JOINT: 1" @ 72" O.C.

LEGEND

- EXISTING 2' BLOCK HEADWALL
- DRAINSTONE (MO. 57 OR EQUIVALENT)
- CLEAN FREE DRAINING BEACH COMPATIBLE SAND (SP) (FDEP ACCEPTED) COMPACTED BACKFILL
- EXISTING SHORELINE (NATURAL GROUND)

I CERTIFY THAT THIS DRAWING IS IN COMPLIANCE WITH THE STANDARDS ESTABLISHED IN SECTION 61G-33.005(2)(G), FLORIDA ADMINISTRATIVE CODE

TOCOI Engineering, LLC
714 NORTH ORANGE AVENUE, GREEN COVE SPRINGS, FL 32043
PH: 904-213-1388 E.B. NUMBER: 29353

ENGINEER OF RECORD
JOHN D. TOCOI, P.E.

FLORIDA REGISTRATION NUMBER: 49389

INLET DRIVE SHORELINE RESILIENCY DESIGN
FOR
CITY OF ST. AUGUSTINE

PRELIMINARY NOT FOR CONSTRUCTION

SEAWALL DETAILS - REDI-ROCK BLOCKING

REVISIONS

PLOT DATE:
DRAWN BY:
DESIGNED BY:
CHECKED BY:
SCALE:
JOB NO.:

SHEET NO.
4

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Project – Inlet Drive Shoreline Stabilization

Survey Staked Alignment and Height

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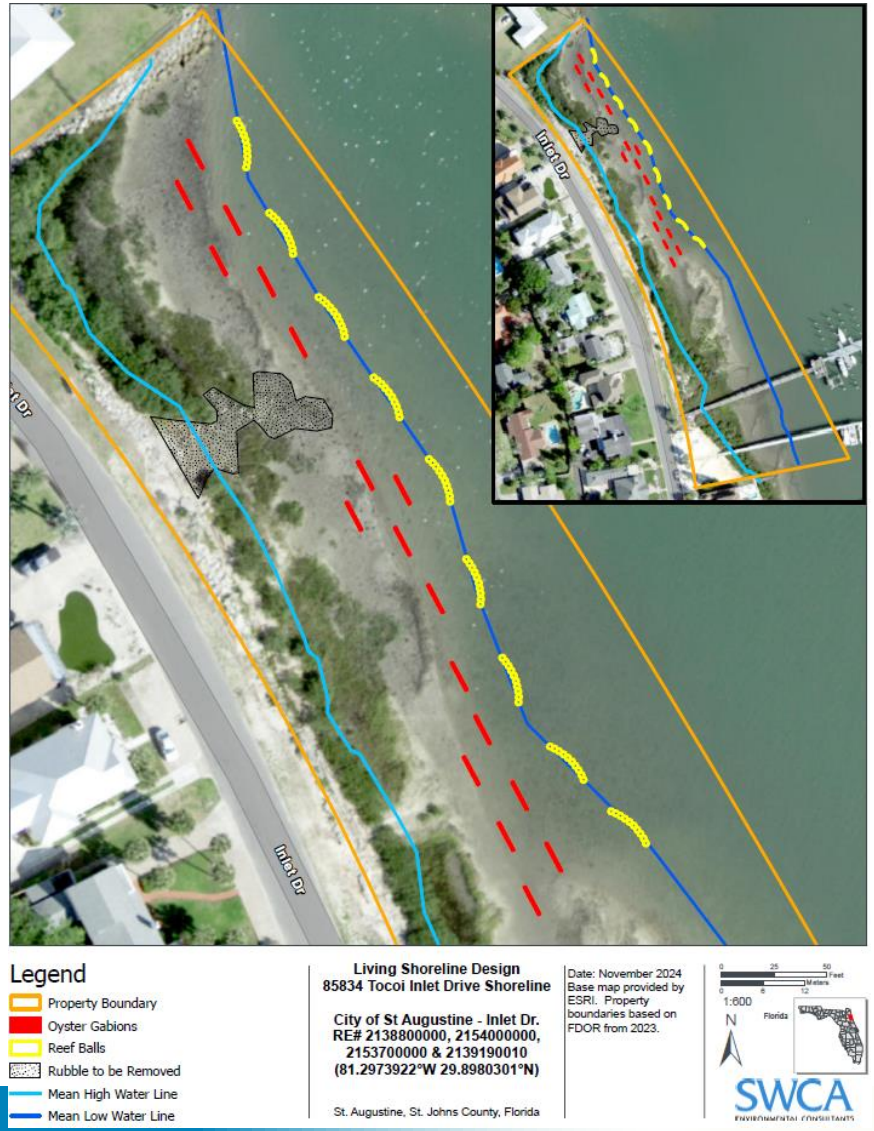
Project – Inlet Drive Shoreline Stabilization

Living Shoreline Enhancement

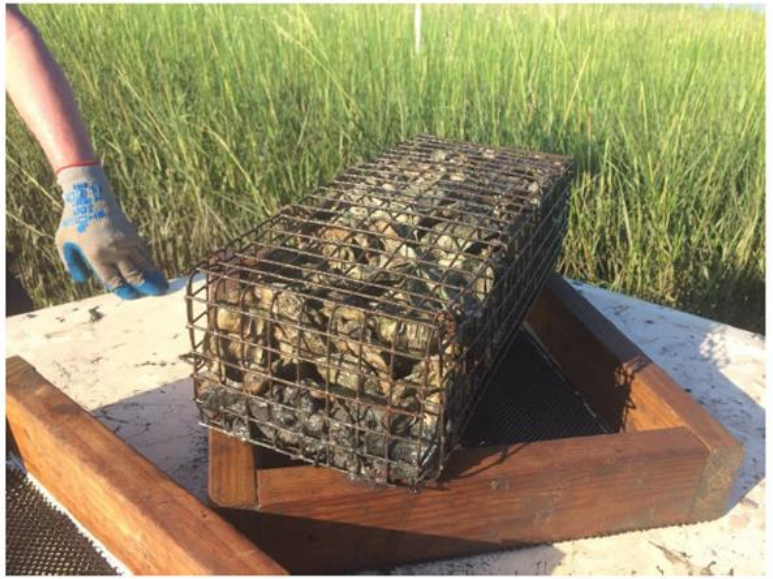
- ✓ Existing living shoreline
  - Mangroves
  - Smooth cord grass
  - Oyster beds
- ✓ Enhance existing living shoreline
  - Remove rubble to allow natural revegetation
  - Installation of Wave Attenuation Devices (WADS)
  - Reef Balls, Oyster Gabions
- ✓ Dissipates wave energy, provides for habitat, water quality benefits



Project – Inlet Drive Shoreline Stabilization

✓ Next Steps

- ❑ Data collection, field work – **completed**
- ❑ Preliminary bulkhead alignment - **completed**
- ❑ Easements
- ❑ Permitting
- ❑ Finish design
- ❑ Prepare for bidding and construction
- ❑ Construction deadline June 30, 2026



Thank you for your time!

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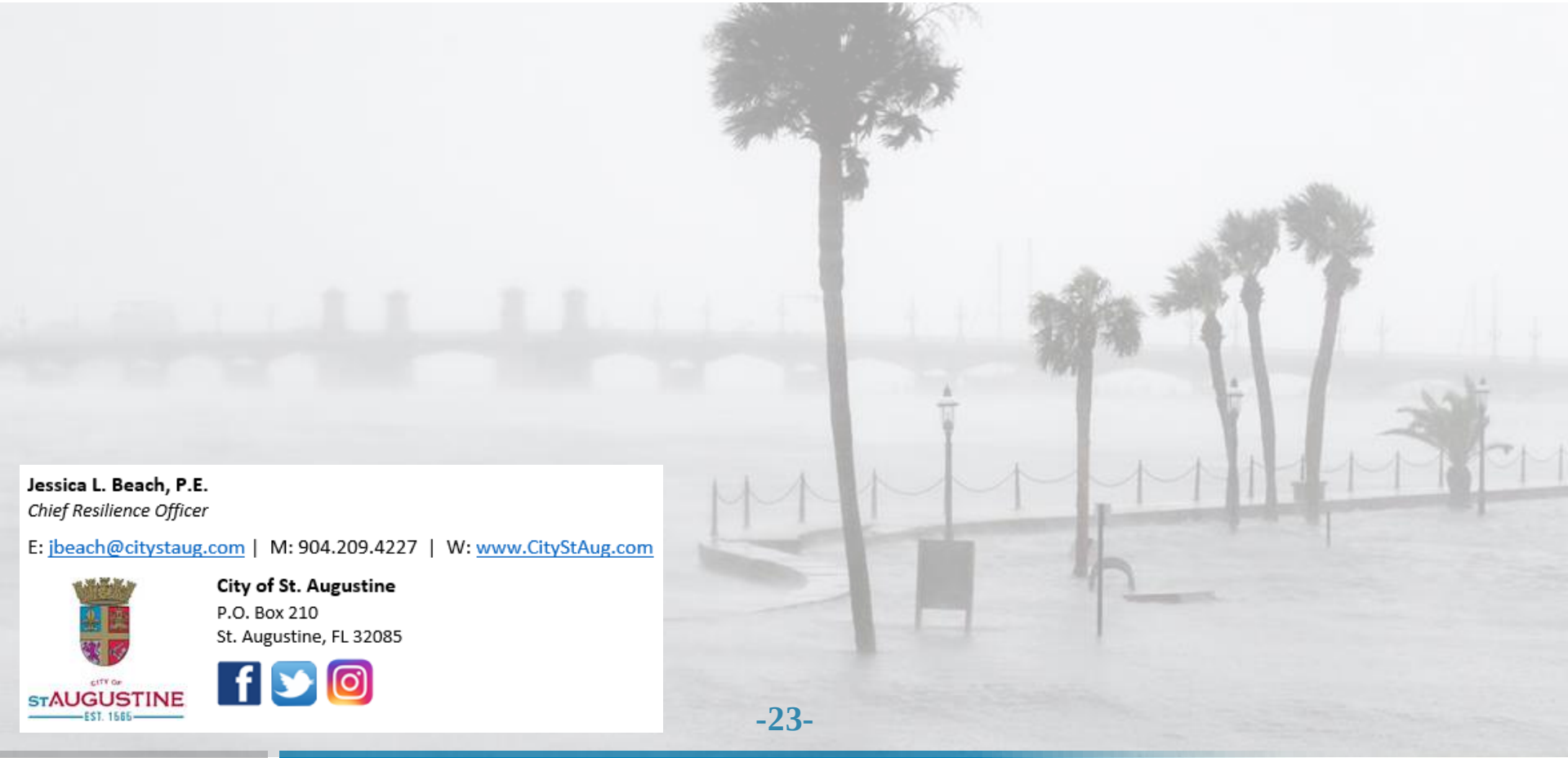

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Chief Resilience Officer

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