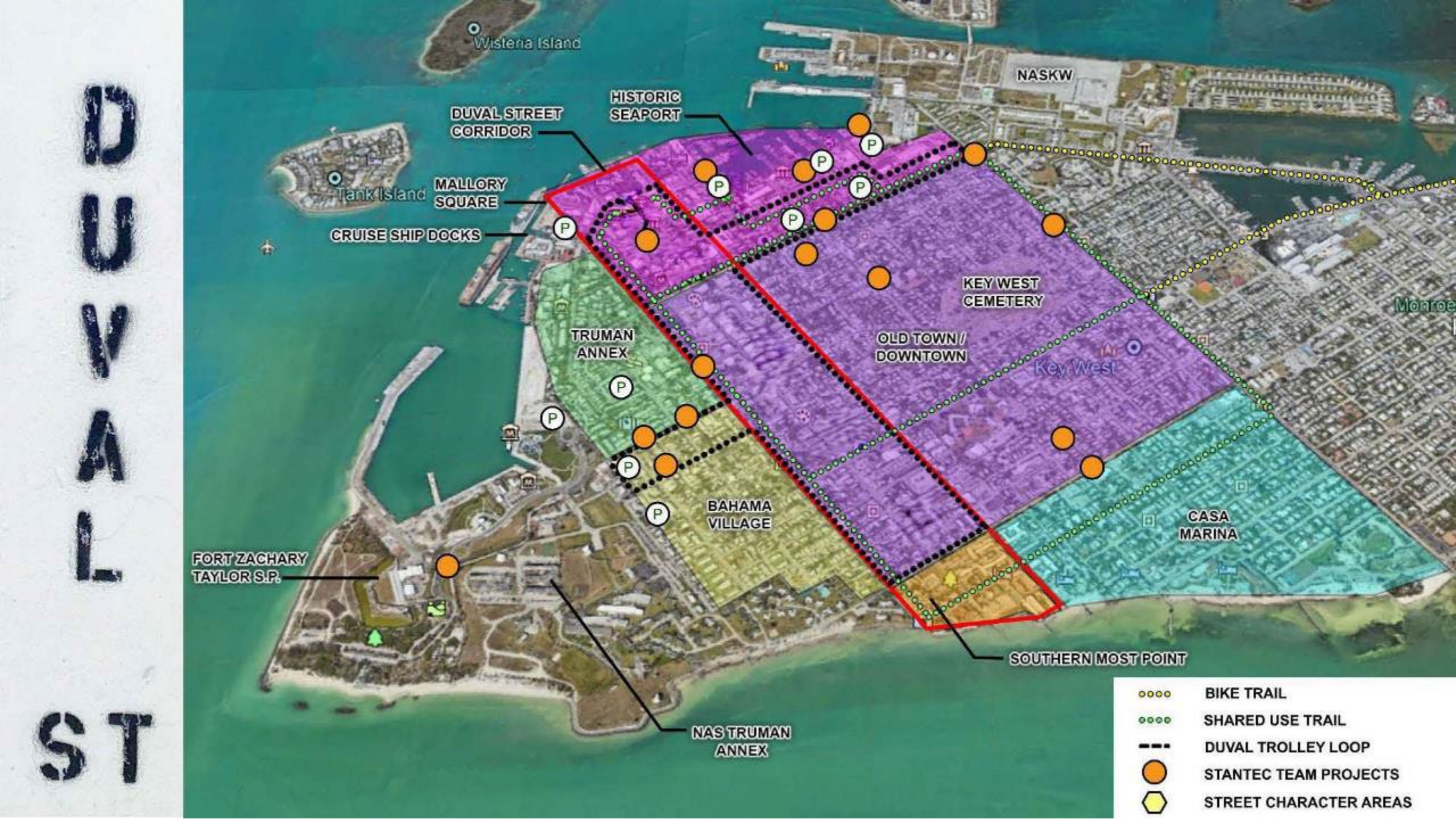
Duval Street Revitalization & Resiliency Plan

June 20, 2024

Duval Street Revitalization & Resiliency Plan - Agenda

- **Introductions**
- **Project:**
  - Why the Duval Street project?
  - Process and components of it.
  - Phases of a streetscape and utility replacement project.
- **Process:**
  - What has been done to date and why.
  - Purpose of these discussion.
  - Next steps.
  - After the pilot segment.
- **Ideas & Concerns:**
  - Project implications for existing property owners.
  - Impact of street closure / future construction on existing businesses.
  - How can this project inform the city on how to minimize impacts to businesses?
- **Discussion & Questions**


DUVAL ST
Wisteria Island
Tank Island
NASKW
HISTORIC SEAPORT
DUVAL STREET CORRIDOR
MALLORY SQUARE
CRUISE SHIP DOCKS
KEY WEST CEMETERY
TRUMAN ANNEX
OLD TOWN / DOWNTOWN
Key West
Monroe
BAHAMA VILLAGE
CASA MARINA
FORT ZACHARY TAYLOR S.P.
SOUTHERN MOST POINT
NAS TRUMAN ANNEX
BIKE TRAIL
SHARED USE TRAIL
DUVAL TROLLEY LOOP
STANTEC TEAM PROJECTS
STREET CHARACTER AREAS

Duval Street Revitalization & Resiliency Plan

Part of a Broader City Effort:

- Comprehensive Plan
  - Future Land Use Element
  - Historic Preservation Element
  - Housing Element
  - Coastal Management Element
- City Strategic Plan: 2020-2024
- Mallory Square Master Plan
- Stormwater Master Plan
- Capital Improvement Plan
- Vulnerability Assessment

Duval Street Revitalization & Resiliency Plan

Project:

- Intended to quantify current and future risks on the physical, cultural, historic and economic components of Duval Street, and serve the basis for developing a plan forward

Purpose:

- To preserve and protect iconic Duval Street as a major tourism destination and economic driver.

Duval Street Revitalization & Resiliency Plan

Goals:

- Develop a comprehensive inventory and analysis of existing conditions of surface and subsurface infrastructure.
- Analyze the impacts of storm surge, King Tides and projected sea level rise on Duval's historic structures and future economic development.
- Engage the business community and residents in discussing scenarios based on these existing conditions and their desired outcomes.
- Recommend next steps, associated costs, and funding opportunities.

Duval Street Revitalization & Resiliency Plan

Mitigating Risks:

- Impacts of:
  - Storm surge
  - King Tides
  - Sea level rise
- Loss of:
  - Historic buildings
  - Tourism
  - Jobs

Duval Street Revitalization & Resiliency Plan

Intended Outcomes:

The Revitalization and Resiliency Plan provides the blueprint to enhance storm resiliency, economic resilience, and increase adaptive capacity to respond and recover from natural disaster.

- Sea level rise interventions
- Roadway design alternatives
- Green infrastructure opportunities
- Stormwater design needs
- Knowledgeable citizenry
- Business support

Duval Street Revitalization & Resiliency Plan

Project Components:

- Resiliency – Vulnerability Assessment
- Civil Engineering – Stormwater / Utilities / Street
- Mobility – Vehicles / Pedestrians / Bicyclists
- Historic Preservation – Adaptation Strategies
- Landscape Architecture – Streetscape
- Public Engagement – Business, Property Owner & Resident Input
- Funding – Tool for Future Implementation

Duval Street Revitalization & Resiliency Plan

Phases of a Streetscape and Utility Replacement Project:

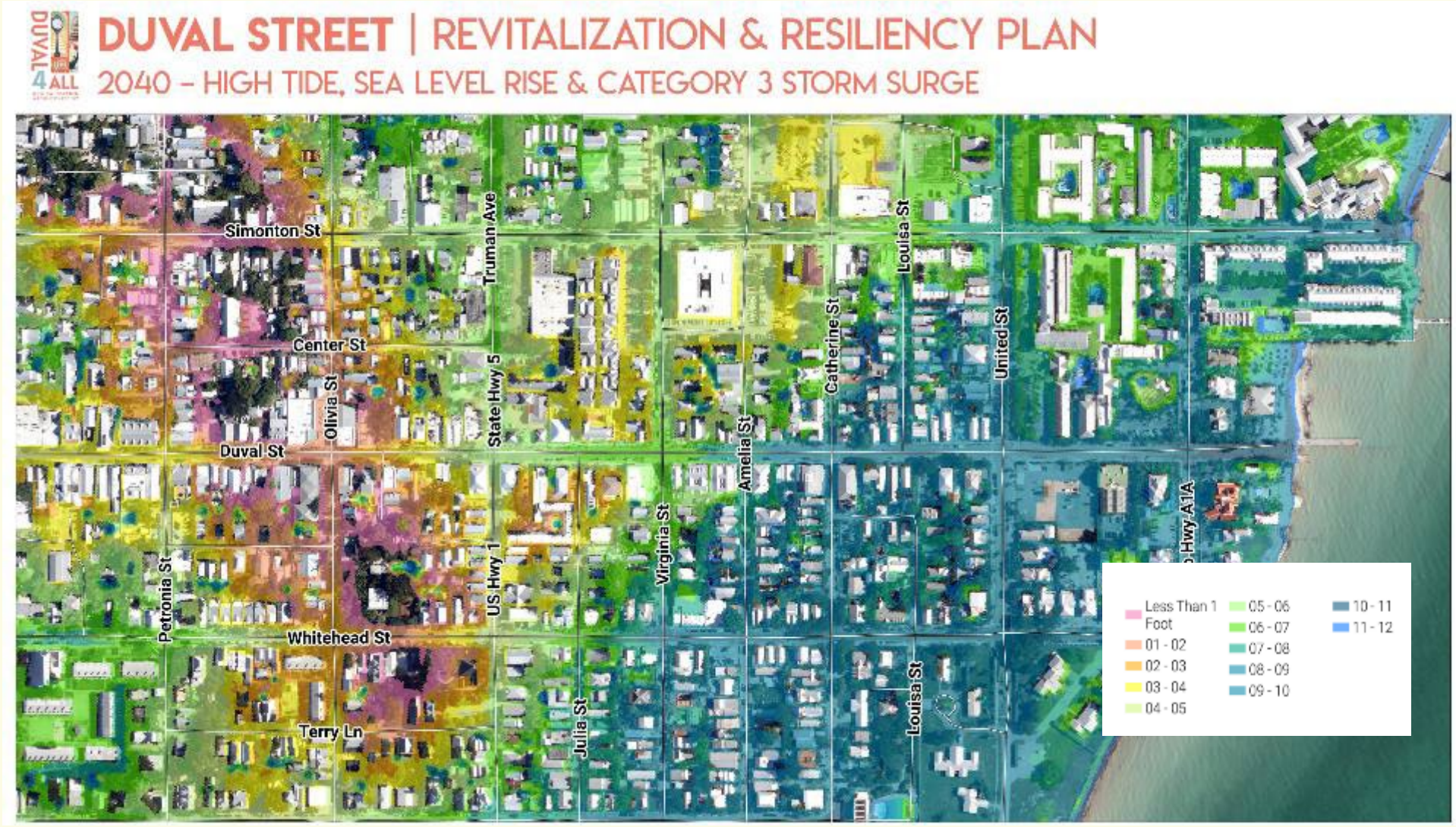
- Project planning / program
- Conceptual design
- Detailed design / engineering / pilot segment
- Pilot segment construction
- Detailed design completion (concurrent with above if not done)
- Full construction

Duval Street Revitalization & Resiliency Plan

Process: Work to Date

- Vulnerability assessment
- Asset scoring
- Infrastructure impact analysis
- Preliminary modeling / design – stormwater / utilities / roadway
- Preliminary roadway section sketches
- Typology analysis & initial considerations – preservation adaptation

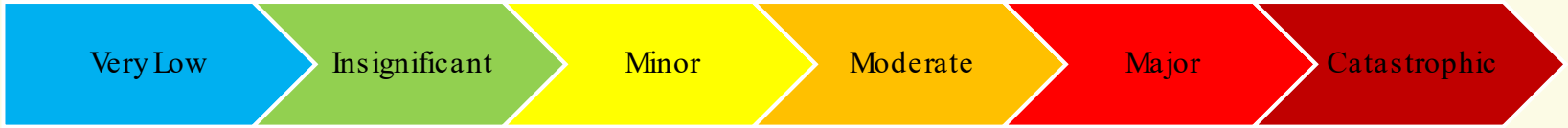
Vulnerability Assessment



Consistent with the VA for the City of Key West Hot Spots

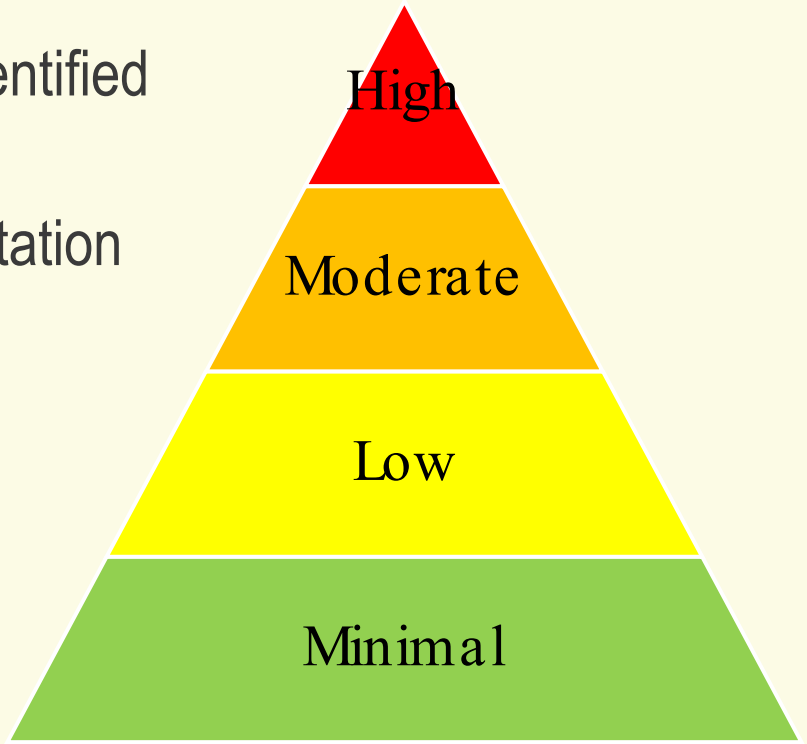
Asset Sensitivity Scoring

- Flooded assets were reviewed for their response and sensitivity to the type and depth of flooding
- Considerations include function of the asset and if failure would cause a disruption to critical operations, cause significant damages, such as:
  - Evacuation route
  - Bus routes and stops
  - Lift stations, pumps and critical city systems
  - Operations centers
  - Emergency centers
  - Listed on national register of historic places
  - Structure built before 1972 when the City joined the National Flood Insurance Program (NFIP)
  - Condition of the asset



Asset Vulnerability Scoring

- Vulnerability Score = depth of flooding x likelihood of hazard occurrence x sensitivity of asset
- Assets that scored between moderate and high were identified as most vulnerable
- Most vulnerable assets will be further analyzed for adaptation strategies
- Engineering solutions (projects)
- Nature based solutions
- Land use strategies
- Relocation
- Hardening



Vulnerability and Adaptation

Minimum Bottom of Road Base Elevation	=	*SHW Elevation*	+	*20-year SLR (Intermediate High)*

Example: 1.0 ft SHW + 1.2 ft SLR = 2.2 ft NAVD 88 (bottom of road base)

Figure 3-1 depicts a typical road section showing the minimum road design elevations based on Option 1. Assuming a combined pavement and base thickness of around 1.0 ft, the *minimum* design road elevation would be 3.2 ft NAVD 88.

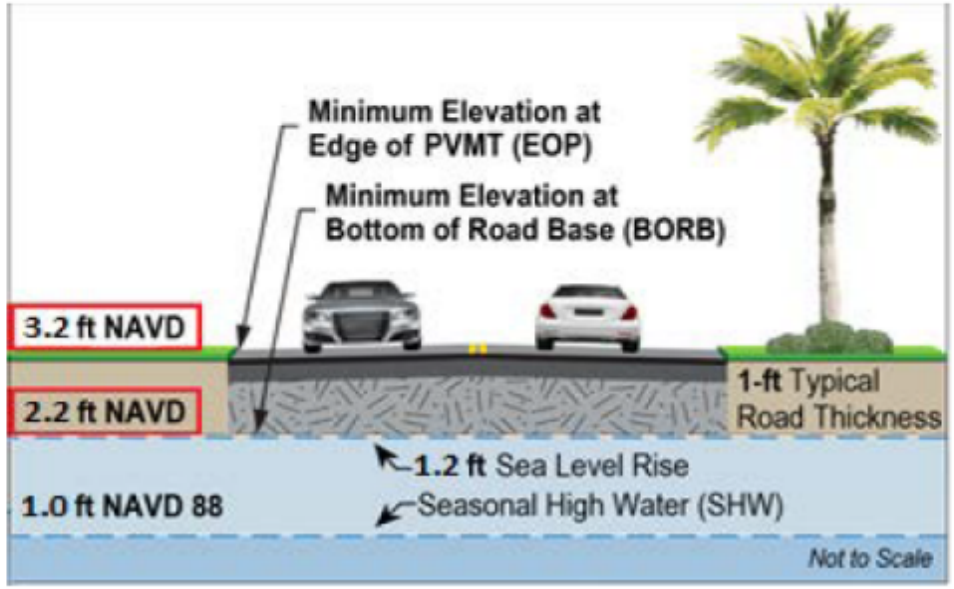


Figure 3-1. Minimum Elevation of 2.2 ft NAVD 88 for the Bottom of Road Base for All Roads

Duval Street Corridor
Adaptation / Harmonization Impact Analysis (2040 Sea Level Rise)
(Assuming 3.2' Minimum Road Elevation, or 2.95' with Alternate Base)

Segment on Duval St	Average Existing Crown Elevation (ft-NAVD)	Average Existing BOS Elevation (ft-NAVD)	Option 1 C&G Section Limerock Base	Option 2 C&G Section 6" Black Base or Conc. Pavement	Option 3 Curbless Section	Option 4 Curbless Section +6" Black Base or Conc. Pavement	Optimized Road Section
			Minimum Proposed Crown Elevation (ft-NAVD)				
			3.45	2.95	3.45	2.95	
			Minimum Proposed BOS Elevation (ft-NAVD)				
			3.70	3.20	3.45	2.95	
			Avg BOS Impact	Ave BOS Impact	Ave BOS Impact	Ave BOS Impact	
Bay to Front St	0.85	1.10	31"	25"	28"	22"	N/R
Front St to Greene St	1.15	1.40	27"	21"	24"	19"	
Greene St to Caroline St	1.75	2.00	20"	14"	17"	12"	
Caroline St to Eaton St	4.75	5.00	None	None	None	None	Option 1
Eaton St to Fleming St	7.25	7.50	None	None	None	None	
Fleming St to Southard St	7.50	7.75	None	None	None	None	
Southard to Angela St	8.50	8.75	None	None	None	None	
Angela St to Petronia St	8.45	8.70	None	None	None	None	
Petronia to Oliva St	10.00	10.25	None	None	None	None	
Olivia St to Truman Ave	8.55	8.80	None	None	None	None	
Truman Ave to Virginia St	6.20	6.45	None	None	None	None	
Virginia St to Catherine St	4.50	4.75	None	None	None	None	
Catherine St to United St	2.85	3.10	7"	1"	4"	None	Option 2
United St to South St	2.50	2.75	12"	6"	8"	2"	Option 4
South St to Ocean	2.00	2.25	18"	12"	14"	8"	

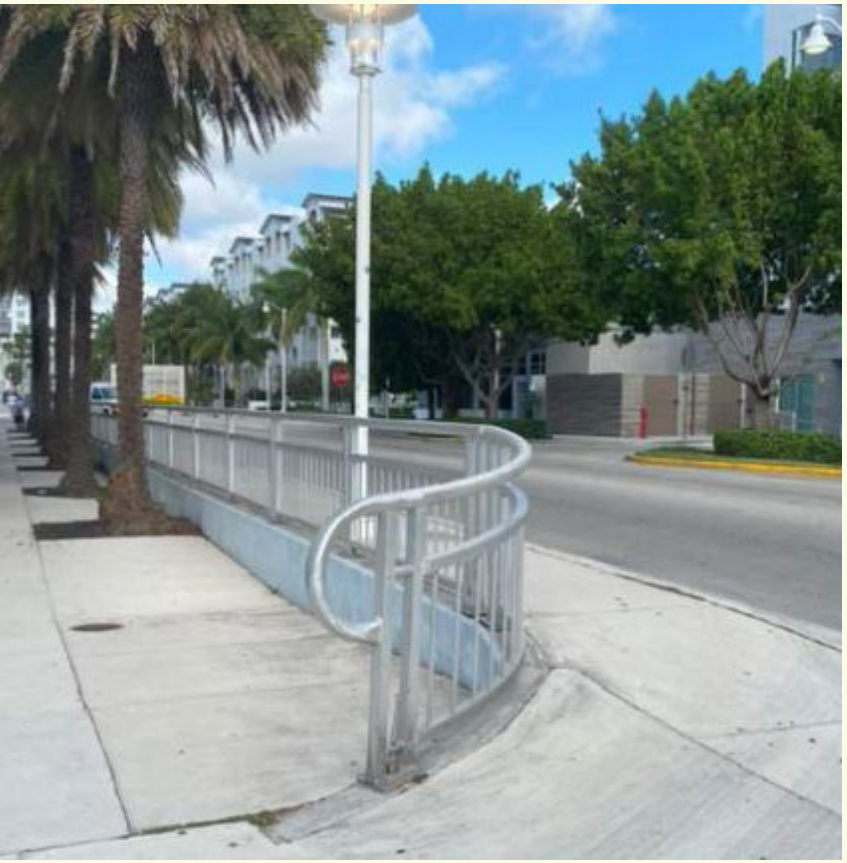
Lower Duval
Adaptation / Harmonization Impact Analysis (2040 Sea Level Rise)

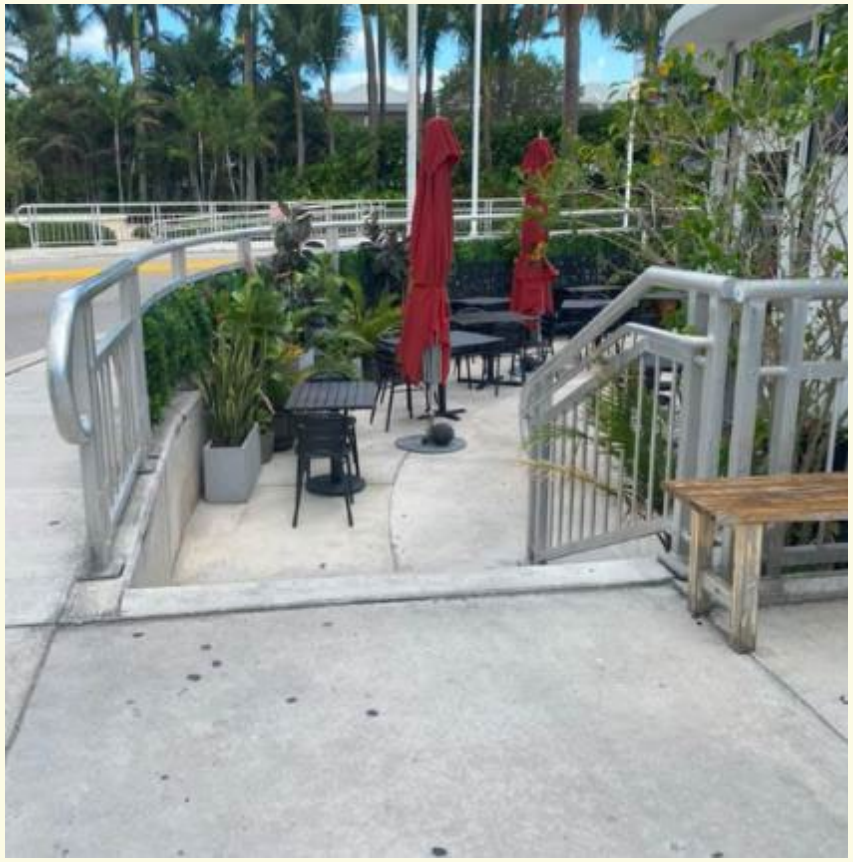
Segment on Duval St	Average Existing Crown Elevation (ft-NAVD)	Average Existing BOS Elevation (ft-NAVD)	Option 2 C&G Section 6" Black Base or Conc. Pavement	Option 4 Curbless Section +6" Black Base or Conc. Pavement	
Scenario A (2.2' Minimum Road Elevation with Alternate Base)			Minimum Proposed Crown Elevation (ft-NAVD)		
			2.45	2.45	
			Minimum Proposed BOS Elevation (ft-NAVD)		
			2.70	2.45	
			Ave BOS Impact	Ave BOS Impact	
Bay to Front St	0.85	1.10	19"	16"	N/R
Front St to Greene St	1.15	1.40	16"	13"	
Greene St to Caroline St	1.75	2.00	8"	5"	
Scenario B (1.5' Minimum Road Elevation with Alternate Base)			Minimum Proposed Crown Elevation (ft-NAVD)		
			1.75	1.75	
			Minimum Proposed BOS Elevation (ft-NAVD)		
			2.00	1.75	
Bay to Front St	0.85	1.10	11"	8"	N/R
Front St to Greene St	1.15	1.40	7"	4"	
Greene St to Caroline St	1.75	2.00	None	None	Option 2
Scenario C (No BOS Impact & 3" Road Raising)			Minimum Proposed Crown Elevation (ft-NAVD)		
			N/A	1.10	
			Minimum Proposed BOS Elevation (ft-NAVD)		
			N/A	1.10	
Bay to Front St	0.85	1.10	N/A	None	Option 4
Front St to Greene St	1.15	1.40	N/A	None	
Greene St to Caroline St	1.75	2.00	N/A	None	

Duval Street Corridor
Adaptation / Harmonization Impact Analysis (2070 Sea Level Rise)
(Assuming 5.0' Minimum Road Elevation, or 4.75' with Alternate Base)

Segment on Duval St	Average Existing Crown Elevation (ft-NAVD)	Average Existing BOS Elevation (ft-NAVD)	Option 1 C&G Section Limerock Base	Option 2 C&G Section 6" Black Base or Conc. Pavement	Option 3 Curbless Section	Option 4 Curbless Section +6" Black Base or Conc. Pavement	Optimized Road Section
			Minimum Proposed Crown Elevation (ft-NAVD)				
			5.25	4.75	5.25	4.75	
			Minimum Proposed BOS Elevation (ft-NAVD)				
			5.50	5.00	5.25	4.75	
			Avg BOS Impact	Ave BOS Impact	Ave BOS Impact	Ave BOS Impact	
Bay to Front St	0.85	1.10	53"	47"	50"	44"	N/R
Front St to Greene St	1.15	1.40	49"	43"	46"	41"	
Greene St to Caroline St	1.75	2.00	42"	36"	39"	30"	
Caroline St to Eaton St	4.75	5.00	6"	None	None	None	Option 2
Eaton St to Fleming St	7.25	7.50	None	None	None	None	Option 1
Fleming St to Southard St	7.50	7.75	None	None	None	None	
Southard to Angela St	8.50	8.75	None	None	None	None	
Angela St to Petronia St	8.45	8.70	None	None	None	None	
Petronia to Oliva St	10.00	10.25	None	None	None	None	
Olivia St to Truman Ave	8.55	8.80	None	None	None	None	
Truman Ave to Virginia St	6.20	6.45	None	None	None	None	
Virginia St to Catherine St	4.50	4.75	9"	3"	6"	None	Option 4
Catherine St to United St	2.85	3.10	29"	23"	26"	20"	N/R
United St to South St	2.50	2.75	34"	28"	30"	24"	
South St to Ocean	2.00	2.25	40"	34"	36"	30"	

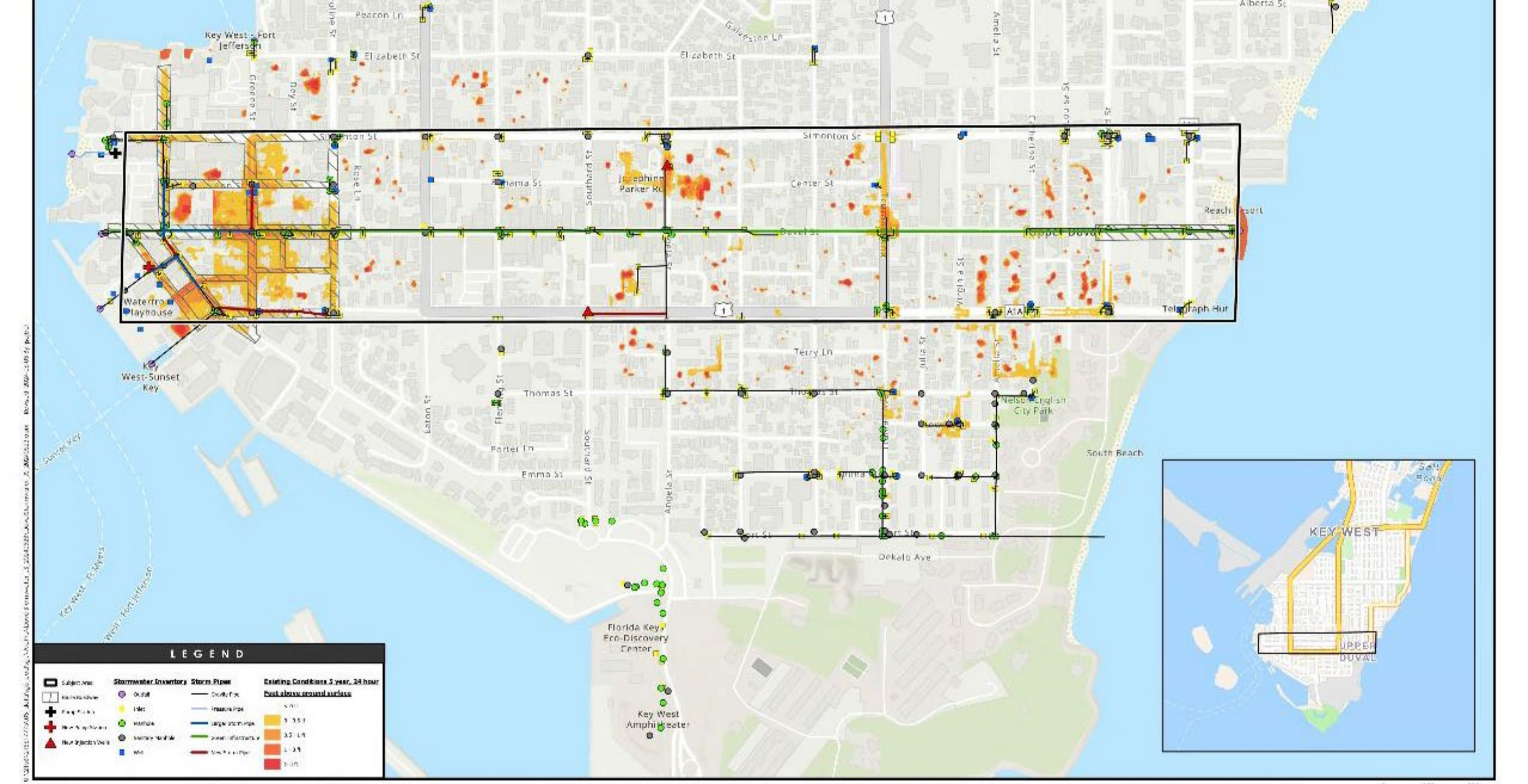
NOT Duval Street





Relevant Examples

Infrastructure Components



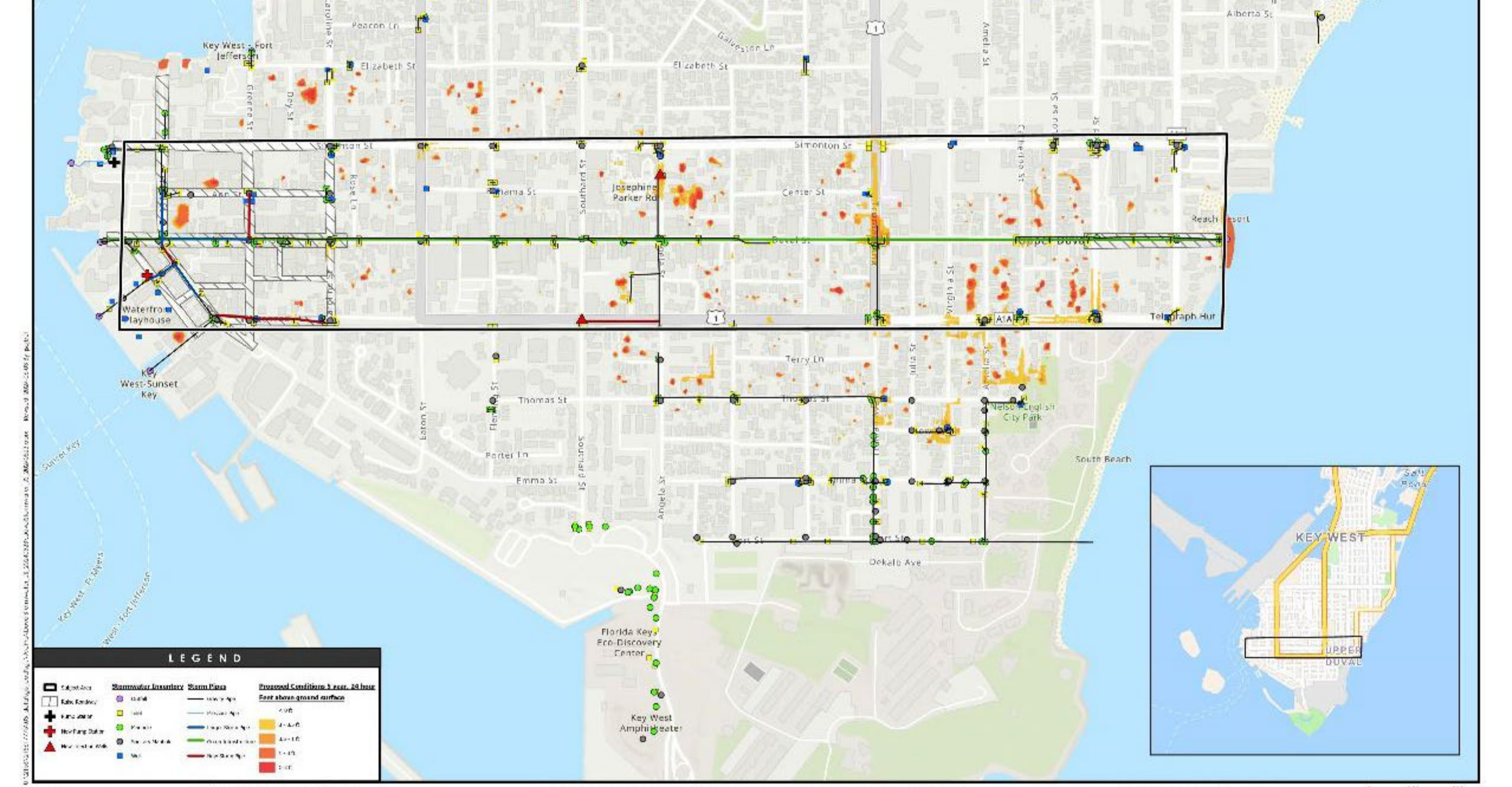
Stantec

CITY OF KEY WEST DUVAL STREET FLOODING MAPS

Existing Conditions 5 year, 24 hour

June 2024

Stantec Consulting Services Inc.
0 200 400 Feet



Stantec

CITY OF KEY WEST DUVAL STREET FLOODING MAPS

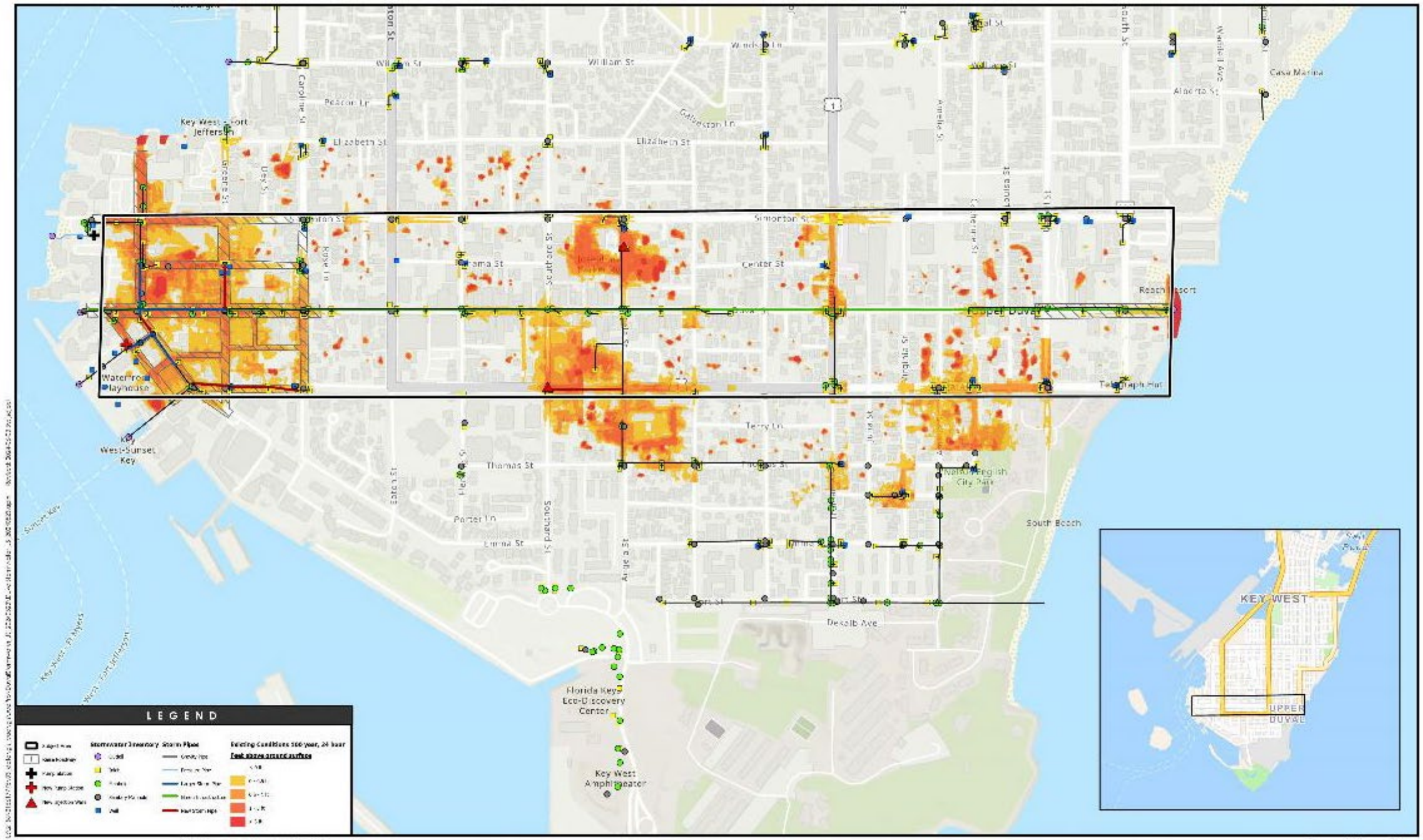
Proposed Conditions 5 year, 24 hour

June 2024

Stantec Consulting Services Inc
1661 Independent Way
Sarasota, FL 34240
Tel: 941.907.6900
Fax: 941.907.6910

0 200 400 Feet

Prepared by: JS 06/28/24
Technical Review by: JS 06/28/24
Independent Review by: JG 06/28/24



Stantec

CITY OF KEY WEST DUVAL STREET FLOODING MAPS

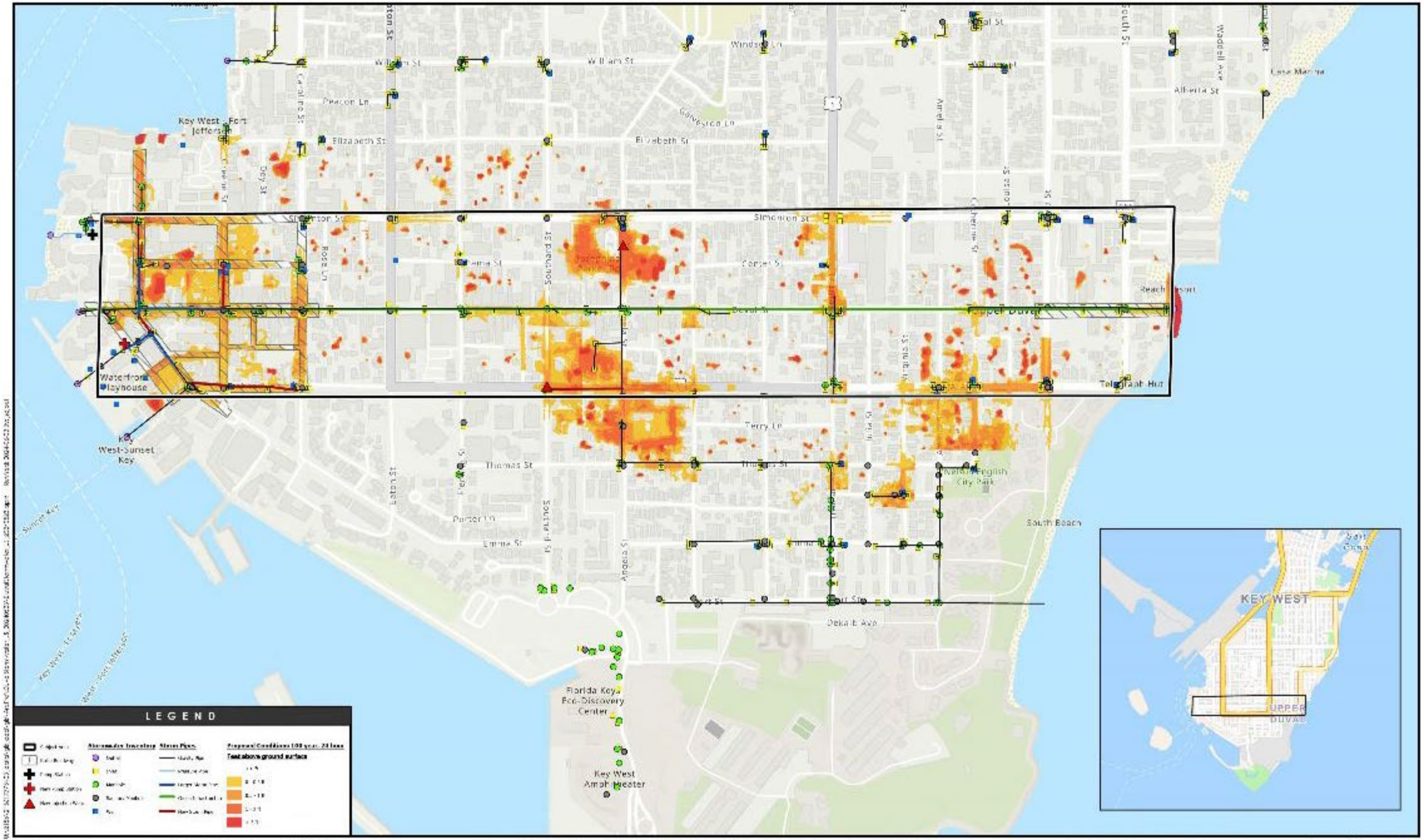
Existing Conditions 100 year, 24 hour

June 2024

Stantec Consulting Services Inc.
8940 Professional Place,
Sarasota, FL 34240
tel 941.907.6900
fax 941.907.6910

0 250 500 Feet

Produced by: JS 06/20/24
Technical Review by: TS 06/20/24
Independent Review by: JS 06/20/24



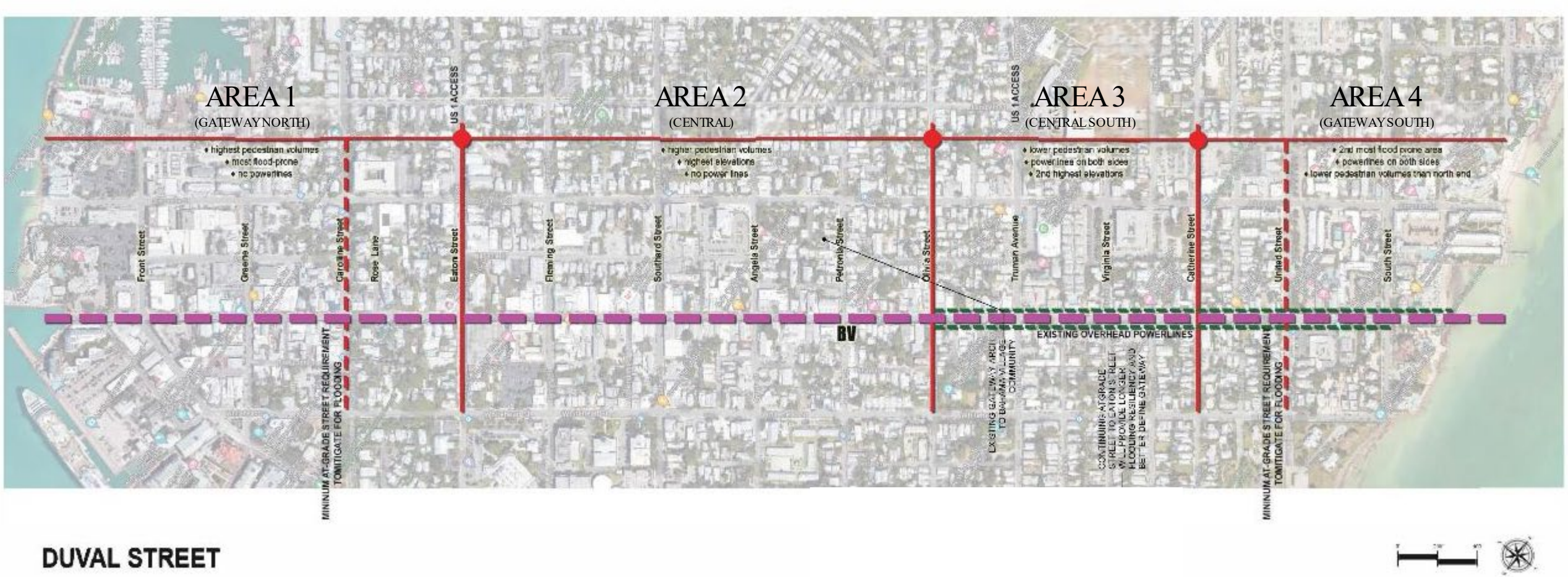
Stantec

CITY OF KEY WEST DUVAL STREET FLOODING MAPS

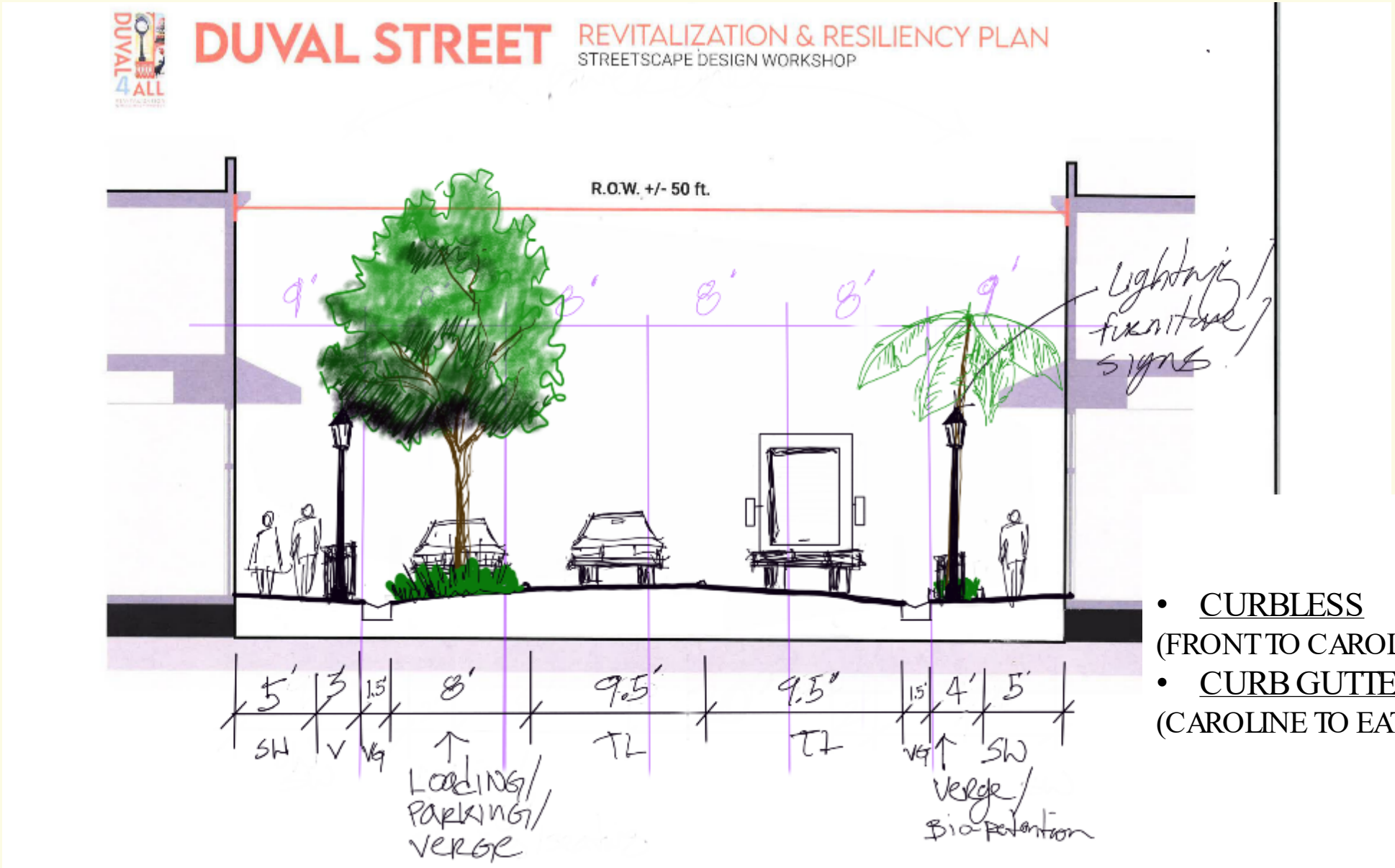
Proposed Conditions 100 year, 24 hour

June 2024

Character Areas

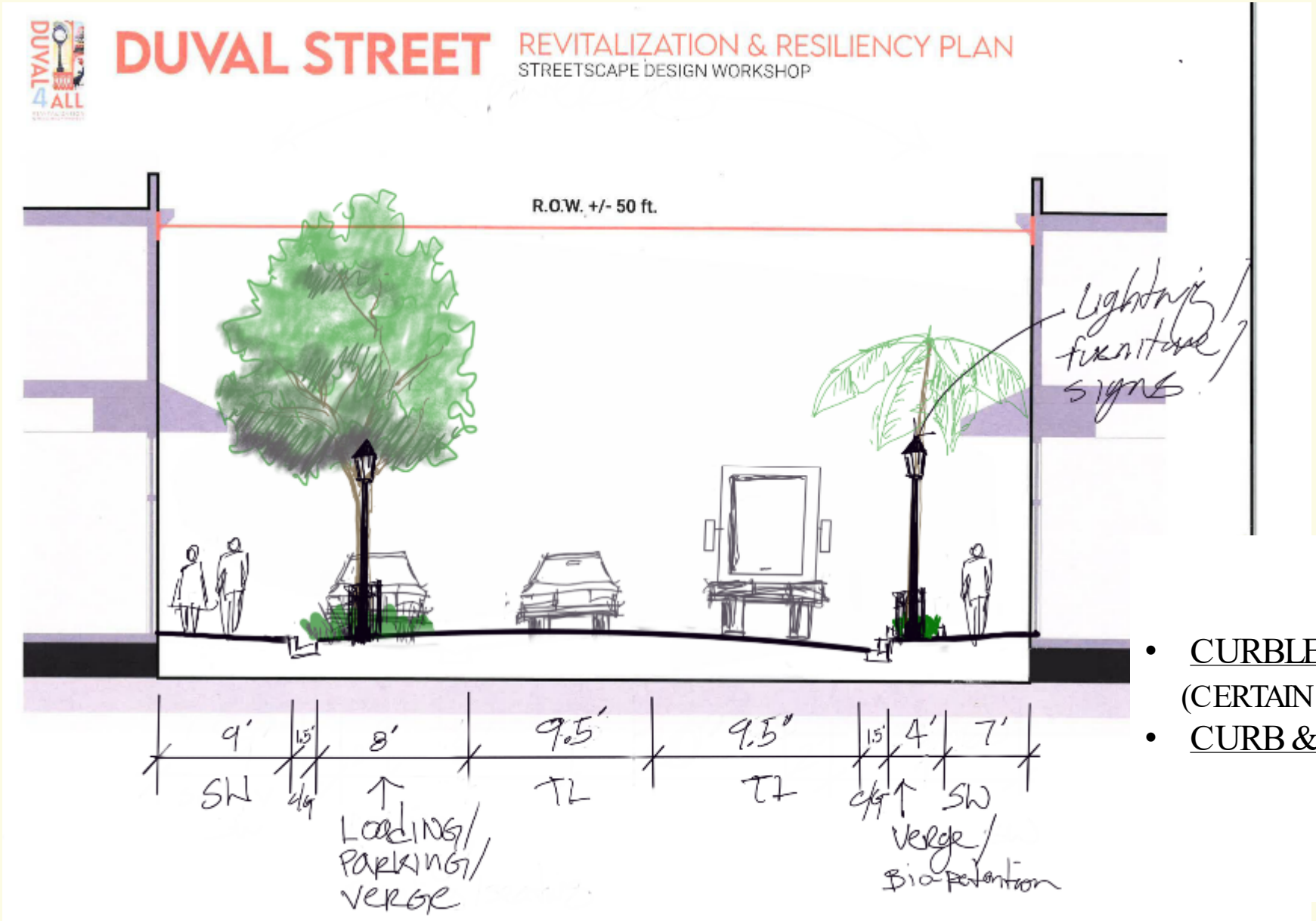


Character Area 1 – Gulf to Eaton St.



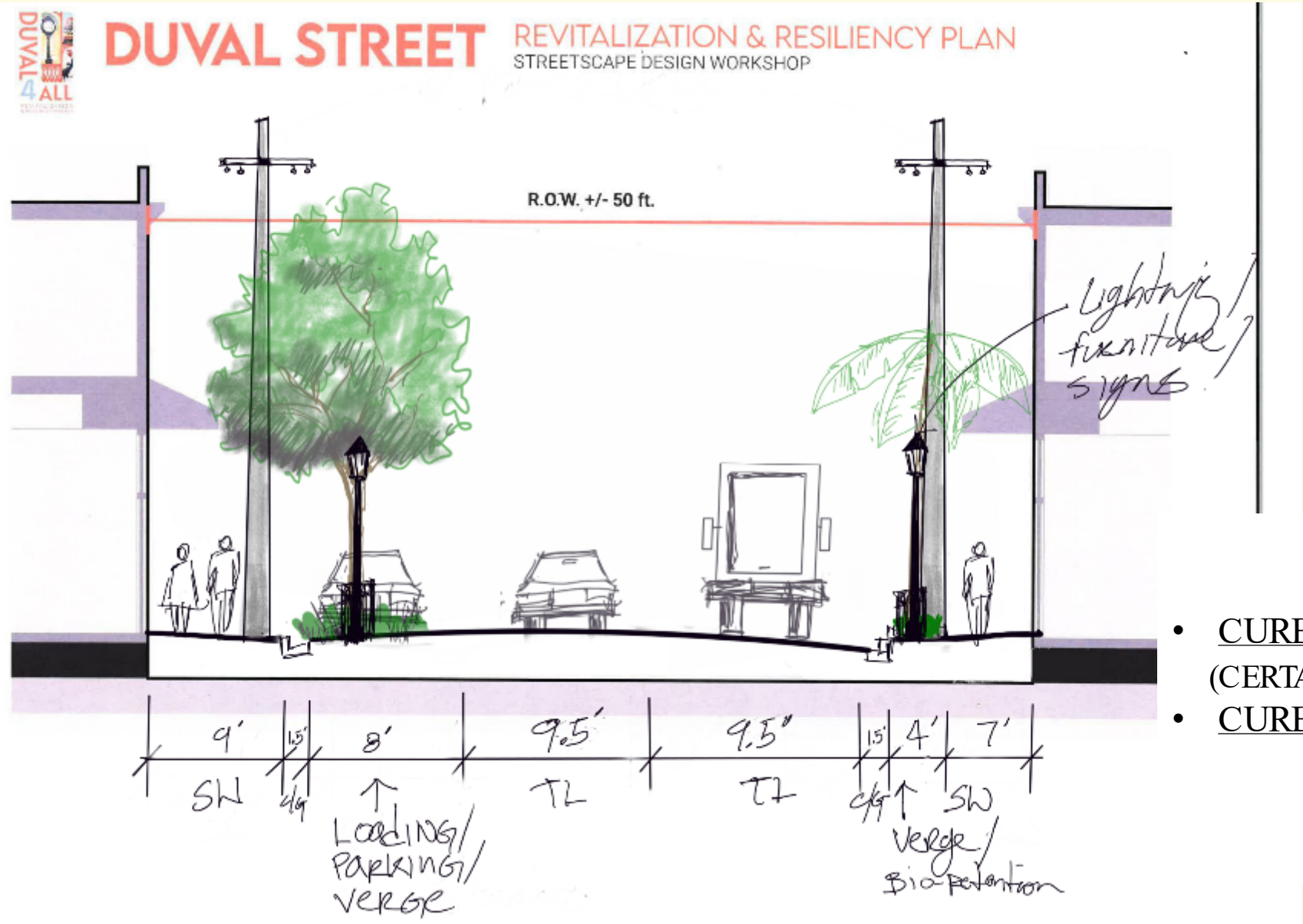
- CURBLESS (FRONT TO CAROLINE)
- CURB GUTTER (CAROLINE TO EATON)

Character Area 2 – Eaton to Oliva St.



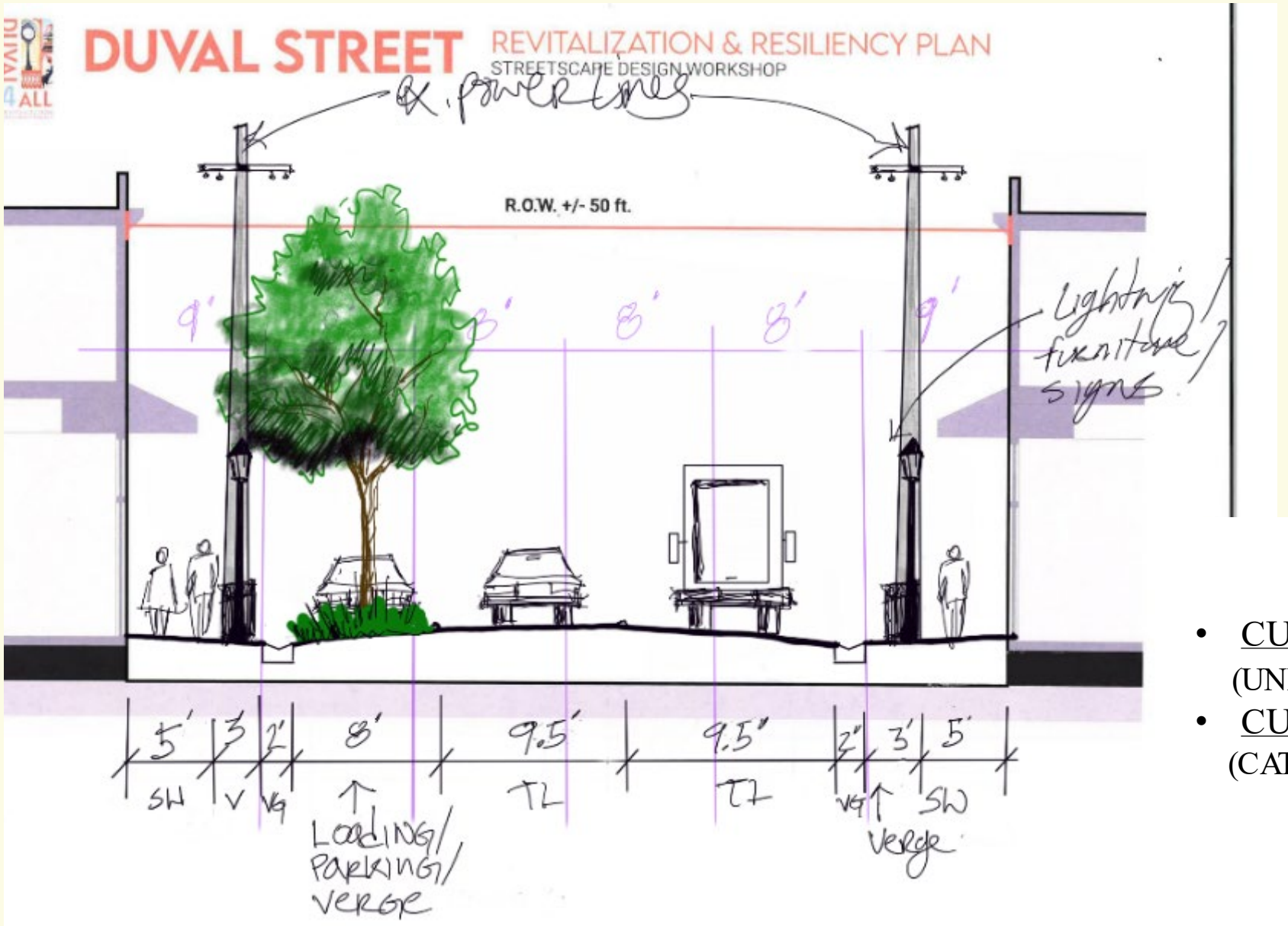
- CURBLESS
  (CERTAIN EMPHASIS AREAS)
- CURB & GUTTER

Character Area 3 – Olivia to Catherine St.



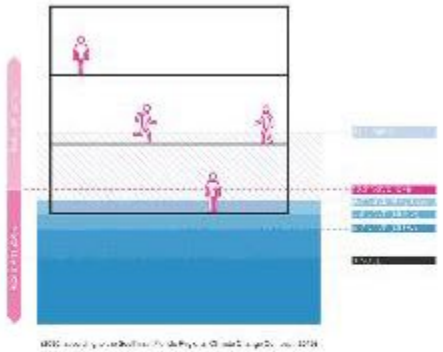
- CURBLESS
  (CERTAIN EMPHASIS AREAS)
- CURB & GUTTER

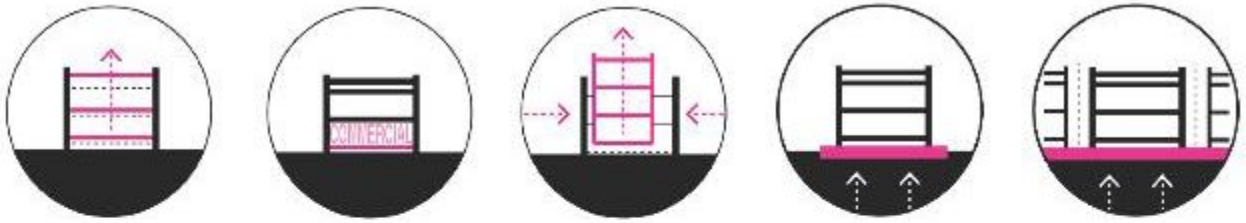
Character Area 4 – Catherine St. to Ocean



- CURBLESS
  (UNITED TO SOUTH)
- CURB & GUTTER
  (CATHERINE ST. TO UNITED)

Preservation Adaptation

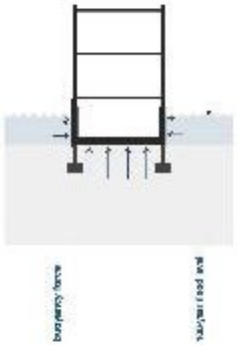




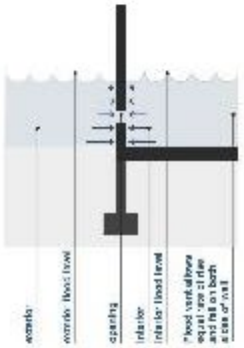
strategy 1: adapt in place

strategy 2: raise

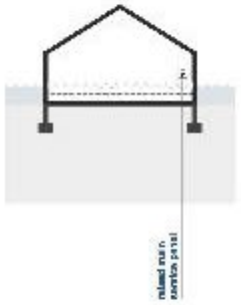
sandbags



dry floodproofing



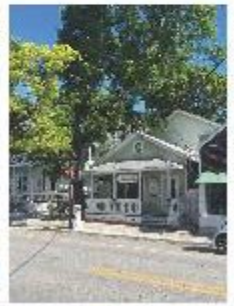
wet floodproofing

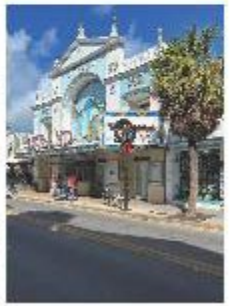


raise utilities

raise structure

Duval Streetfront Conditions





Duval Street Revitalization & Resiliency Plan

Next Steps:

- Continue community input
- Refine conceptual roadway sections & character area considerations
- Public presentation of refined concept options for review and input
- Continuation of infrastructure and preservation adaptation study
- Refinement of concept options based on public input
- Final or near final concept plans for public input
- Detailed design for pilot segment

Duval Street Revitalization & Resiliency Plan

Implementation:

- Business continuity
- Neighborhood impacts
- Coordination with public events
- Real-time project updates
- 24/7 access to project representatives
- Incentivized construction contracts
- Minimize sprawl of work
- Long lasting materials
- Quality control

Duval Street Revitalization & Resiliency Plan

Funding:

This is a major project and it will require significant city investment however, there are other funding sources that can help offset the costs. Some require no public funding match, whereas other do, and the city allocations would apply. The most critical part will be to identity any and all "components" of the project, then identify ways to leverage investment from to secure additional funding for others, and so forth, or referred to as grant stacking. Example sources:

- Resilient Florida Implementation Funds
- BRIC – Building Resilient Infrastructure and Communities
- Transportation Alternative Program Grant
- Pre-Mitigation Grant
- Section 319 Non-Point Pollution Grant
- State Water Quality Grant
- Legislative Water, Transportation & Economic Development Appropriations

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  - How can this project inform the city on how to minimize impacts to businesses?
- **Discussion & Questions**

Next Steps

- Next Focus Group Discussion
- Concept Plan Development
- Public Presentation