Matlacha, Pine Island Road | Public Space/Parking Urban Strategy

October 21st, 2025

UF Florida Institute for Built Environment Resilience
UNIVERSITY of FLORIDA

FLORIDA RESILIENT CITIES

Collaboratory℠

Project Team



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Site and Context Overview

PINE ISLAND ROAD

Overview

Strategic Connector

Only connector of Pine Island to mainland, supports daily travel, emergency services, and local commerce

Backbone that structures the town, no cross connections (redundancy), high dependency

The most commercial area confines a right of way of 66ft., with 22ft. Used for traffic lanes



PINE ISLAND ROAD

Section Perimeters

Section 1

Large parcels. A mix of commercial and warehouse/production. Space allocation for pedestrian infrastructure and parking is not an issue.

Study focus

Section 2

Commercial core, small retail, restaurants, and art galleries.

Section 3

Residential and accommodation. Single-family houses, rental properties, and diverse accommodation types.



BUILDING USE/CONDITIONS/PARKING

Section 2

Mixed-use commercial and residential. Several abandoned buildings. Parking insufficient. Informal use of both sides of the right-of-way creates safety conflicts for pedestrians and cyclists.

Total Buildings: 35
Current Parking Space Availability: 161
Total Required Parking Spaces: 304
Potential Parking Spaces Availability: 252
Parking Space Deficit: 52 PP




P
ON
PAVEMENT
KEEP IT LOCAL
Support Island Businesses

Study Objectives

- Identify the **flood vulnerability** and resilience community needs along Pine Island Road, which include addressing potential improvements for public space, landscape, and transportation infrastructure.

- Develop a **resilience planning framework** that includes diverse flood adaptation scenarios and illustrates possible futures for the surrounding areas of Pine Island Road that address public space, parking, landscaping, and potential land redevelopment.

- **Identify alignment** of the proposed scenarios with **existing planning frameworks** and potential implementation paths.

Flood Vulnerability

PLANNING FLOOD SCENARIOS

Flood Sources

Tidal Flooding

Represents low and moderate frequent nuisance flooding conditions that will worsen over time

- Based on NOAA Sea Level Rise projections for 2040–2070
- National Ocean Service (NOS) extreme water level thresholds

Storm Surge Flooding

Represents high-impact, extraordinary storm surge events

- FEMA 100-Year Flood Event
- Comparable to impacts from a Category 2 Hurricane

Represents high-impact, storm surge events

PLANNING FLOOD SCENARIOS

Sea Level Rise

High tide flooding (“sunny day” flooding)

Sea level rise 2040 Int-High scenario: 1.38ft NAVD88

Sea level rise 2070 Int-High scenario: 3.28ft NAVD88

Sea Level Rise Projections 2017
source: NOAA, Fort Myers Station 8725520



Sea Level Rise 2040 (Int-High)

PLANNING FLOOD SCENARIOS

Sea Level Rise

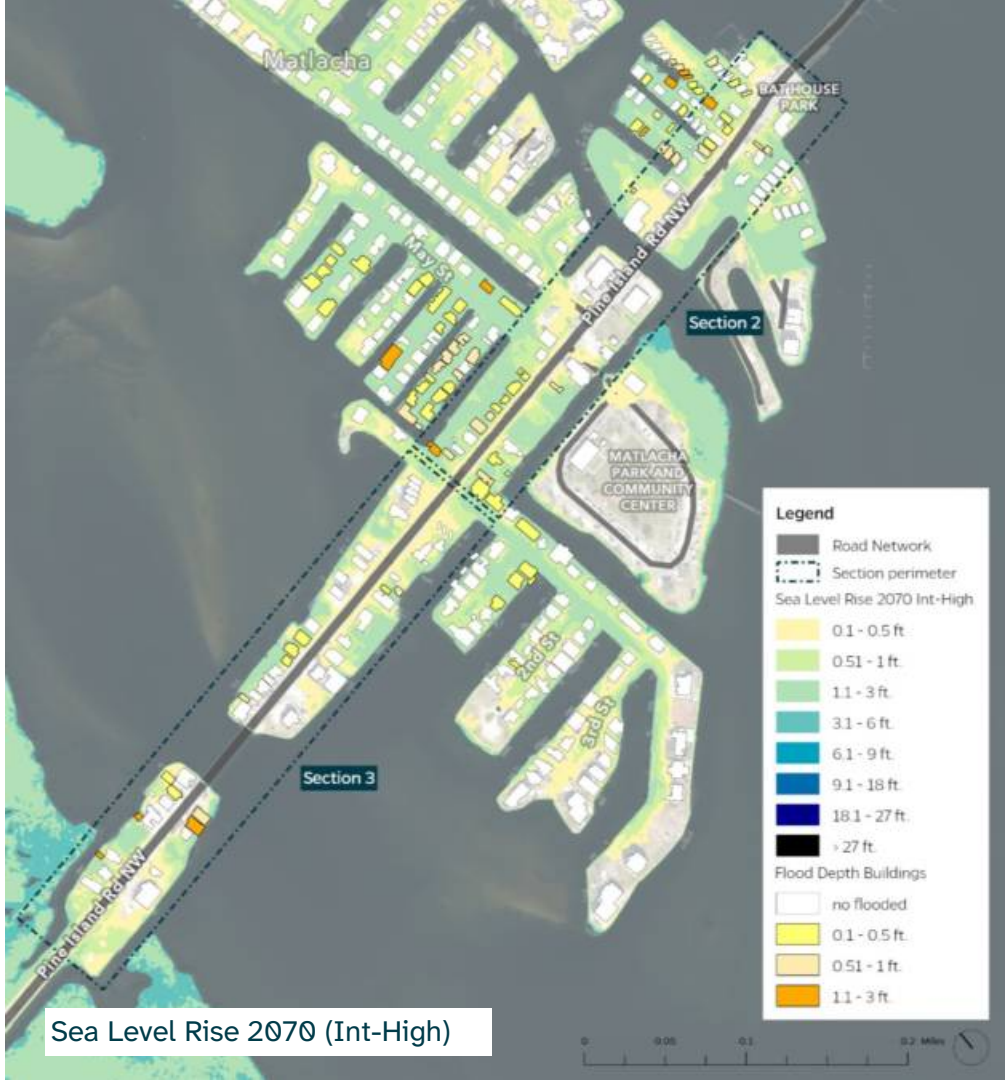
High tide flooding (“sunny day” flooding)

Sea level rise 2040 Int-High scenario: 1.38ft NAVD88

Sea level rise 2070 Int-High scenario: 3.28ft NAVD88

~ 10yr return Extreme Water Level by 2030

Sea Level Rise Projections 2017
source: NOAA, Fort Myers Station 8725520



Sea Level Rise 2070 (Int-High)

PLANNING FLOOD SCENARIOS

Water Level Thresholds

Critical water levels where flood and infrastructure impacts occur.

Predefined thresholds by the National Ocean Service (NOS) NAVD88:

Type	Impact	Elevation
Minor	Disruptive	1,97 ft
Moderate	Damaging	2.94 ft
Major	**Destructive**	**4.17 ft**

source: NOAA, Sea Level Rise Calculator



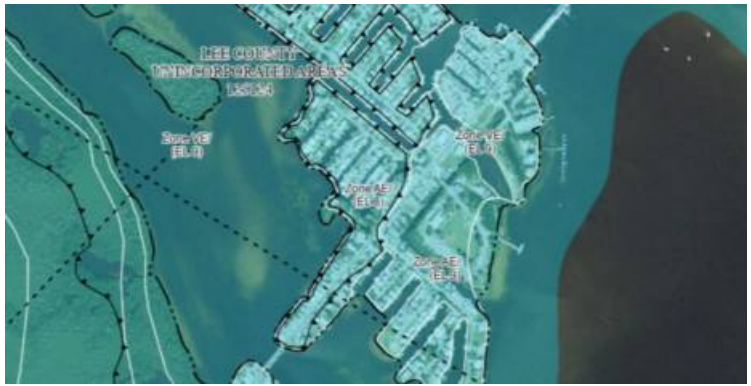
NOS Major 4.17 ft (NAVD88)

PLANNING FLOOD SCENARIOS

Coastal Flooding

(FEMA 100yr)

- All Matlacha is within the FEMA 100-year floodplain. Pine Island Road crosses both AE and VE zones
- The commercial area in Section 2 is affected by moderate wave action.
- Base flood elevation 9 ft NAVD88





Pine Island Road / Public Space, Parking, Development Scenarios

Components and goals

Transportation Infrastructure

- Improve parking space allocation and increase capacity.
- Improve accessibility for pedestrians, bicycles, and reduce conflict with motorized vehicles.

Green Infrastructure and Landscape

- Ecological enhancement of shorelines to create natural buffers for flood protection.
- Improve public space livability and aesthetics by integrating vegetation.
- Improving stormwater quality

Land Development

- Coordinated strategies for building elevation, shared infrastructure, site planning, and flexible use of space in flood-prone parcels.

Temporal and Resilience Parameters

Short-Term / Public Space Functional Improvements

- Temporary, low-cost improvements
- Quick implementation, adaptable to changing needs
- No modification to Pine Island Road

Mid-term / Tidal Flooding Resilience

- Uses and building structures resilient to frequent tidal events
- Mobile structures and temporary uses
- Optional redesign of the Pine Island Road section (no changes if unnecessary)

Long-Term / Storm Surge Resilience

- Stable land use and permanent buildings designed for high-impact storm events
- Elevated shared infrastructure for public use
- Optional redesign of the Pine Island Road section (no changes if unnecessary)

Rethinking land development on a Transforming Edge

The Resilience Performance Approach

The two guiding principles:

1. Focus on the relationship street to building

- Buildable area defined by a maximum depth from the street
- Create a resilient and active public/private interface at the street edge.
- Design guidelines that preserve architectural identity, scale, and building rhythm for a cohesive streetscape
- Predictable development consistent across parcels, concentrate building footprint.

Rethinking land development on a Transforming Edge

2. A living and adaptive buffer zone

- The rear area of the parcels is defined as a buffer zone for environmental enhancements, flood protection.
- Promote soft-edge that prioritizes nature-based stabilization, such as mangrove planting, artificial reefs, and permeable rip-rap to create intertidal habitats.
- Incorporate low-impact elements, docks, boardwalks, and kayak launches.
- Create a continuous ecological connectivity across parcels. Create a collective protection and improve stormwater drainage function.

Scenario 1: Functional Improvements

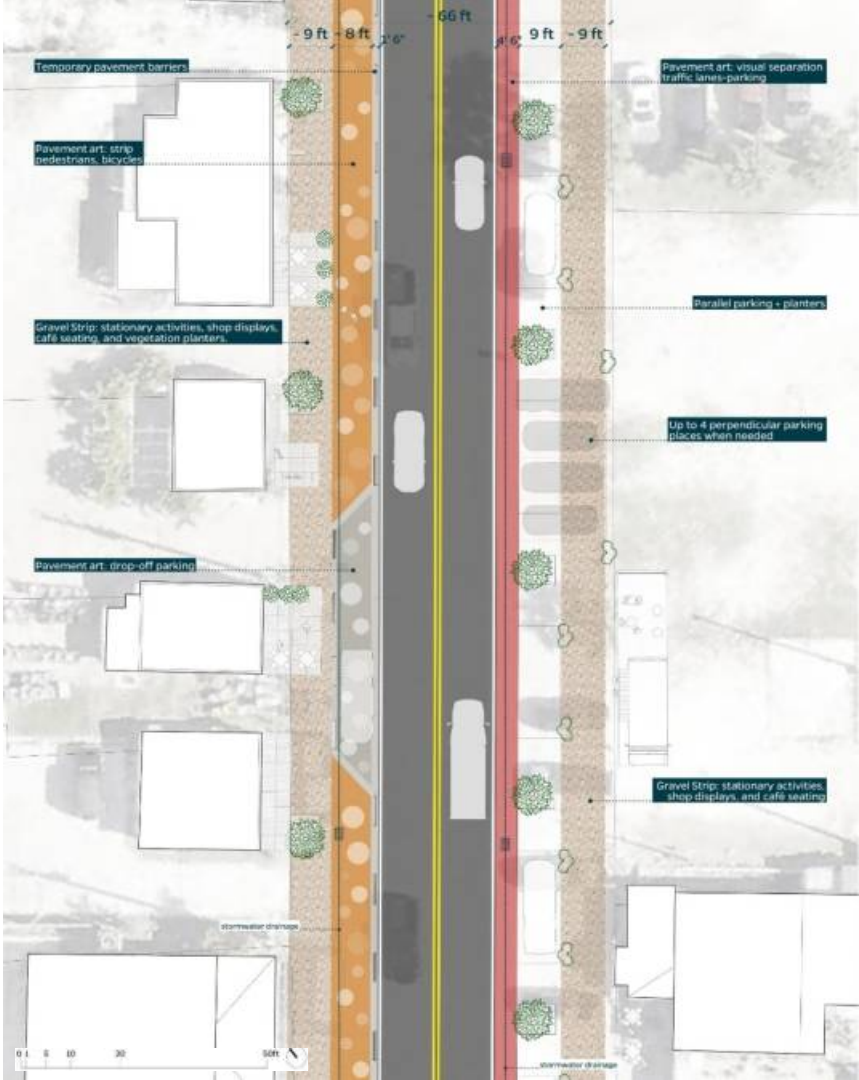
Scenario 1: Functional Improvements

Scope:

Short-term implementation

No modification to Pine Island Road

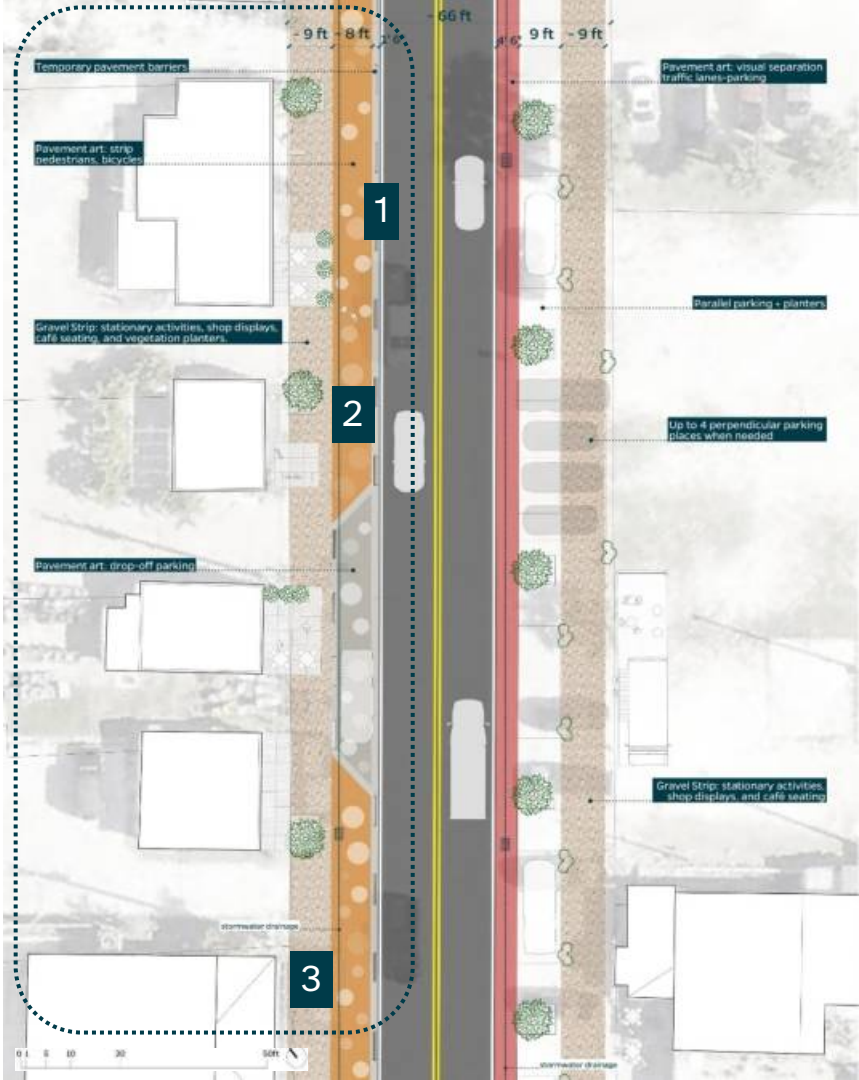
Flexible improvements that can adapt over time.



Scenario 1: Functional Improvements

North Side of Pine Island Road

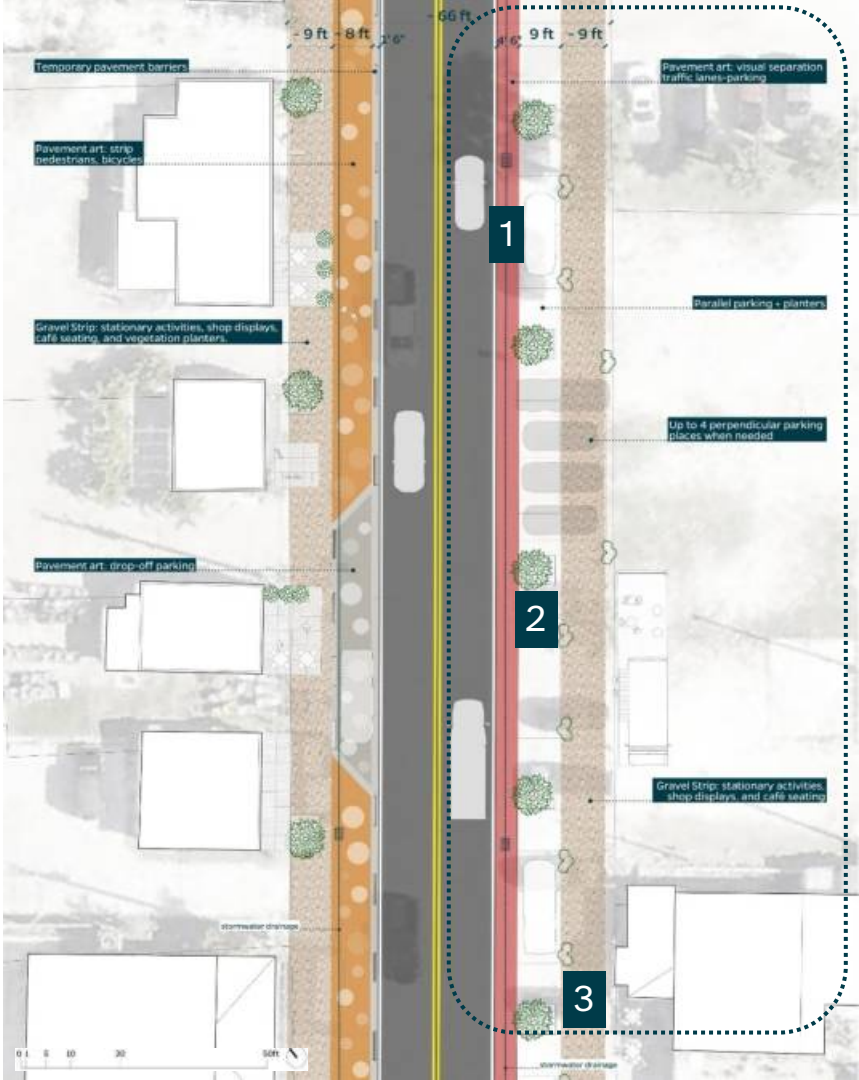
1. Temporary pavement barriers are placed between traffic lanes and the existing concrete shoulder to define the slow mobility space and improve safety.
2. Pavement marking transforms the concrete shoulder into a shared zone for walking, cycling, and drop-off activity.
3. The gravel strip (bare soil) adjacent to the shoulder is used for temporary functions such as shop displays, café seating, and vegetation planters.



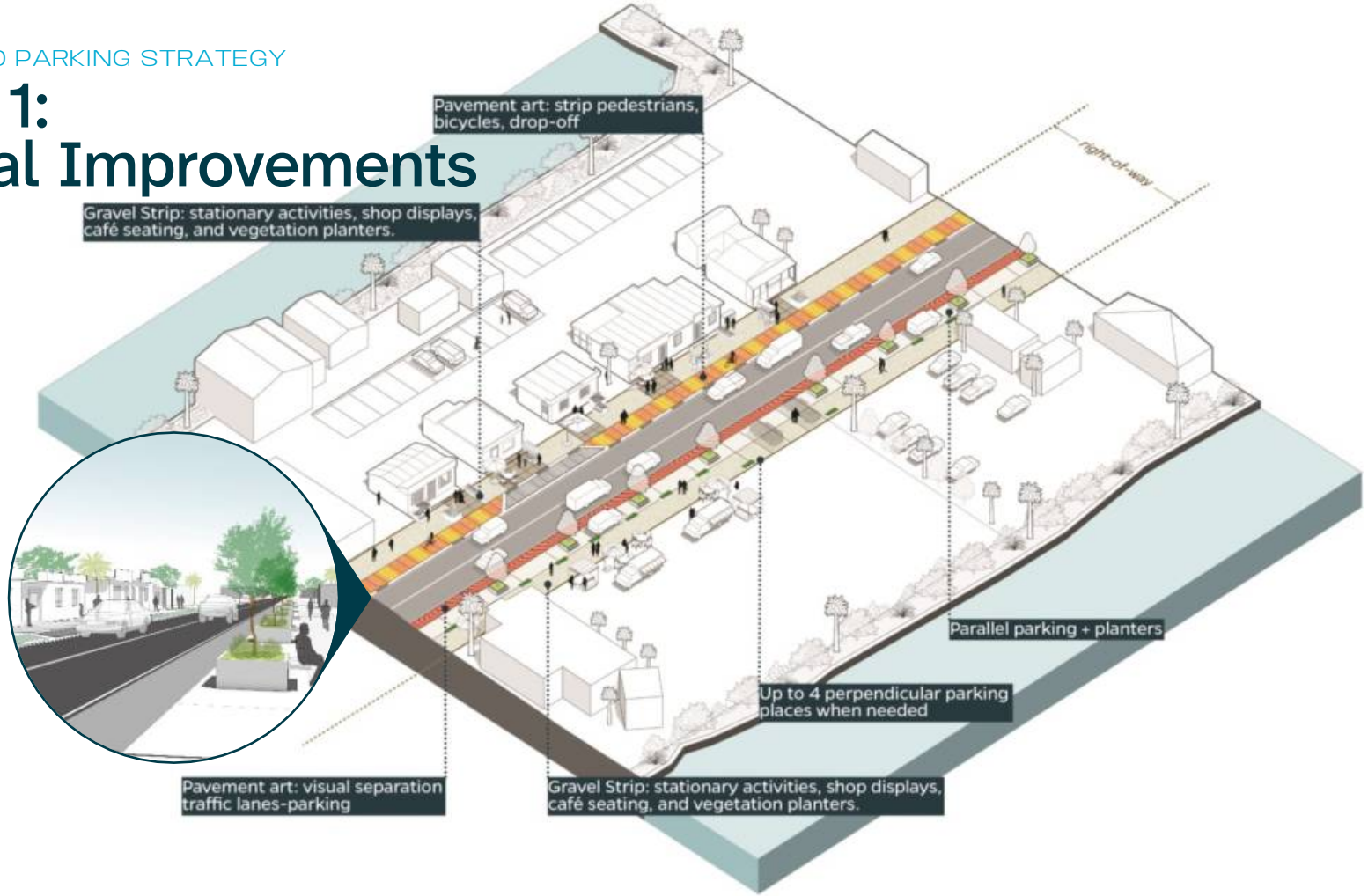
Scenario 1: Functional Improvements

South Side Pine Island Road

1. Concrete shoulder with paint striping or textured pavement separating traffic, pedestrian, and parking zones.
2. Parallel parking with tree and movable planters for shade, safety, and flexible edges.
    - Flexible layout allowing up to four perpendicular spaces while maintaining visibility and drainage.
1. Gravel strip for temporary uses such as shop displays, cafe seating, and planters.



Scenario 1: Functional Improvements



Scenario 1: Functional Improvements

Benefits	Trade-offs
Low-Cost and Quick Implementation Uses minimal resources for highly visible improvements in a short timeframe.	**Limited Resilience to Flooding** Temporary elements are not designed to withstand tidal flooding or storm surge.
Flexible and Adaptable Components can be easily rearranged or removed in response to feedback or changing conditions.	**Maintenance Challenges** Visual and functional quality depend on continued upkeep and community coordination.
Encourages Community Engagement Create opportunities for residents and business to test and shape future interventions.	
Supports Economic Revitalization Provides outdoor space for local commerce, enhances walkability, and improves street life.	

EXISTING POLICY FRAMEWORKS

FDOT and Tactical Interventions

FDOT Design Manual – Topic #625-000-002: Community Aesthetic Features (CAF)

Enhance public spaces within FDOT right-of-way (R/W) to reflect community identity, culture, and values—while maintaining safety, accessibility, and maintenance standards.

- **Approval & Agreement** – Any public art, landscaping, or identity feature in FDOT R/W must be approved by FDOT District Design Office through a CAF Agreement with the local government.
- **Safety & Access** – Features cannot obstruct visibility, signage, or traffic flow and must meet ADA standards.

- 127.2 Requirements
  (15) The Department prohibits any applications of pavement or surface art on travel lanes, paved shoulders, bridges, intersections, crosswalks, or sidewalks. Pavement or surface art is defined as surface markings that are not in direct support of traffic control or public safety on the State Highway System.
  - Public Art and Local ID Markers allowed if placed outside clear zones, built to wind-load and structural codes.
  - Lighting must avoid glare for drivers or pedestrians.

- **Maintenance & Liability** – Local government is responsible for design, funding, construction, and long-term upkeep.
- **Design Review** – Final plans must be signed by a Florida-licensed professional and coordinated through FDOT District Design Engineer.

Scenario 1 does not intervene in the traffic lanes. However, the concrete shoulders could be discussed between the County and FDOT for strategies to calm traffic. Currently, the shoulder serves as a stormwater drainage area.

Scenario 2: Big Deck | Tidal Flooding Resilience

PUBLIC SPACE AND PARKING STRATEGY

Scenario 2: Big Deck Tidal Flooding Resilience

Scope:

Development scheme to withstand potential frequent tidal flooding while supporting flexible public and commercial use through a shared elevated platform (“Big Deck”).

Moderate re-structure of land development parameters



PUBLIC SPACE AND PARKING STRATEGY

Scenario 2: Big Deck Tidal Flooding Resilience

Flood Resilience Parameters

- Baseline flood level based on National Ocean Service (NOS) major flooding threshold (≈4.17 ft NAVD88).
- Elevated platform raised about 3 ft above existing grade with 1 ft of freeboard.
- Designed for temporary and mobile uses, trailers, container size shops, foodtrucks allowing relocation during extreme events.
- Adaptable to frequent changing flood conditions and long-term sea level rise.



PUBLIC SPACE AND PARKING STRATEGY

Scenario 2: Big Deck Tidal Flooding Resilience

Parcel Development Guidelines

- Large shared elevated platform (“Big Deck”) hosts mobile structures such as trailers or containers for flexible commercial use.
- Platform also supports stationary activities like outdoor seating and shop displays.
- No setbacks; development extends to the parcel edge along Pine Island Road, creating a compact, walkable frontage.
- Shared parking located behind the platform to reduce visual impact.
- Optional shared access and exit points between adjacent parcels improve circulation efficiency.



PUBLIC SPACE AND PARKING STRATEGY

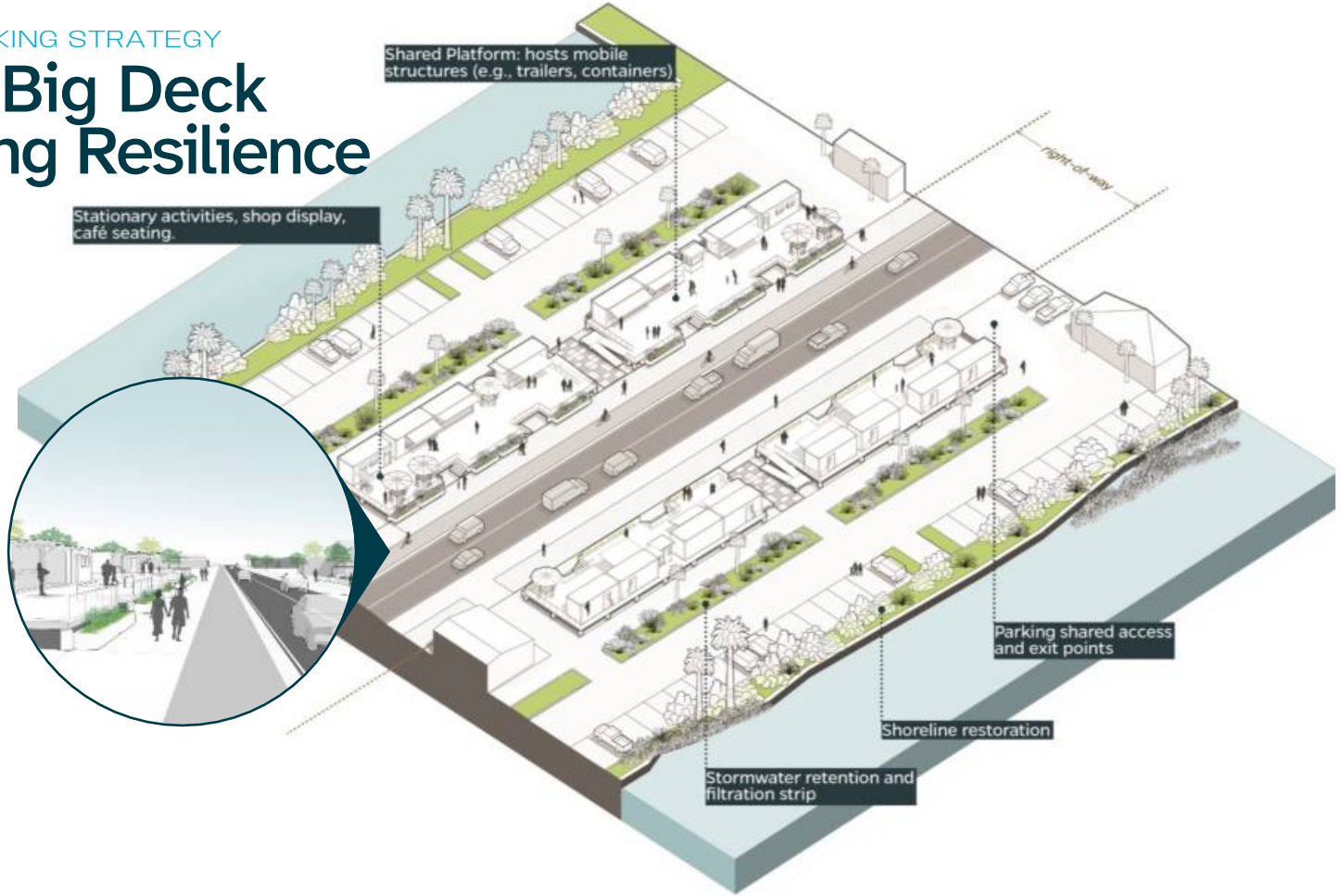
Scenario 2: Big Deck Tidal Flooding Resilience

Landscape + Green Infrastructure

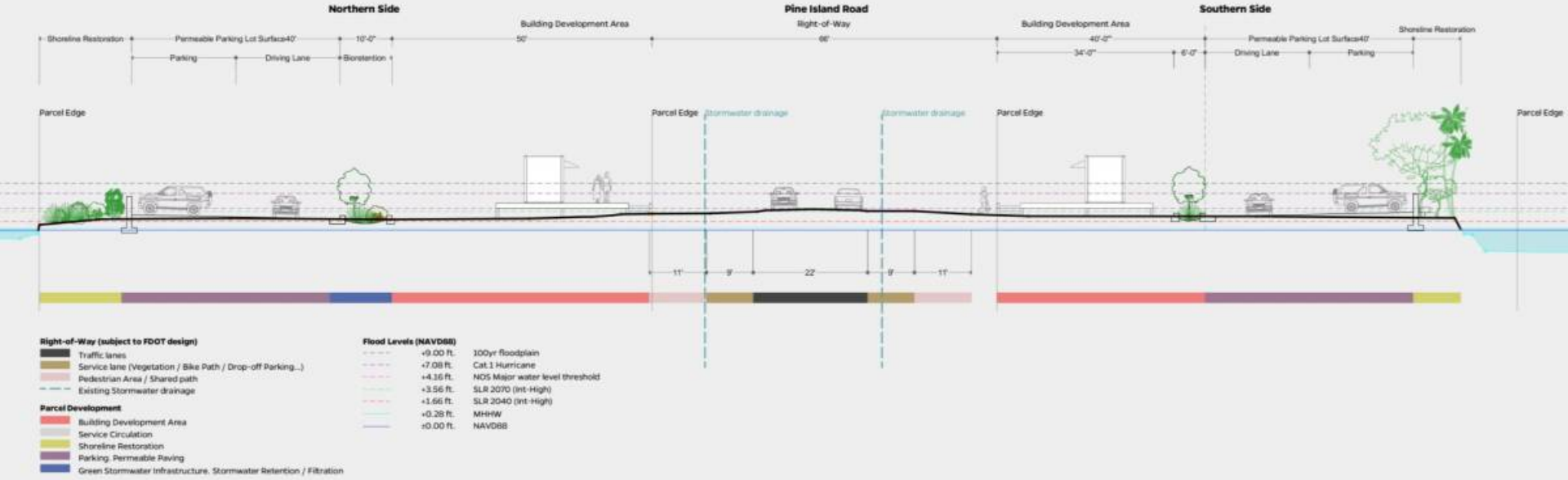
- Planters along deck edges to soften the transition between platform and ground.
- Retention and filtration strip behind the platform to manage runoff and improve water quality.
- Shoreline natural enhancements to improve ecological and landscape function.



Scenario 2: Big Deck Tidal Flooding Resilience



Scenario 2: Big Deck Tidal Flooding Resilience



Scenario 2: Big Deck Tidal Flooding Resilience

Benefits	Trade-offs
Flood-Resilient Design Shops and activities are protected from regular tidal flooding and nuisance disruptions	**Permitting and Regulatory Complexity** Shared access and use can create coordination challenges between owners and with Lee County and FDOT
Flexible Use of Space Allows adaptable layouts for commercial, public, and recreational use.	**Upfront Investment** Shared infrastructure could represent initial higher cost.
Compact Urban Form Create walkable, vibrant street front along Pine Island Road	**Maintenance and Management** Requires clear responsibility for upkeep of shared elements (platform, parking, drainage, landscaping).
Shared Infrastructure Coordinated access and shared parking reduce infrastructure duplication and increase land efficiency.	**Limited Long-Term Adaptability to Storm Surge** Designed for tidal flooding, but may not for severe storm surge.

Scenario 3: The Arcade | Storm Surge Resilience

PUBLIC SPACE AND PARKING STRATEGY

Option 3: The Arcade Storm Surge Resilience

Scope:

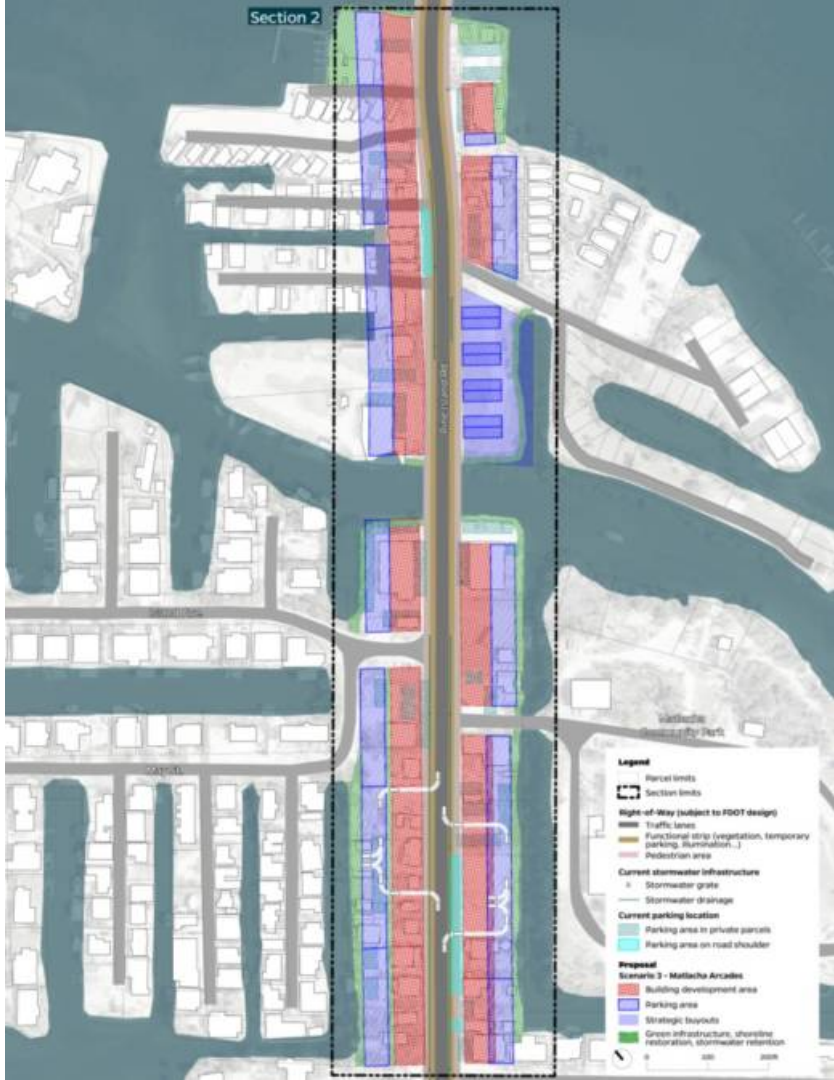
Development scheme to adapt to severe storm surge events.

Two levels of public activity: arcade enhances public life and walkability at the ground level, and shared boardwalk public activity for elevated buildings

Moderate to high re-structure of current land development parameters

Flood Resilience Features

- Based on FEMA 100-year flood event (9 ft BFE).
- Elevated buildings, first-floor height of 13 ft NAVD88.
- Long-term resilience and faster recovery after major storms.

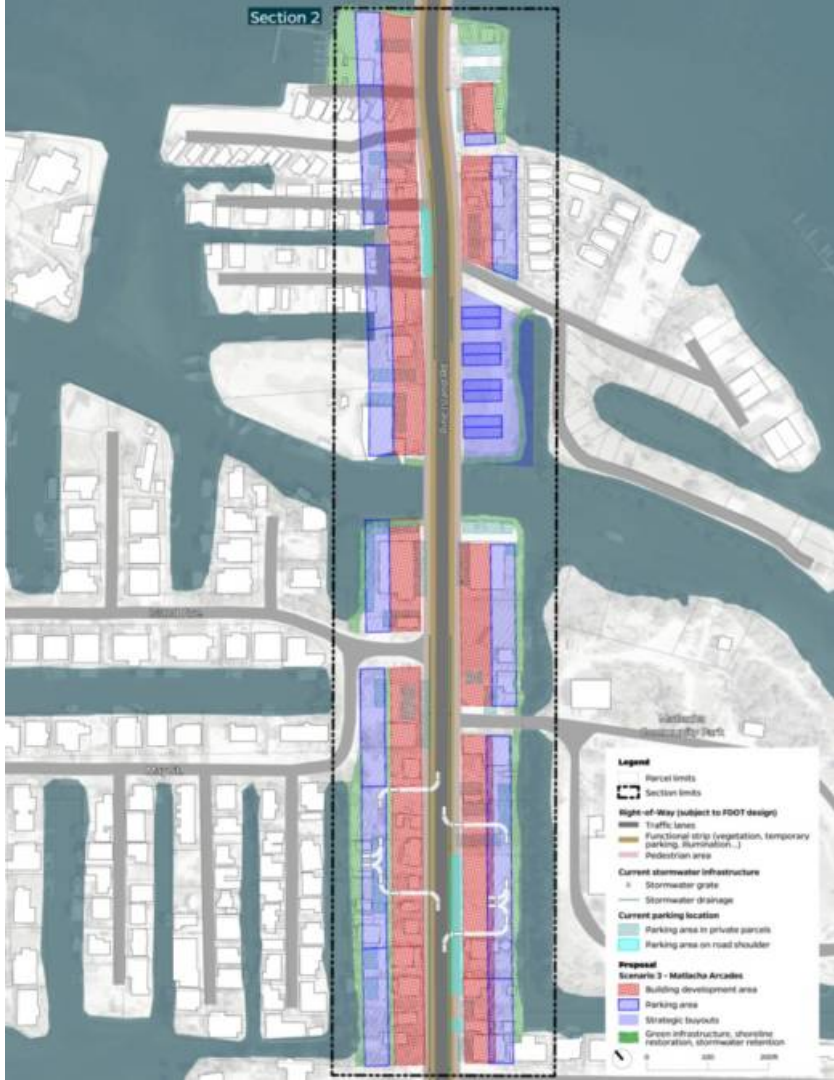


PUBLIC SPACE AND PARKING STRATEGY

Option 3: The Arcade Storm Surge Resilience

Parcel Development Guidelines

- Stable commercial uses: shops, cafés, galleries, and workshops.
- Elevated buildings, first-floor height of 13 ft NAVD88.
- Shared vertical circulation elevated walkway and (~10 ft. high) for seating, shop display, and access.
- Buildable depth ~50 ft; no setbacks from Pine Island Road, creating a compact frontage.
- Ground-level arcades activate public space and allow water flow during storms.
- Shared parking and coordinated access points behind parcels for infrastructure efficiency.



PUBLIC SPACE AND PARKING STRATEGY

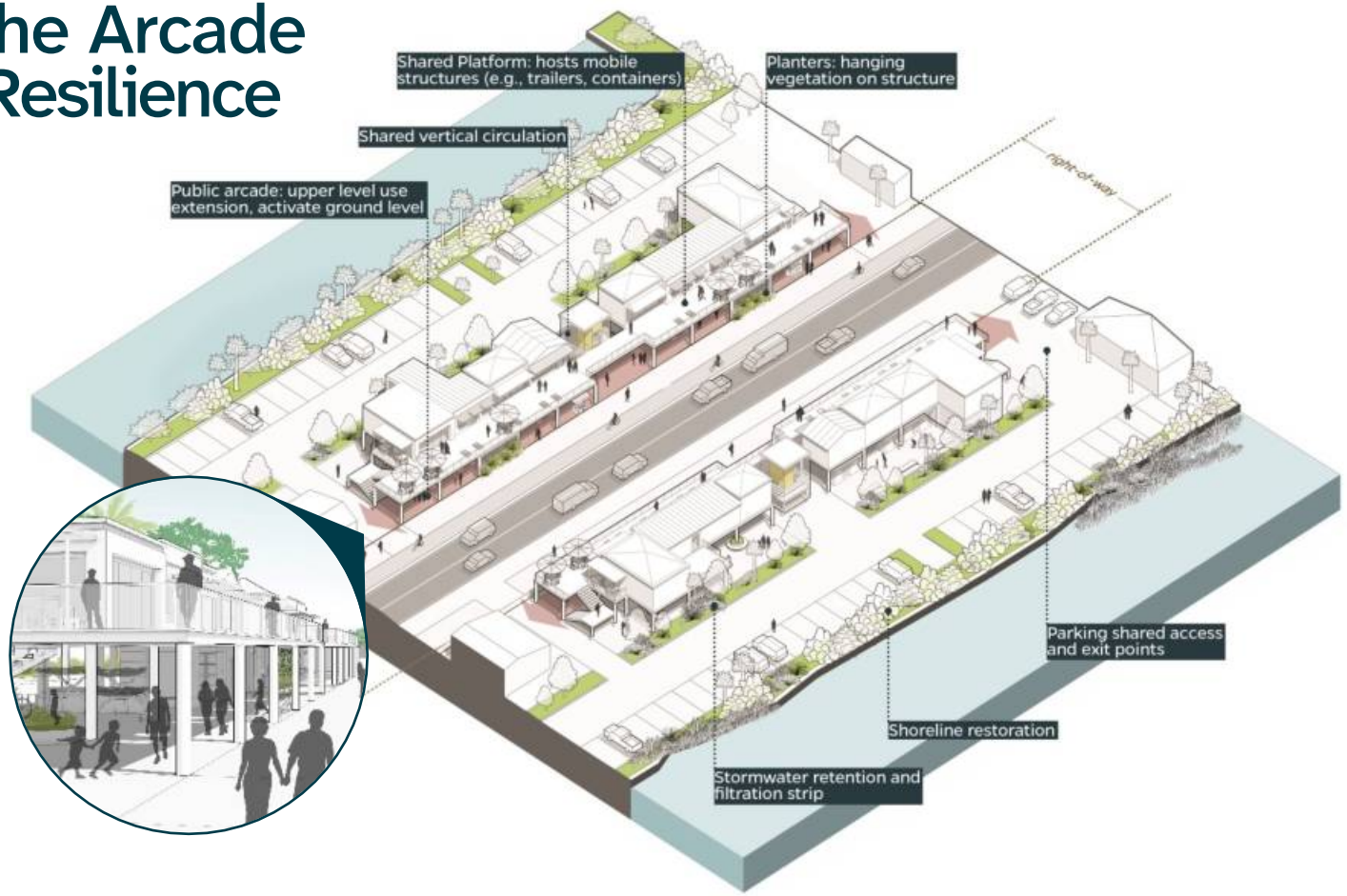
Option 3: The Arcade Storm Surge Resilience

Landscape + Green Infrastructure

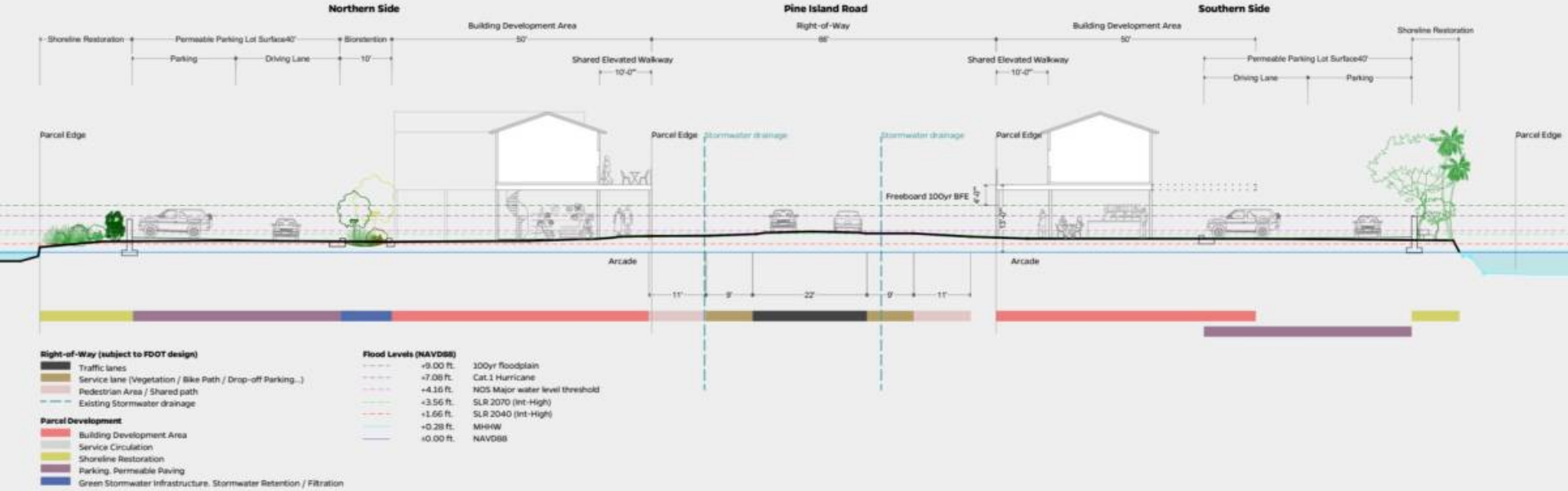
- Planters and hanging vegetation along street-facing facades to soften elevated structures.
- Retention and filtration strip behind the buildable area to manage runoff and improve water quality.
- Shoreline restoration to enhance ecological and landscape resilience.



Scenario 3: The Arcade Storm Surge Resilience



Scenario 3: The Arcade Storm Surge Resilience



Scenario 3: The Arcade Storm Surge Resilience

Benefits	Trade-offs
High Flood Protection Designed to withstand severe flood events, offering long-term resilience.	**Permitting and Regulatory Complexity** Shared private access and infrastructure can be difficult to fit into existing institutional procedures and can create coordination challenges between owners for implementation.
Permanent, Durable Structures Elevated buildings provide safe investment opportunities for shops, cafés, and galleries with year-round use.	**Upfront Investment** Shared infrastructure could represent initial higher costs.
Active Public Realm at Ground Level Stilted areas create shaded public arcades, improving pedestrian experience, seating, and informal uses even in flood-prone areas.	**Accessibility Considerations** Elevated design demands reliable, inclusive vertical circulation (elevators, ramps, stairs), adding cost and space requirements.
Compact Urban Form Creates a walkable, vibrant streetfront along Pine Island Road.	**Visual Scale Impact** Elevated structures (~10 ft) may alter the low-scale village aesthetic, without a detailed study to define design guidelines.
Shared Infrastructure Coordinated access and shared parking reduce infrastructure duplication and increase land use efficiency.	**Logistics** Shared facilities can be challenging in terms of construction logistics.
Visual Identity An elevated typology streetfront can enhance Matlacha's core character, embracing coexistence with water.	

Previous experiences



John's Pass Village
Madeira Beach

Scenario 4: Facing Nature | Storm Surge Resilience

PUBLIC SPACE AND PARKING STRATEGY

Scenario 4: Facing Nature Storm Surge Resilience

Scope:

Development scheme to adapt to severe storm surge events.

Environmental and landscape enhancements integrated into public life.

High re-structure of current land development parameters

Flood Resilience Features

- Based on FEMA 100-year flood event (9 ft BFE) with ~2 ft freeboard.
- Elevated buildings at an average first-floor height of 8–9 ft above grade.
- Long-term resilience and faster recovery after major storms.
- Adaptability to coastal change.



PUBLIC SPACE AND PARKING STRATEGY

Scenario 4: Facing Nature Storm Surge Resilience

Parcel Development Guidelines

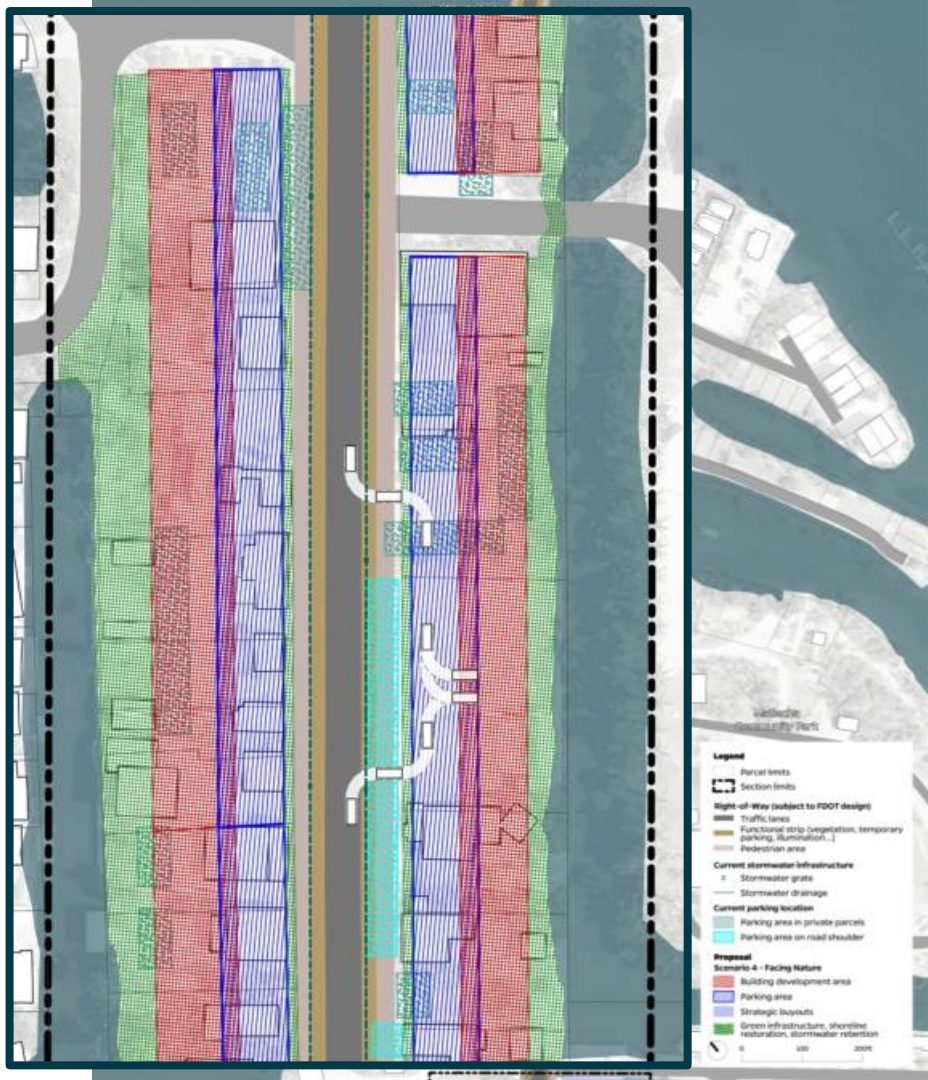
- Parking at the parcel front. ~35 ft front setback for stormwater buffer and parking area.
- Allows independent vehicular access at the front of parcels for flexibility.
- Elevated buildings for stable year-round uses: shops, restaurants, galleries, and workshops.
- Shared elevated walkway (~10 ft wide) for circulation, seating, and retail display.
- Buildable depth ~50 ft; includes stilted parking under buildings for limited public or private use.



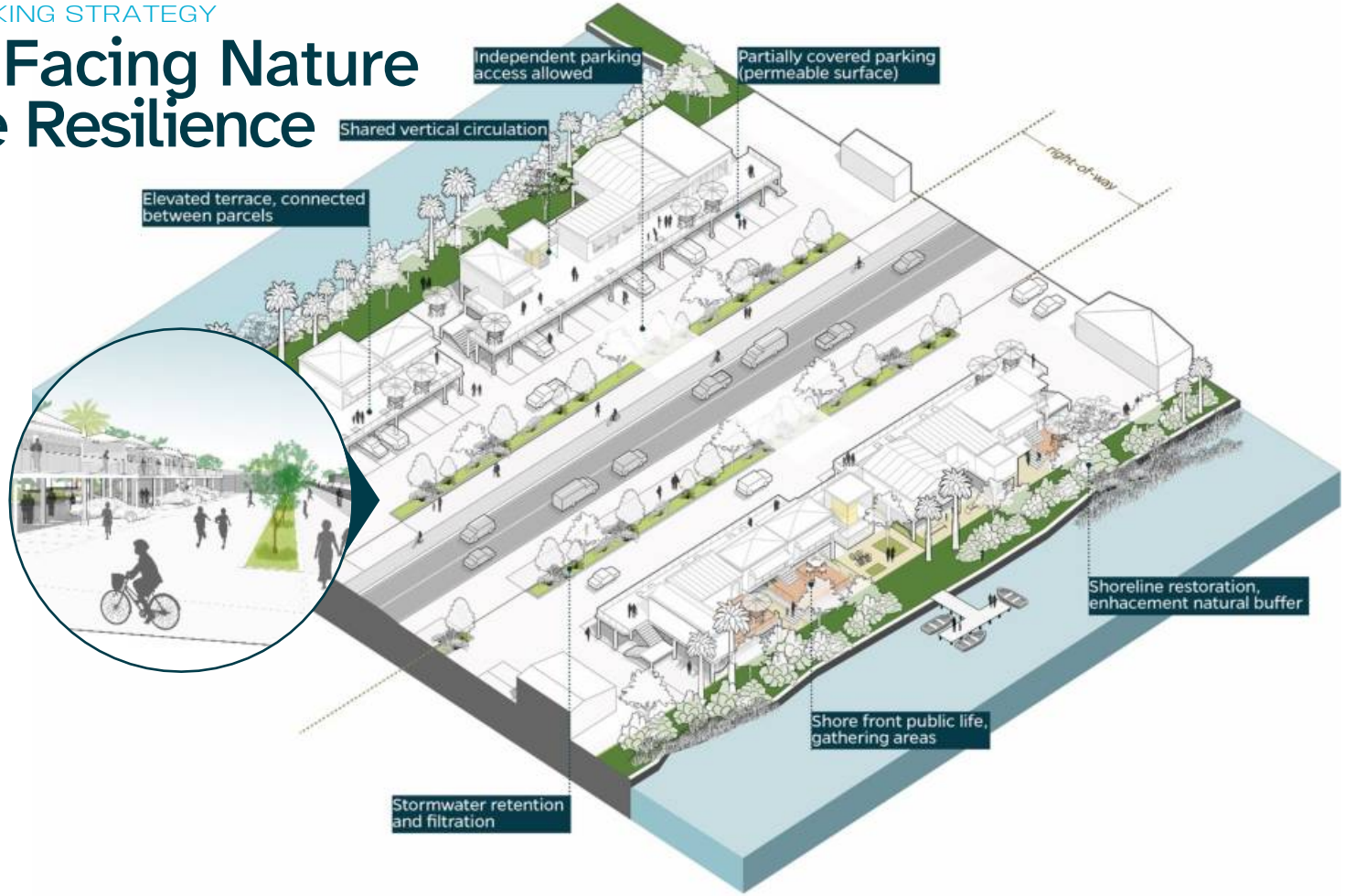
Scenario 4: Facing Nature Storm Surge Resilience

Landscape + Green Infrastructure

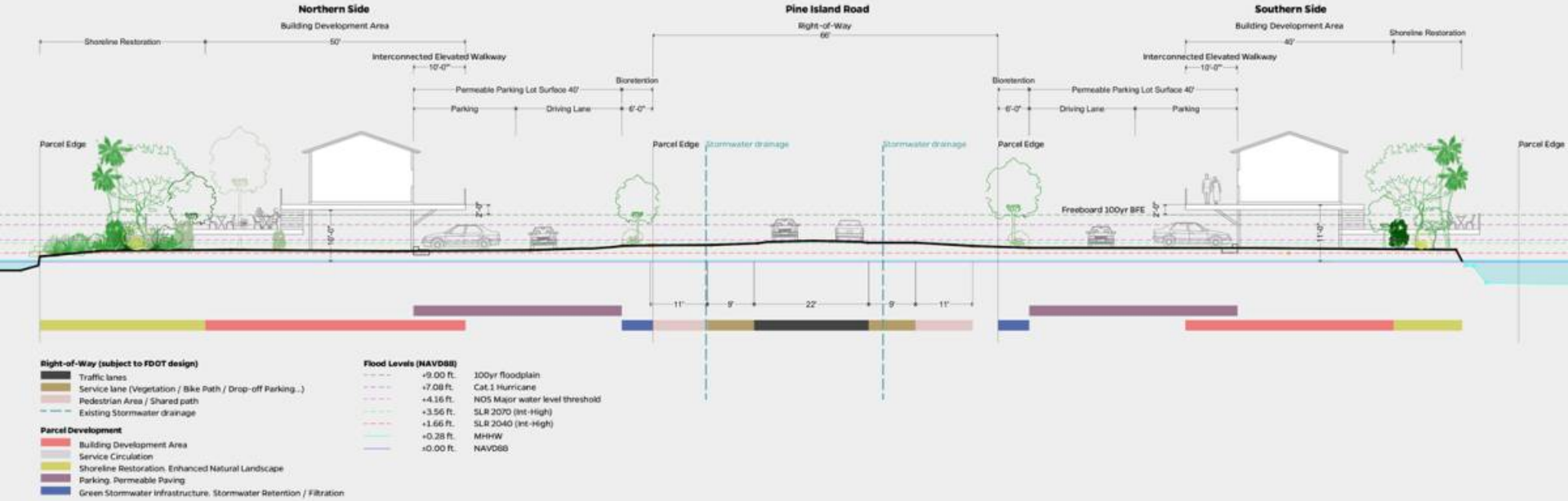
- Vegetated filtration strip along the street edge to manage runoff and soften visual impact of parking areas.
- Generous landscaping and green infrastructure strategies at the rear of parcels to enhance habitat and absorb storm surge impacts.



Scenario 4: Facing Nature Storm Surge Resilience



Scenario 4: Facing Nature
Storm Surge Resilience



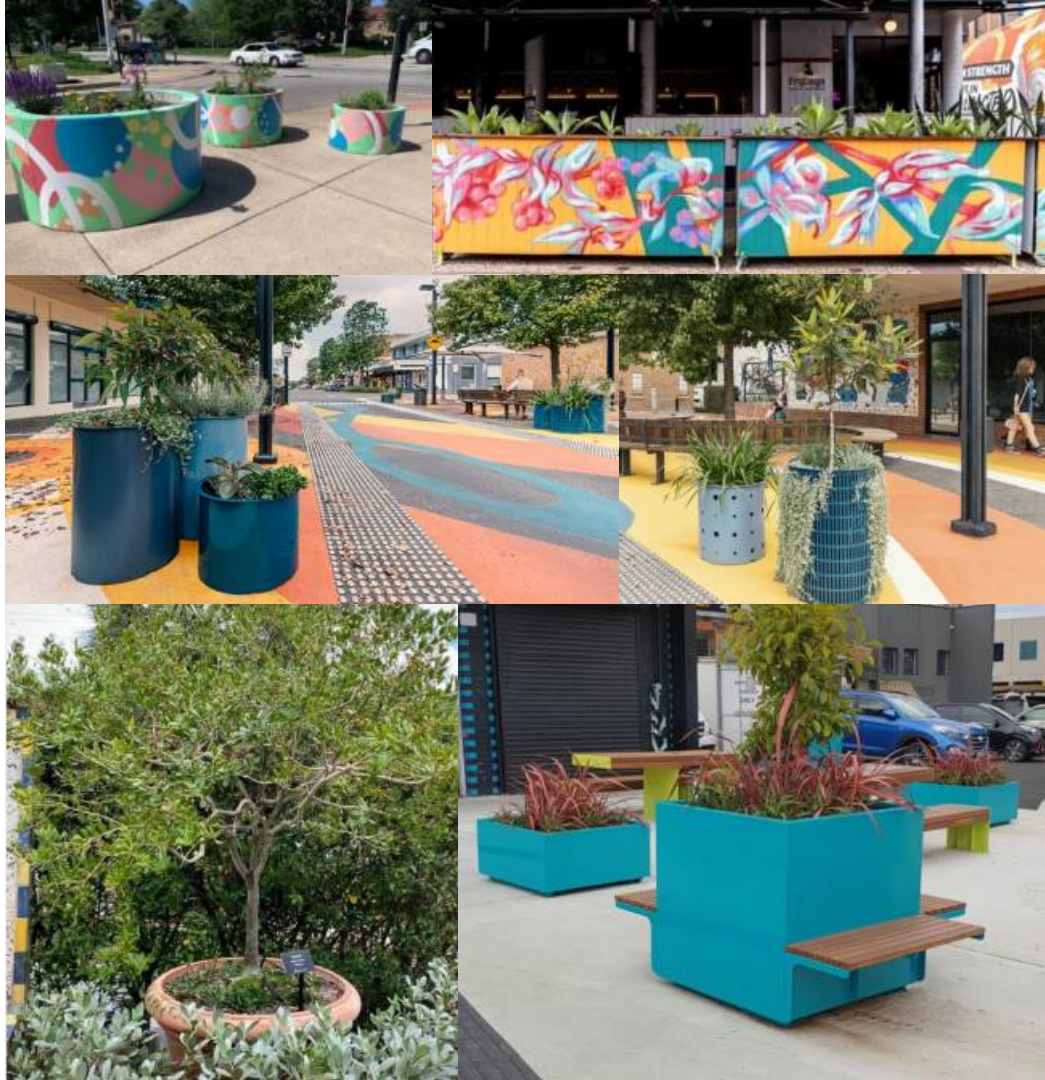
Scenario 4: Facing Nature Storm Surge Resilience

Benefits	Trade-offs
High Flood Protection Designed to withstand severe flood events, offering long-term resilience.	**Inactive and Vehicle-Oriented Street Edge** Parking at the front of parcels creates a disconnect between buildings and Pine Island Road, reducing walkability, visibility, and vibrancy at the street level.
Permanent, Durable Structures Elevated buildings provide safe investment opportunities for shops, cafés, and galleries with year-round use.	**Dispersed Parking Access** Individual driveways reduce land efficiency and may conflict with FDOT corridor management.
Private Circulation Autonomy Independent parking access per parcel simplifies development coordination and use control.	**Limited Public Realm Activation** Public areas beneath buildings are secondary and elevated, while the frontage remains dominated by large parking areas.
	Accessibility Considerations Elevated design demands reliable, inclusive vertical circulation (elevators, ramps, stairs), adding cost and space requirements.
	Visual Scale Impact Elevated structures (~10 ft) may alter the low-scale village aesthetic, without a detailed study to define design guidelines.
	Logistics Shared facilities can be challenging in terms of construction logistics.

GREEN INFRASTRUCTURE

Tactical Solutions: Planter Strategies

- Planters of various sizes serve multiple purposes:
  - Act as bollards to improve pedestrian safety and define vehicle spaces.
  - Combine modular planter-furniture units for seating and gathering.
  - Provide surfaces for murals or mosaics, celebrating Matlacha's local art culture.
- Can be permanent, movable, or temporary, allowing flexibility and adaptation over time.
- Enhance aesthetics and comfort, offering shade and resting areas for pedestrians.
- Use native, salt- and heat-tolerant plants to improve resilience and ecological value.



GREEN INFRASTRUCTURE

Bioretention Planters

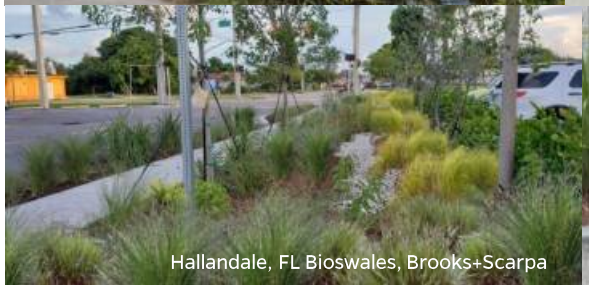
- Manage stormwater in small drainage areas with high water tables, common in coastal communities.
- Flexible retrofit systems, ranging from simple rain gardens to engineered detention planters that blend green and gray infrastructure.
- Enhance aesthetics in developed areas such as streetscapes and parking lots.
- Provide habitat.
- Capture, store, and filter runoff, improving water quality and drainage performance.


Pahokee Marina Bioswale, 2HGO


Gulf Coast Bioswale


Pahokee Marina Bioswale, 2HGO


Bayfront Park Sarasota Rain Garden


Hallandale, FL Bioswales, Brooks+Scarpa


Cape Canaveral Bioswale 2024, FL Sea Grant

GREEN INFRASTRUCTURE

Nature Based Shoreline Solutions

"A shoreline management practice that provides erosion control benefits; protects, restores, or enhances natural shoreline habitat; and maintains coastal processes through the strategic placement of plants, stone, sand fill, and other structural organic materials" - NOAA

- Enhance water quality, provide habitat, increase biodiversity, and support recreation.
- Vegetation traps sediment, reducing erosion and allowing shorelines to build elevation as sea levels rise.
- Mangroves, oyster reefs, and marshes absorb wave energy and buffer against storm impacts.
- Retrofit opportunities for existing gray infrastructure such as traditional seawalls.
- Cost-effective and can be implemented through community partnerships and volunteer planting programs.



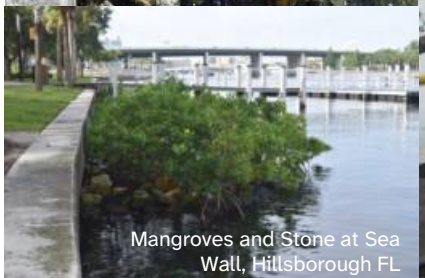
Mangroves and stone at Sea Wall Tampa Bay, Victoria Parsons / Bay Soundings



Brittany Bay Living Shoreline, Miami



Living Seawalls, Reef Design Lab



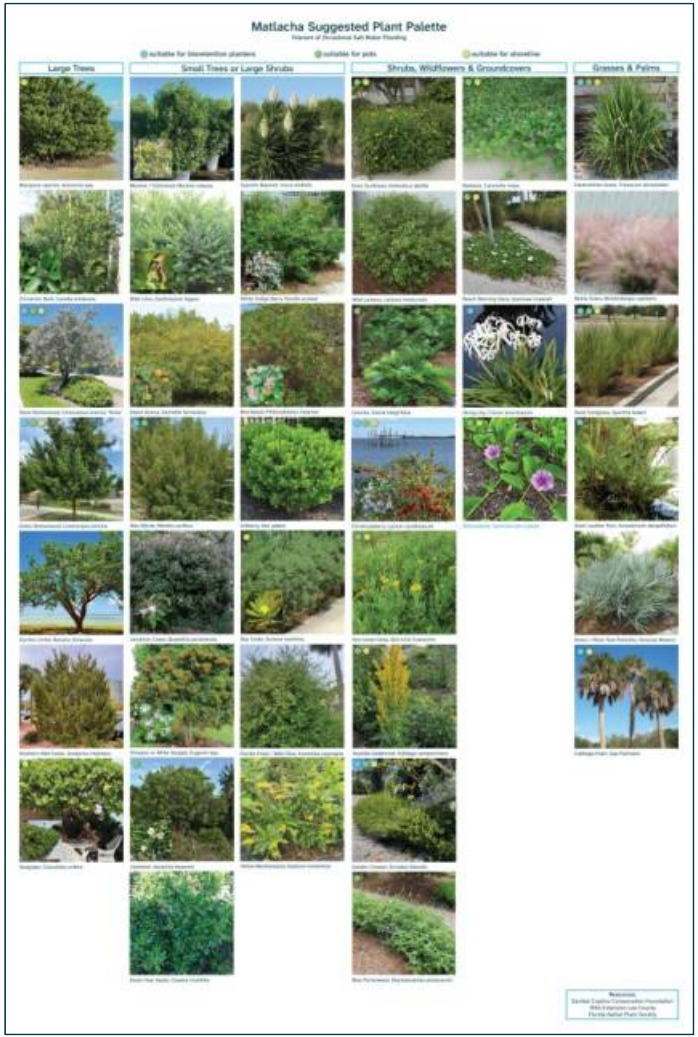
Mangroves and Stone at Sea Wall, Hillsborough FL



Brittany Bay Living Shoreline: Volunteer Plantings

Matlacha Resilient Plant Palette

- Salt-tolerant, native plant species suitable for Matlacha
- Preliminary identification of plants suitable for:
  - Bioretention planters
  - Pots
  - Shorelines
- Resources: Sanibel-Captiva Conservation Foundation, IFAS Extension Lee County, Florida Native Plant Society
- These are generally salt-tolerant, resilient species, but further identification of plants (right plant, right place) is needed



Existing Policy Frameworks

Lee Plan

Land Use and Community Character

OBJECTIVE 24.4: COMMERCIAL LAND USES.
POLICY 24.4.3: The County will provide specific architectural and site design standards for Greater Pine Island in the LDC. These standards must: promote but not mandate rehabilitation over demolition; address the size and scale of building mass in relation to the built and natural environment; establish community-specific architectural standards in support of Greater Pine Island's coastal rural character; preserve mature trees wherever possible; encourage the location of off-street parking to the side and rear of buildings to preserve viewsheds along public roadways; require large windows and forbid most blank walls; and encourage metal roofs and other features of traditional "Old Florida" styles. The new commercial design standards will reflect the different characteristics of Bokeelia, Pineland, Matlacha, and St. James City. Deviations from these standards may not be granted unless the request meets the County approval criteria for variances set forth in the LDC, Chapter 34. (Ord. No. 03-03, 16-07, 18-18)

Lee Plan

Transportation and Mobility

OBJECTIVE 24.2: ROAD IMPROVEMENTS.

POLICY 24.2.5: Lee County will continue to evaluate pedestrian safety and circulation, and will seek to minimize pedestrian-vehicular conflicts within the Matlacha Historic District. (Ord. No. 16-07, 18-18)

POLICY 24.2.6: Lee County will assess the benefits of expanding mass transit services to Greater Pine Island to minimize the number of vehicular trips through Matlacha, and will encourage projects to accommodate bus stops, multi-modal opportunities, ride share lots, water taxis, and/or pedestrian connectivity. (Ord. No. 16-07, 18-18)

Lee Plan

Resilience & Environmental Protection

OBJECTIVE 122.2: ESTUARINE WATERSHED MANAGEMENT PLANS.
POLICY 122.2.2: Apply key action plans, objectives and policies from the Comprehensive Conservation and Management Plan for the Greater Charlotte Harbor Watershed that relate to Pine Island Sound, Matlacha Pass, the Estero Bay, the tidal Caloosahatchee and attendant watersheds, including upland and coastal development practices and public land acquisition programs. Particular emphasis will be placed on evaluating the effectiveness and improvement of County watershed programs as they relate to watershed conservation and public land acquisition programs, watershed management needs prioritization and water quality monitoring. (Ord. No. 00-22, 18-28)

Lee Plan

Green Infrastructure

OBJECTIVE 61.2: MIMICKING THE FUNCTIONS OF NATURAL SYSTEM.
Support a surface water management strategy that relies on natural features (flow-ways, sloughs, strands, etc.) and natural systems to receive and otherwise manage storm and surface water (Ord. No. 18-28).

POLICY 61.2.4. Encourage surface water management plans that mimic the functions of natural systems (Ord. No. 18-28).

GOAL 101: COASTAL AREAS. Protect human life along with current and future development from the impacts of coastal flooding. Coastal flooding includes, but is not limited to, high tide events, storm surge, flash floods, stormwater runoff, and impacts of sea level rise (Ord. No. 94-30, 18-28).

OBJECTIVE 101.1: COASTAL AREA PLANNING. Improve the function of natural systems as a defense against coastal flooding (Ord. No. 94-30, 00-22, 18-28).

OBJECTIVE 101.4: SHORELINE STABILIZING SYSTEMS. Encourage the construction of environmentally compatible shoreline stabilizing systems where stabilizing systems are needed (Ord. No. 00-22, 18-28).

POLICY 101.4.3. Encourage the planting of mangroves or placement of rip-rap in artificial and natural canal systems to replace existing seawalls in need of repair (Ord. No. 00-22, 18-28).

Historic Preservation

Current parameters:

- Matlacha's Historic District prioritizes maintaining the traditional patterns of **height, building scale, street alignment, and spacing between structures.**
- No conditions for building elevation are determined, but currently, it is allowed.

Recommendations:

- The proposed scenarios integrate the existing development patterns, such as street alignment and building mass. However, it is necessary to create design guidelines for new buildings in the district. These guidelines should:
    - Define clear parameters about buildable area (using the right of way edge as a unique datum)
    - Establish maximum allowable heights and rules for elevation transitions.
    - Specify building spacing that aligns with the existing streetscape rhythm.
    - Parameters for shared infrastructure, such as elevated walkways, drainage elements, and parking areas, to ensure that the new development reinforces the spatial qualities of the historic district.

Discussion and Next Steps