COASTAL AREA ACTION PLAN

CITY OF TAMPA

ADAPTATION STRATEGIES

COASTAL AREA ACTION PLAN

CITY OF TAMPA

PLUSURBIA DESIGN
WITH BENESCH
WWW.PLUSURBIA.COM

JUNE 2023

PREPARED FOR
The City of Tampa

PROJECT TEAM

PLUSURBIA
Juan Mullerat
Maria Bendfeldt
Manuel De Lemos
Cristina M. Parrilla
David Soto
Patricia Fábregas Pérez
Marcos Ortiz
Camila Zablah

BENESCH
Catherine Hartley
Demian Miller
Lauren O'Neill
Richard Wilson

CITY OF TAMPA
Miguel Aguila
Stephen Benson
Frank Hall
Matthew Pleasant

STAKEHOLDERS:
We want to acknowledge all the stakeholders who provided their invaluable input in order to create this report.

Content

Introduction

CITY OF TAMPA COASTAL ACTION PLAN

Coastal resiliency in low lying areas is an increasingly important issue as sea levels rise and weather patterns become more unpredictable. The low-lying coastal regions in the City of Tampa are home to a variety of human, animal, and natural habitats that are especially vulnerable to the effects of climate change. The inhabitants of these areas must face the challenge of protecting their homes, communities, and livelihoods from the impacts of natural disasters.

To help meet this challenge, the City of Tampa is developing Coastal Area Action Plans for Palmetto Beach and neighborhoods south of Gandy Boulevard, including Port Tampa, Gandy Civic, Interbay, and Ballast Point. These communities are within Hurricane Evacuation Zones A and B and face a high risk from the impacts of sea level rise and storm surge. This report summarizes public input received during community workshops held in December 2022, during which residents of each neighborhood provided feedback on resiliency strategies and conducted SWOT (Strengths, Weaknesses, Opportunities, Threats) analyses.

Coastal resiliency can be achieved through a variety of approaches, including engineering projects, improved building standards, public education and outreach, and more sustainable land-use practices.

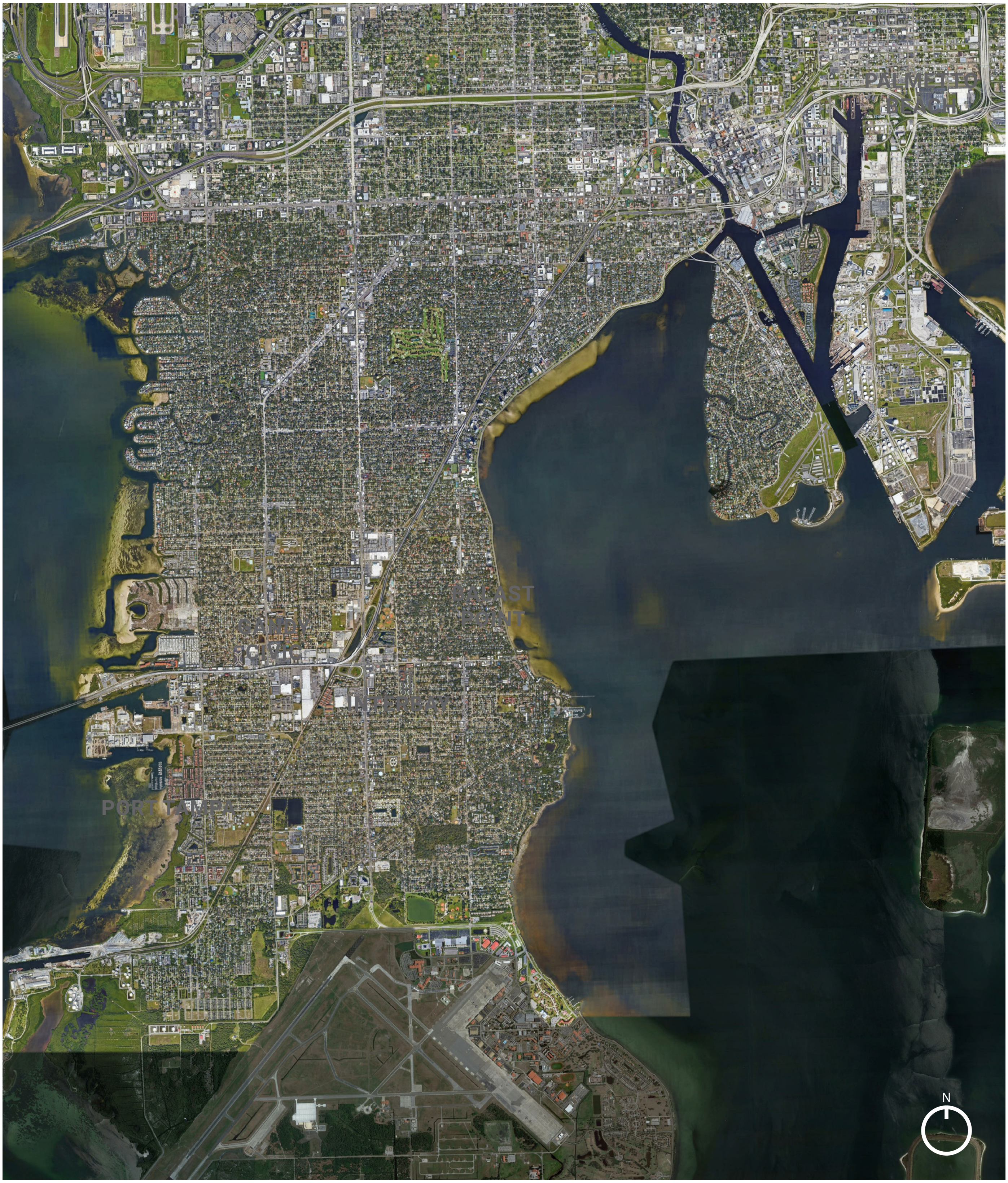
By utilizing a variety of strategies, coastal communities can become more resilient in the face of climate change. The following are the types of strategies identified in the Florida Adaptation Planning Guidebook published in 2018:

01 Protection. Protection strategies are structurally defensive measures that directly protect vulnerable structures, allowing them to be left largely unaltered. These involve both hard and soft (or “gray” and “green”) structurally defensive measures to mitigate impacts of rising seas while leaving the vulnerable structures behind these measures largely unaltered. Examples include seawalls (hard/gray), levees (hard/grey) and living shorelines (soft/green).

02 Accommodation. Accommodation strategies alter the physical design of vulnerable structures to allow the structure or land use to stay in place with modification. Examples include raising structures, floodable development and increasing stormwater storage.

03 Retreat or Managed Relocation. Retreat from areas or infrastructure where protection or accommodation will not be efficient or effective can be voluntary, incentivized, or done gradually. It can also involve new building designs in vulnerable areas being altered or moved when appropriate in the future. Home buyout programs, rolling easements, and land swaps are a few possible mechanisms that communities can investigate in order to implement managed retreat.

04 Avoidance. Avoidance involves guiding new development away from areas that are subject to coastal hazards and can be done by implementing policy/or offering of incentives. City and county land development regulations and codes, as well as zoning regulations, can be used to direct development and redevelopment to more suitable areas where flooding and erosion are less troublesome. Examples include Transfer of Development Rights (TDR) or policies prohibiting net density increases in the Coastal High Hazard Areas (CHHA).



Maps 01. City of Tampa Coastal Area Action Plan Study Area Aerial Map (Source: Google Earth)

Coastal Planning Maps

COASTAL HIGH HAZARD AREA MAPS

The following maps document the recent changes in designations and sea level rise projections related to coastal management in the South of Gandy and Palmetto Beach neighborhoods. Floodplain area with a 0.2% (or 1 in 500 chance) or less annual chance of flooding. Includes areas of moderate flood hazard, such as base floodplains and shallow flooding areas, and minimal flood hazard, which may still have ponding and local drainage problems.

Maps 02-05 contrast the 2016 Coastal High Hazard Area (CHHA) to the most recent boundaries for the CHHA released in 2021. Both neighborhoods' CHHA's are larger in area than previously mapped, due in part to more accurate LIDAR mapping completed for the Federal Emergency Management Agency and partially funded by the State of Florida. This increase in the CHHA is relevant to coastal planning policy, as Florida Statutes regulate land use, density, and intensity decision-making for areas within the CHHA.

Maps 02. South of Gandy 2016 High Hazard Area. (Source: Benesch).

Maps 03. South of Gandy 2021 High Hazard Area. (Source: Benesch).

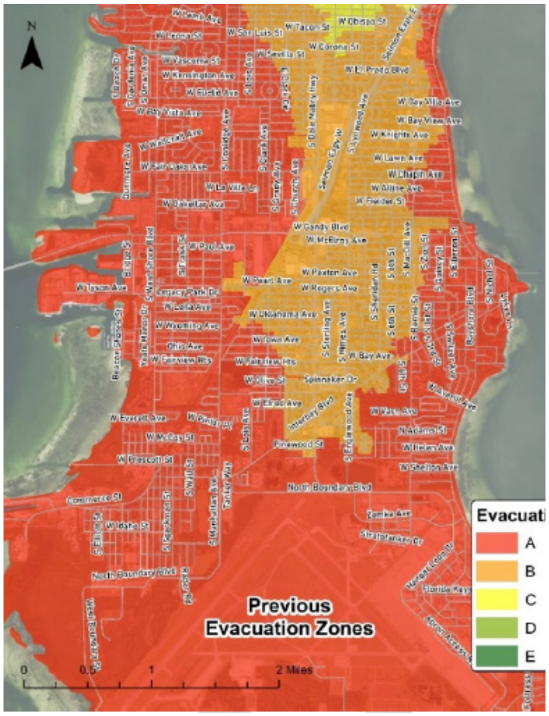
Maps 04. Palmetto Beach 2016 High Hazard Area. (Source: Benesch).

Maps 05. Palmetto Beach 2021 High Hazard Area. (Source: Benesch).

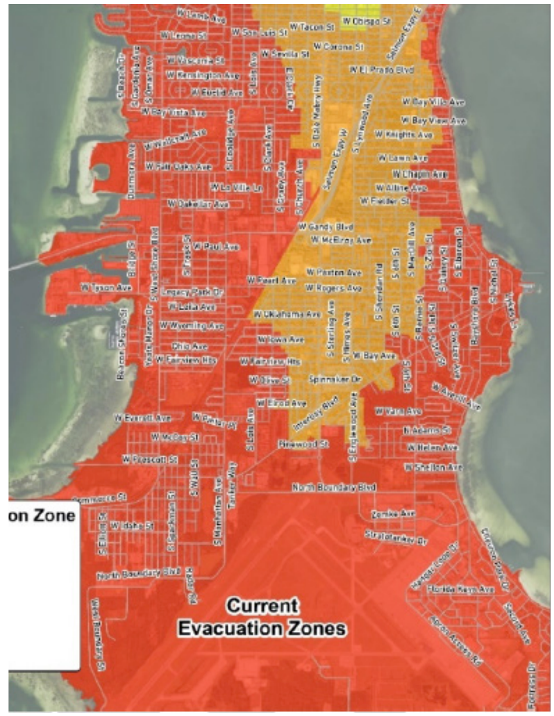
Coastal Planning Maps

EVACUATION ZONES MAPS

Maps 06-09 depict the change in evacuation zones between 2017 and 2022. The area south of Gandy Boulevard saw a small increase in the Evacuation Zone A, while Palmetto Beach's evacuation zone remains unchanged; the neighborhood is located entirely in Zone A.

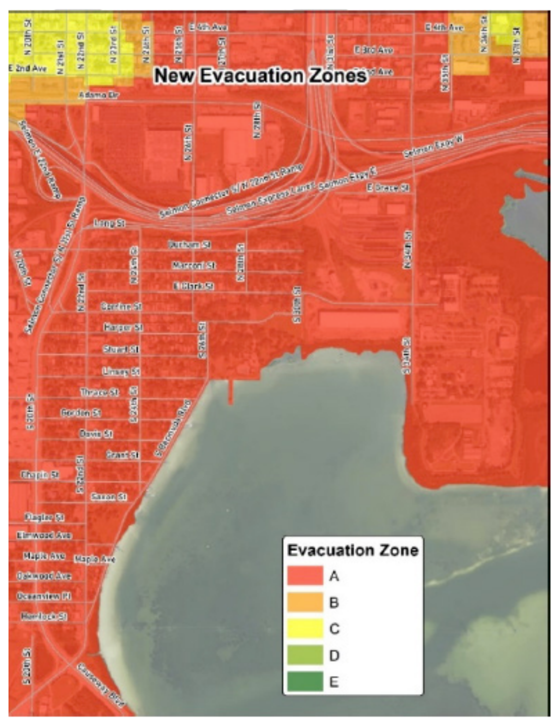


Maps 06. South of Gandy 2016 High Hazard Area. (Source: Benesch).



Maps 08. South of Gandy 2021 High Hazard Area. (Source: Benesch).

Maps 07. Palmetto Beach 2016 High Hazard Area. (Source: Benesch).



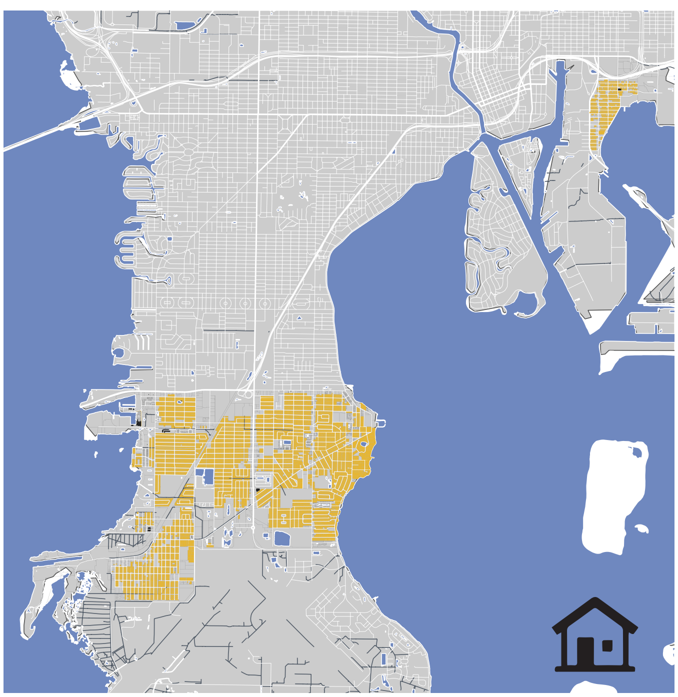
Maps 09. Palmetto Beach 2021 High Hazard Area. (Source: Benesch).

Study Area Building Types

DETACHED SINGLE AND TWO-FAMILY RESIDENTIAL

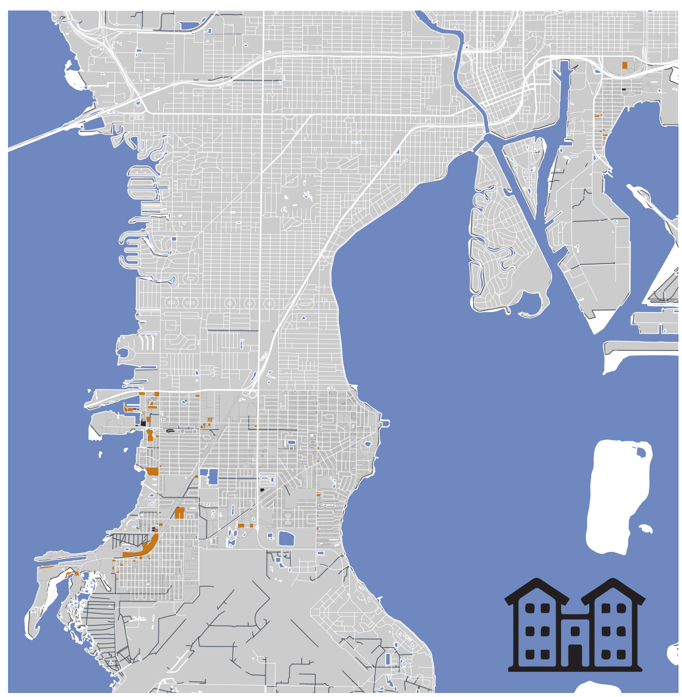




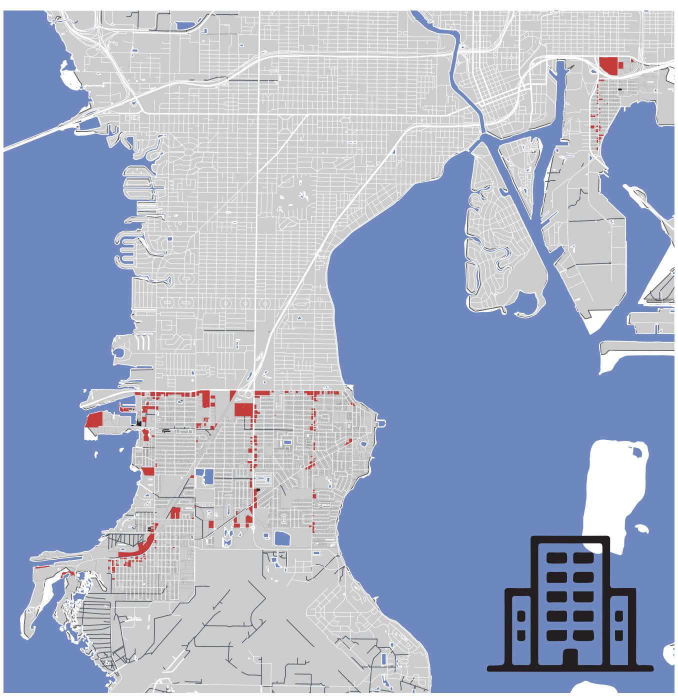


ATTACHED TOWNHOUSES AND MULTI- FAMILY RESIDENTIAL

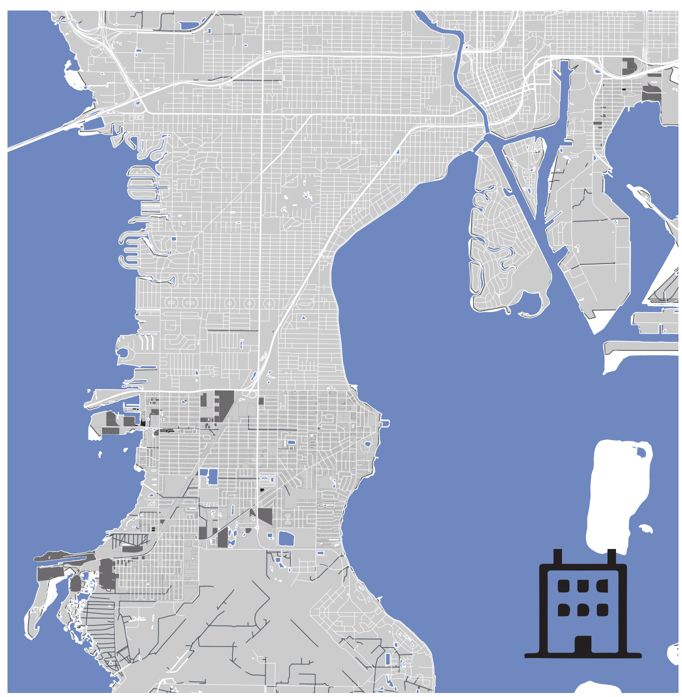


COMMERCIAL AND MIXED USE BUILDINGS



INDUSTRIAL BUILDINGS



Accommodation Strategies

Accommodation strategies alter the physical design of vulnerable structures or uses to allow the structure or land use to stay in place with modification.

These strategies are meant to provide a resource to help Tampa's property owners and developers make informed, forward-looking decisions about flood protections for existing buildings and new construction. These strategies are guided by the following principles:

- They should be innovating strategies that draw on best design practices that also respond to the unique conditions of Tampa's building types.
- Building-scale resilience solutions should contribute to an overall enhancement of the public realm.
- Accommodation strategies should play a beneficial role in the overall building sustainability such as enhancing surrounding landscapes, and improving stormwater management and energy efficiency.
- Building upgrades should, wherever possible, relate to adjacent district-scale flood prevention infrastructure investments.

Crafting accommodation strategies for the current building stock requires understanding the range of building types in the study area and how they are distributed. The most prevalent building types identified in the study area, shown on the previous page, include detached single and two family residential, attached townhouses and multifamily residential, commercial and mixed-use buildings and industrial buildings. This section describes accommodation strategies and what building types these can be applied to. These strategies can already be found in different parts of the City and the study area.

Building attributes such as material configuration, construction type, lot condition, and size and form are important factors when considering resilient strategies.

Increasing the freeboard of a building is an essential strategy for improving its resilience in coastal areas. Freeboard is the vertical distance between the Base Flood Elevation (BFE) to the elevation of a structure. By increasing a building's freeboard, it can withstand greater amounts of flooding or other environmental impacts caused by rising sea levels and storms. The City's current freeboard of 1 foot might not be enough to overcome the 2080 sea level rise projections for the study areas.

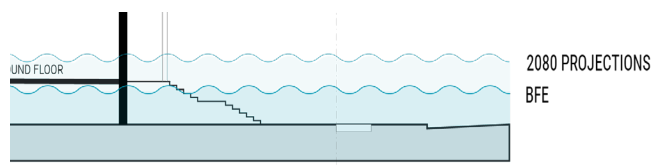
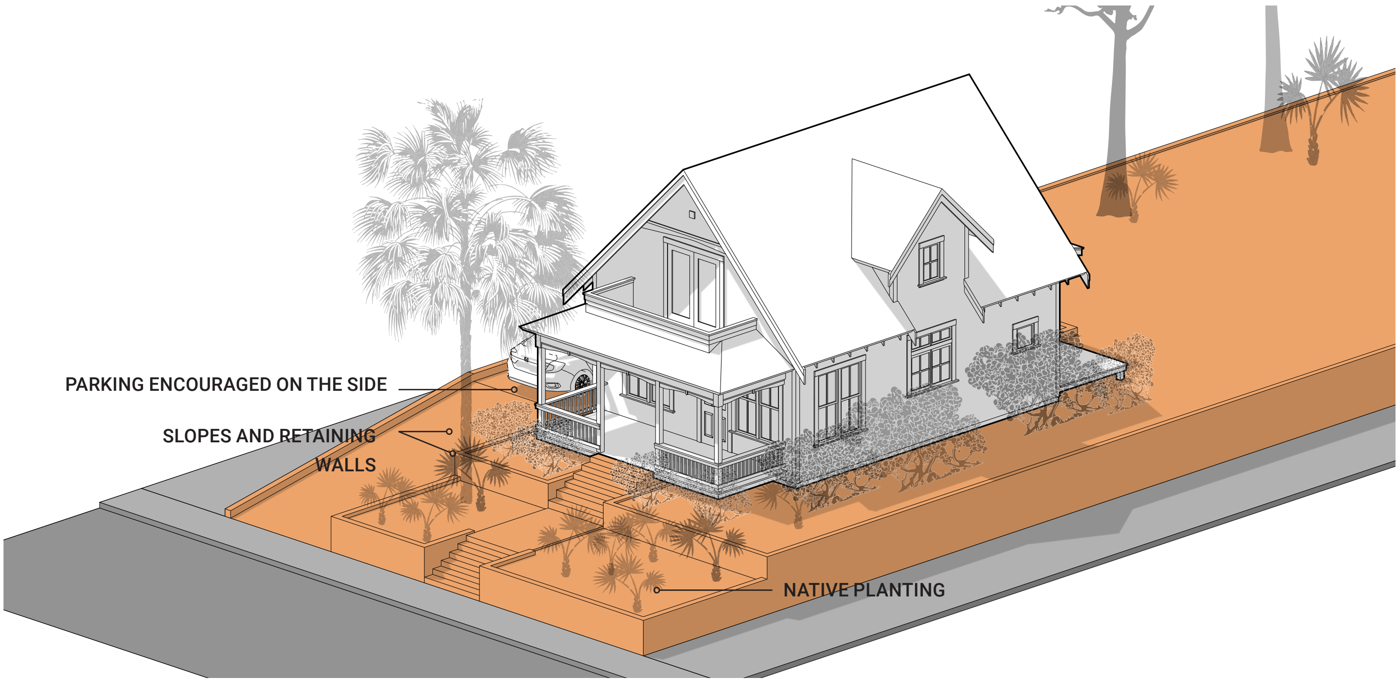


Image 01. A house is surrounded by flooding waters. (Source: ctpost.com).

Image 02. View of downtown from Ballast Point Park. (Source: Plusurbia).

Elevate on Fill

RESILIENT STRATEGY



APPLICABLE IN:

Elevating a house on fill is a resilient design strategy that involves bringing land to the property to meet FEMA's minimum elevation requirements. However, this solution requires on-site stormwater management and addressing the elevated site's impact on the public realm. Additionally, masking the uneven land form with lush landscaping and retaining walls can help avoid an unattractive appearance from the street.

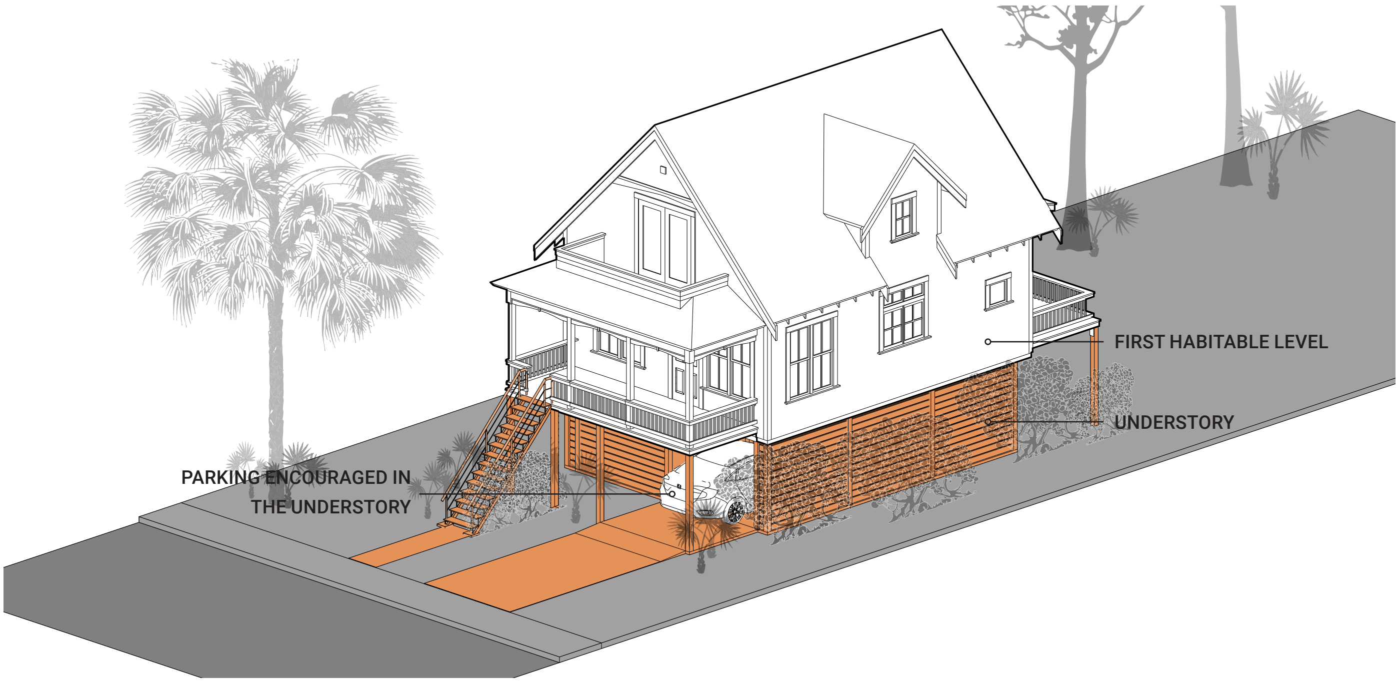
It is important to note that FEMA discourages this strategy in Coastal A and V Zones.

ELEVATE ON FILL - CONSIDERATIONS TABLE

	Considerations
Setbacks	• Existing average of 20-25 setback for most RS zoning districts are usually sufficient to allow for the vertical transitions to happen. The zoning code will need to be reviewed to allow for access to be built within the setback.
Stormwater Management	• Proper design of fill, slopes, and retaining walls is necessary to manage stormwater on-site using mechanisms such as drain ditches and retaining walls. • For waterfront locations, elevating a site on structural fill is highly recommended; this will prevent flooding from reaching other properties or public rights of way landward of the site. Raising an entire waterfront site offers better support for incremental implementation of district-scale coastal flood protection than raising only a portion of a site around a building.
Vertical Transitions	• Elevation of a building on fill should try to create a positive co-benefit of creating or preserving open space in the form of fill slope or terraces with vegetation and other public amenities. • Fill may be graded to slope up from adjacent grade or be held in place by retaining walls taking into account on-site stormwater management.
Screening	N/A
Parking	• Parking may slope up to fill level or remain at grade. • Parking is encouraged on the side setback (may need to increase the setback allowed on one side. • It is recommended for the parking surface to be of permeable materials such as gravel or permeable pavers to avoid runoff into the street.
Planting	• Native planting is encouraged on the front setback to enhance the slope or retaining walls and support stormwater management. • This strategy is ideal for larger waterfront sites, as it can incorporate landscape features on the waterfront for protection against storm surge. Living shorelines are an example of such features that provide additional protection. (Consider an incentive for reduced building footprint and additional floor (%), to mitigate "lost views" argument.)
Building Height	• Maximum building height should be measured from DFE + Freeboard.
Accessibility	• Provide safe and accessible ways for people with mobility impairments to access the house.
Structure	• Buildings and sites elevated on fill must be designed to structurally resist site-specific design flood loads, be geothecnical stable, and be protected from scour and erosion. • Building materials below DFE should be resistant to water damage.

Elevate on Open Foundation

RESILIENT STRATEGY



APPLICABLE IN:

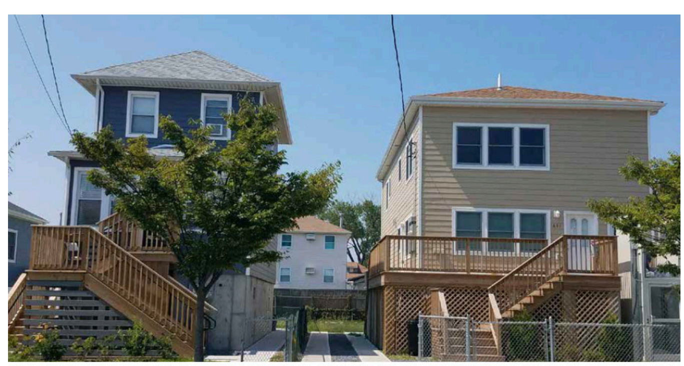
Constructing on open foundation is a resilient design strategy that provides the most protection for the habitable spaces and is already commonly used in the neighborhood.

Some structure can be elevated above the required Design Flood Elevation on an open foundation and provide an "understory" that can be used for parking or non-habitable uses. It is important to keep in mind that it does not include air-conditioned spaces that can flood (with some exceptions for stairs and access to the first floor).

Consider how the elevated houses address the street and how they enhance the urban environment and fit into the existing neighborhood's character and scale.

This strategy is appropriate for detached single and two family residential structures.

Elevation on open foundation is recommended in FEMA V Zones and Coastal A Zones.



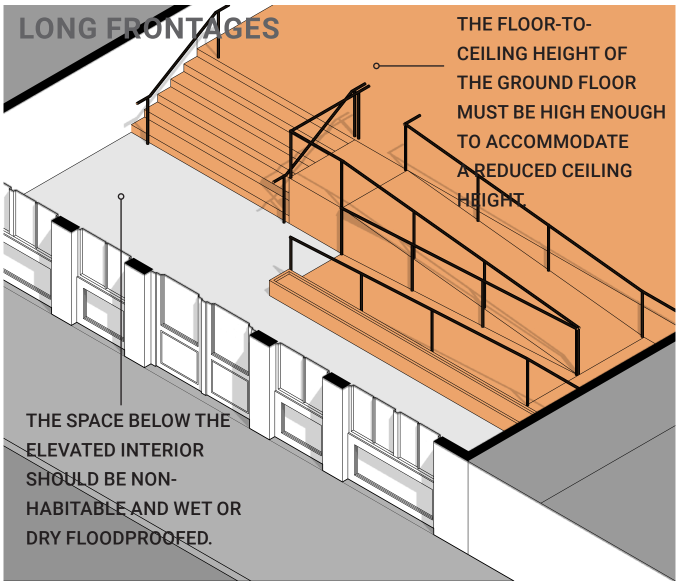
ELEVATE ON OPEN FOUNDATION - CONSIDERATIONS TABLE

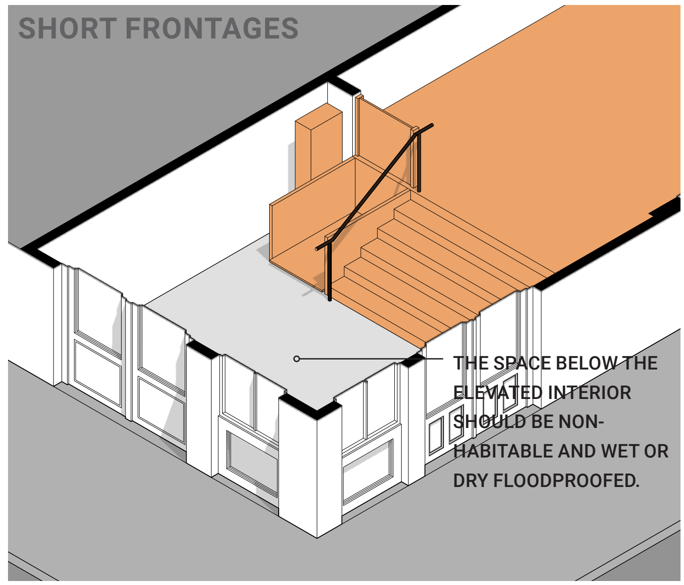
	Considerations
Setbacks	• Existing 20-25 setback for most RS zoning districts are sufficient to allow for the vertical transitions to happen. • For larger lots, increasing the side setback areas can discourage expanded building footprints and promote permeable spaces. An incentive program can also be implemented, offering an additional story (limited by percentage) in exchange for a smaller building footprint.
Stormwater Management	• Encourage understory ground floor to have permeable materials.
Vertical Transitions	• To ensure design integration, carefully consider access from grade to the lowest habitable level for both the building and public realm. • The front side of the structure facing the primary front with the open foundation level should utilize streetscape mitigation measures such as screening, plantings, and porches, stairs, and decks. • In zoning districts with shorter setback requirements, the vertical transition is encouraged to occur on the side setback.
Screening	• Consider strategies to mitigate for an unoccupied lower level through screening, planings, and front porch designs. • Screening the level below the first habitable level with resistant building materials are encouraged. • Matching the setback of the upper exterior walls is important to maintain a cohesive facade.
Planting	• Low scale plantings are encouraged within the setback to mask or screen the open foundation.
Parking	• Parking is encouraged to happen in the understory area with a maximum driveway width of 10 ft.
Building Height	• The minimum height for a usable understory should be 9 feet (The first habitable level may be higher than the required Design Flood Elevation) • Understory may only be utilized for non-airconditoned non-habitable uses. • The only area that can have air conditioning within the understory is the access to the first habitable level.
Accessibility	• Accessible ramps and elevators to the first habitable level are encouraged to happen within the understory.
Structure	• Elevated open pile, pier, or post foundations must structurally resist design flood loads that are specific to the site. • Geothecnical stability must be ensured, and protection from scour and erosion is necessary. • Enclosures under the lowest habitable floor must be free of obstructions. • Building materials beneath the DFE (design flood elevation) should be waterproof. • Front decks, stairs, and porches are encouraged to be built to structurally resist design flood loads or break-away without damaging the building or its foundation. Decks and porches should allow flooding to pass through them to prevent adverse effects on nearby structures.

Understory definition: Understory means the non-air-conditioned space(s) located below the first elevated habitable floor.

Elevate Non-Residential Interior Floor - Interior Transitions

RESILIENT STRATEGY





APPLICABLE IN:

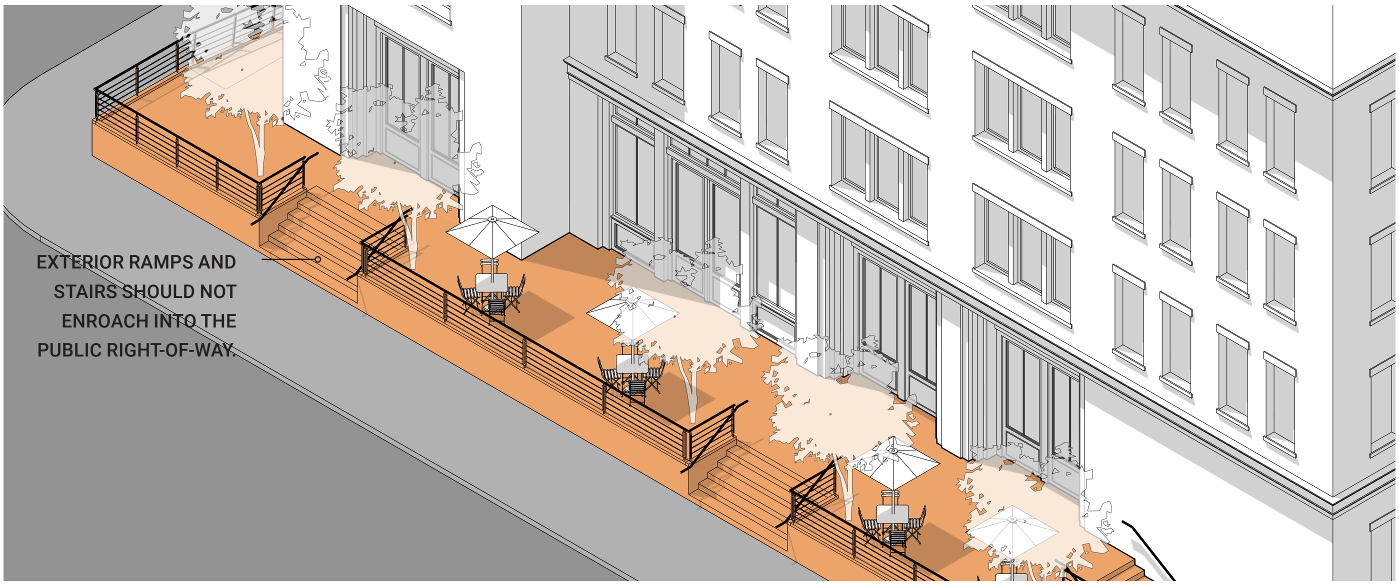
To enhance a mixed-use building's design, the ground floor can be elevated to meet flood regulations without limiting street views. Interior and exterior vertical transitions are both viable options for achieving this result.

ELEVATE NON-RESIDENTIAL INTERIOR FLOOR INTERIOR TRANSITIONS - CONSIDERATIONS TABLE

	Considerations
Setbacks	• This strategy is ideal for commercial corridors and areas of the city where the required setback for buildings is 0 ft-10 ft.
Stormwater Management	• Spaces below DFE must be floodproofed to resist flood-related loads on the structure. An engineer must approve and coordinate floodproofing efforts. • Wet floodproofing of entry areas allows water to enter and exit through vents in the wall or door, thus equalizing hydrostatic pressure. Flood damage-resistant materials should be used for wet floodproofed vestibules.
Vertical Transitions	• In new construction, elevate circulation areas above DFE to maintain visual connection at the sidewalk and an active streetscape. Visual connectivity between pedestrians and building interiors should not be disrupted. • Using this technique on existing historic structures maintains the front facade while enhancing the resilience of the structure. • In short frontage buildings, vertical transitions can occur inside and outside the building facade. • In large frontage buildings, vertical transitions should happen inside the building facade. • Provide a carefully designed interior circulation area that moderates an at-grade entry area with an elevated main floor.
Screening	N/A
Planting	N/A
Parking	N/A
Building Height	• The floor-to-ceiling height of the ground floor must be high enough to accommodate a reduced ceiling height. • The maximum building height should be measured from DFE+Freeboard.
Accessibility	• Short frontage buildings: Where ramps don't fit encourage elevators at the vestiblue. • Large frontage buildings: Encourage incorporating the ramps and the stairs together from the vestibule level.
Structure	• Spaces below DFE must be floodproofed to resist flood-related loads on the structure. An engineer must approve and coordinate floodproofing efforts. • Wet floodproofing of entry areas allows water to enter and exit through vents in the wall or door, thus equalizing hydrostatic pressure. Flood damage-resistant materials should be used for wet floodproofed vestibules.
Public Realm Considerations	• This strategy makes non-residential first floor spaces more resilient while defining the urban spaces and maintaining an active streetscape.

Elevate Non-Residential Interior Floor - Exterior Transitions

RESILIENT STRATEGY



APPLICABLE IN:

Another strategy for mixed use buildings ground levels is to build the ground floor at the required Design Flood Elevation and incorporate the vertical transitions inside the building envelope so that the street frontage is not compromised. This vertical transition can also happen outside, inside, or a combination of both.

ELEVATE NON-RESIDENTIAL INTERIOR FLOOR EXTERIOR TRANSITIONS - CONSIDERATIONS TABLE

	Considerations
Setbacks	• This strategy is encouraged where the required setback is larger and allows for vertical transitions to happen outside of the building envelope while still defining the urban spaces and maintaining an active streetscape.
Stormwater Management	• The incorporation of vegetated areas within the stairs and ramps provides additional opportunities for stormwater and temperature mitigation.
Vertical Transitions	• Consider the public realm when elevating a building's first floor. • Exterior ramps and stairs may not encroach into the public right-of-way.
Screening	N/A
Planting	• Use design elements like planted areas, seating, lighting, and materials that match the context to create visual interest, give the neighborhood character, and break up larger surfaces. • Saltwater tolerant plants can be added to edges and railings on stairs and ramps, enhancing the sidewalk's visual interest and softening the look of pavement.
Parking	N/A
Building Height	• The maximum building height should be measured from DFE+Freeboard.
Accessibility	• Exterior vertical circulation elements should prioritize accessibility and universal design. • Sideways or ramps in the back may be considered in case a front ramp is not possible.
Structure	• Stairs, ramps, and walkways must be designed to structurally resist design flood loads.
Public Realm Considerations	• Encourage creation of informal gathering areas that blend seamlessly into stairs and ramps. • Walkways that lie before restaurants or retail spaces benefit from added seating, creating lively streetscapes.

Dry Floodproofing

RESILIENT STRATEGY

APPLICABLE IN:

A short-term measure that can complement other options is to make a non-residential ground floor flood-proof. This entails installing barriers to block floodwaters from entering commercial spaces on the ground level during a flood event. It's worth noting, however, that this strategy is ineffective in areas prone to high-velocity wave-action because it doesn't provide protection against such action.

DRY FLOODPROOF - CONSIDERATIONS TABLE

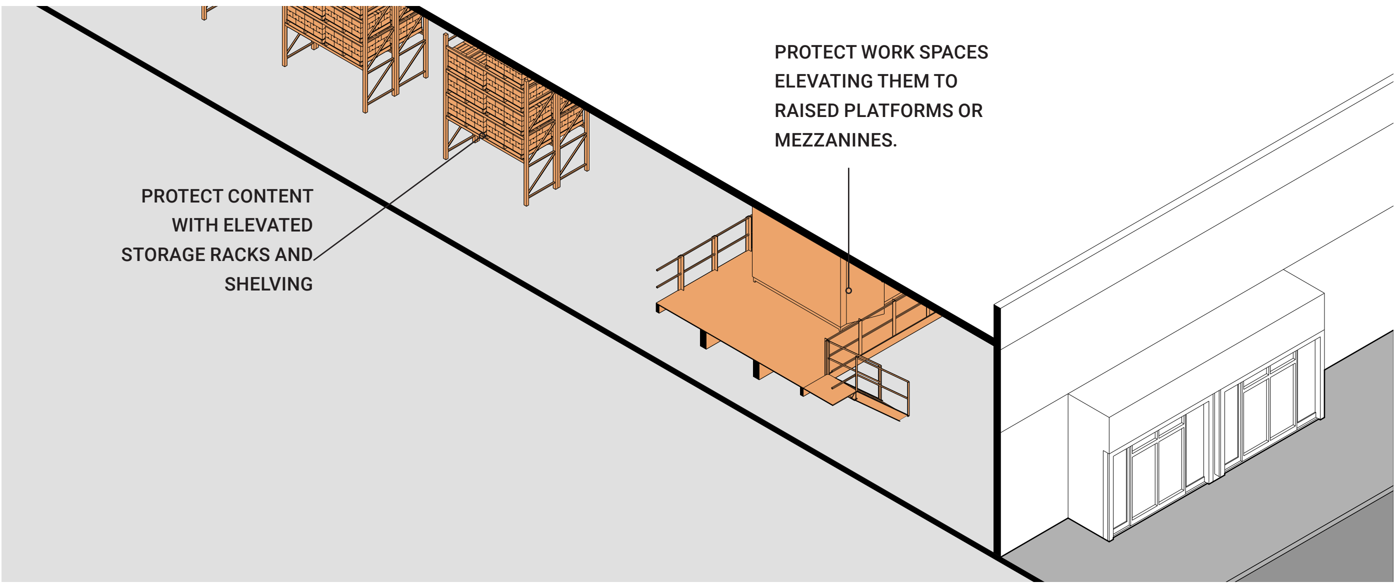
	Considerations
Setbacks	• This strategy is applicable in any setback condition since it requires only a few inches for the structure of the flood barriers.
Stormwater Management	• Encourage permeable pavers on the sidewalk. • The incorporation of vegetated areas within the sidewalk provides additional opportunities for stormwater and temperature mitigation.
Vertical Transitions	N/A
Screening	N/A
Planting	• Saltwater tolerant plants can be added to landscaped areas, enhancing the sidewalk's visual interest and softening the look of pavement.
Parking	• Flood barriers can be used for parking areas, access and storage.
Building Height	N/A
Accessibility	• Flood barriers should not obstruct a means of escape. There must be at least one door complying with egress requirements for emergency evacuation above applicable flood elevation.

Structure	• Watertight enclosures for openings, doors, windows, and floors, including shields and barriers, often require human intervention prior to a storm event.
	• These enclosures should also be supported by components such as:
	  • Membranes and sealants to reduce seepage of floodwater through walls and utility conduits.
	  • Structural reinforcement to wall assemblies so they can resist hydrostatic pressure, flotation or collapse.
	  • Pumping and drainage systems with backup power to control water intrusion.
	  • Backflow or check valves to prevent the entrance of water or waste through plumbing systems.
	  • Flood doors and egress requirements.

Public Realm Considerations	• Dry floodproofing can allow for active uses such as retail to remain on the ground floor for a building. • Careful consideration to best integrate any permanent element such as the mounting and brackets for shields and barriers.

Wet Floodproofing

RESILIENT STRATEGY



APPLICABLE IN:

Wetproofing is another strategy that involves floodproofing the ground level of a building up to the required elevation. Anything up to that level must be built with materials that can get wet without significant damage. The term "wet" refers to the use of impermeable membranes or materials to prevent water from penetrating the building structure.

WET FLOODPROOF - CONSIDERATIONS TABLE

	Considerations
Setbacks	• This strategy is applicable in any setback condition in industrial areas.
Stormwater Management	• Encourage permeable pavers on the sidewalk. • The incorporation of vegetated areas within the sidewalk provides additional opportunities for stormwater and temperature mitigation.
Vertical Transitions	N/A
Screening	N/A
Planting	• Saltwater tolerant plants can be added to landscaped areas enhancing the sidewalk's visual interest and softening the look of pavement.
Parking	N/A
Building Height	N/A
Accessibility	• Provide safe and accessible ways for people with mobility impairments to access the structure.

Structure	• Flood openings are necessary to maintain equal water levels both inside and outside the building, thus avoiding structural damage from hydrostatic pressure, buoyancy, or uplift forces.
	• Wet floodproofing involves:
	  • Installing flood-resistant materials below flood elevation to minimize damage
	  • Protecting service equipment to prevent flood damage
	  • Relocating high-value contents

Public Realm Considerations	If combined with providing interior circulation to raised interior, a wet floodproofed lobby or access area can maintain an at-grade connection between sidewalk and building entry.

Supporting Strategies

RESILIENT STRATEGY

Managing stormwater runoff is essential in preventing water quality degradation, flash floods, and flooding, especially in residential and urban landscapes.

Conservation measures like capturing and infiltrating stormwater have proved effective in reducing the impact of runoff. By employing these supporting strategies, communities can benefit from systems that prevent water from building up on streets, consequently reducing soil and pollutant discharge into waterways.

Protecting critical systems in flood-prone areas is crucial to ensure the safety and functioning of vital infrastructures such as power plants, hospitals, and transportation systems. Floods can cause significant damage to equipment and facilities, disrupt services, and even cause casualties. The economic impact of flood damage can be staggering, with billions of dollars lost annually. Implementing effective flood protection measures can help minimize these impacts and ensure the continuity of essential services. Measures such as elevated or flood-resistant buildings, and strengthen evacuation routes can help mitigate the risks of flooding. It is important for governments, businesses, and communities to work together to protect critical systems in flood-prone areas to reduce the potential for damage and protect the safety and well-being of citizens.

The use of flood damage-resistant materials is particularly important for the long-term protection of properties in flood-prone areas. When these materials are used during the construction of a building, they ensure that the structure can withstand floods and provide more extended service life. Compared to the conventional materials, flood damage-resistant materials can resist damages caused by floodwaters, such as water infiltration, mold growth, and rusting of metal components. Moreover, these materials have high durability and require minimal maintenance. Not only does this ensure that the building lasts longer, but it also helps to reduce the costs associated with regular repairs and replacements due to flood damage, which can be exorbitant. Using flood damage-resistant materials is a cost-effective solution to reduce the impact of floods in flood-prone areas.

BIOSWALES

Bioswales are an alternative to buried storm sewer pipes. They're cost-effective to install, and they provide water quality benefits that conventional storm sewers cannot. Bioswales are designed to infiltrate frequent small rainy runoffs and convey large runoffs to receiving streams. They have a perforated subdrain, strategically spaced berms, and a sandy soil mix to facilitate infiltration.

Bioswales can infiltrate up to 80-85% of runoffs, which significantly reduces the delivery of pollutants to receiving streams. Additionally, bioswales can reduce stream corridor erosion, which is a major source of sediment in surface waters.

RAIN GARDENS

Rain gardens are installed using natural soils that allow filtering and infiltration of water at acceptable rates. Although they look the same as biocells from above the ground, below ground, they have a unique natural and healthy soil profile that promotes smooth flow of water.

The presence of rain gardens helps to reduce the runoff volume and breakdown pollutants, ultimately minimizing negative environmental impact. Notably, rain gardens are cost-effective due to superior soil quality, thus requiring less labor and materials for installation.

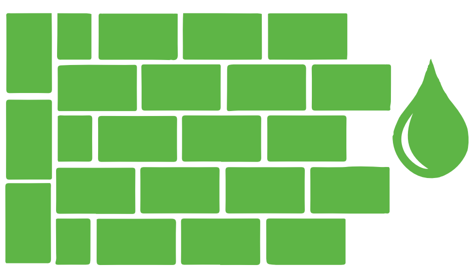
RETENTION PONDS

A retention pond (or wet detention basin) is a man-made waterbody designed to capture and store extra stormwater temporarily. Its initial design was to mitigate flooding but a multi-stage outlet can enhance water quality too. As stormwater enters the forebay, sediment settles before moving to the main pool.

Wetland plants within the pond can extract excess nutrients and pollutants before slowly releasing the clean water layer through a series of stoplogs and orifices during storm events. Inclusion of trails, fishing piers, and walking paths can make these ponds a recreational hotspot with supported wildlife and extended habitat in parks or open spaces.

Supporting Strategies Cont.

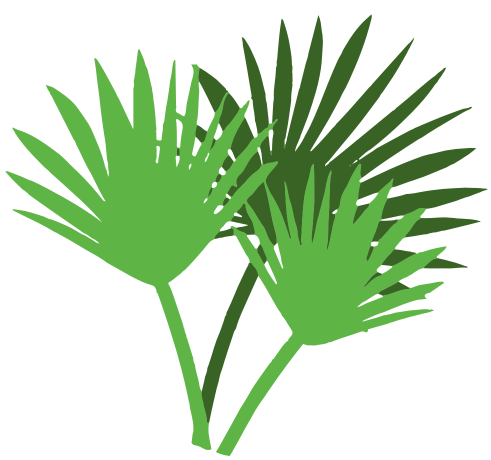
RESILIENT STRATEGY



PERMEABLE PAVING

Permeable pavers allow water to percolate through gaps into a rock chamber beneath, promoting ground water recharge, pollutant filtration, and water cooling.

Most impervious surfaces come from transportation related surfaces such as streets, parking lots and driveways, generating a large volume of stormwater runoff. Substituting traditional paved surfaces with permeable pavers reduces the volume of runoff and minimizes the delivery of pollutants through storm sewers to streams. This improves water quality by reducing flashy flows in receiving streams.



INCREASE THE USE OF NATIVE LANDSCAPING

Native plants are well-adapted to Florida's climate and soil conditions, making them more resilient to extreme weather events such as heavy rainfall and flooding. They have deep root systems that can absorb large amounts of water, reducing runoff and the risk of flooding.

Additionally, native landscaping can help to improve soil quality, which in turn helps to reduce erosion and sedimentation during floods. This not only helps to prevent property damage but also improves water quality in rivers and streams.

Native plants also require less maintenance than non-native species, reducing the need for fertilizers and pesticides that can contribute to water pollution.

RAIN WATER HARVESTING

Rainwater harvesting is a practice that captures and treats runoff from impervious surfaces for non-potable uses, such as watering gardens, flushing toilets, and laundry, as commonly practiced in arid regions worldwide. It reduces delivery of pollutants and the erosion of stream corridors by minimizing runoff volume, and lessens the burden on municipal water supply systems, potentially saving high water use customers money.

GREEN ROOF

A green roof is a practice used to manage stormwater. It comprises several layers like vegetation, filter fabric, insulation, drainage panels, gravel, and geotextile. It works best on flat roofs but can be set up on steeper ones using extra fasteners. There are three types of green roof systems based on the growing medium's depth - extensive, semi-intensive, and intensive. The system is primarily defined by how much runoff the roof can retain.

The green roof's primary goal is to reduce urban stormwater runoff where installing water improvement strategies is difficult due to limited space. Additionally, green roofs can also help mitigate the urban heat island effect, augment air quality, offer aesthetically-pleasing functional green space in ultra-urban areas, create habitats for birds and beneficial insects, and extend the roof's lifespan.

plusurbia.
1385 Coral Way PH 401 | Miami, FL 33145
info@plusurbia.com | +1 305 444 4850

This document was prepared for:
The City of Tampa (the Client)

This document was prepared and designed by PlusUrbia Design