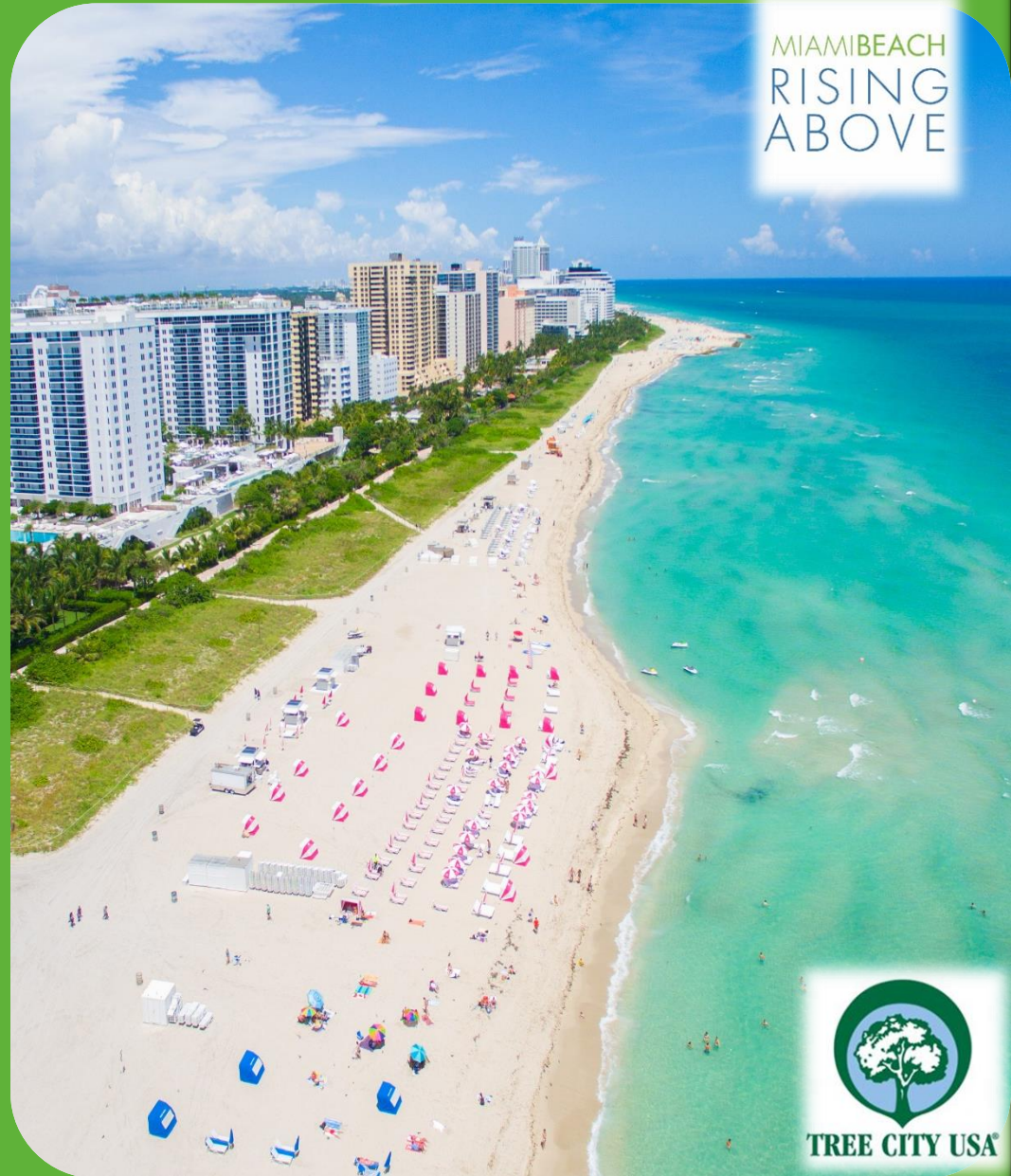


Urban Forestry Master Plan

Tree Cities of the World
Conference
Oct. 29, 2020



A programme of:



MIAMI BEACH
RISING
ABOVE

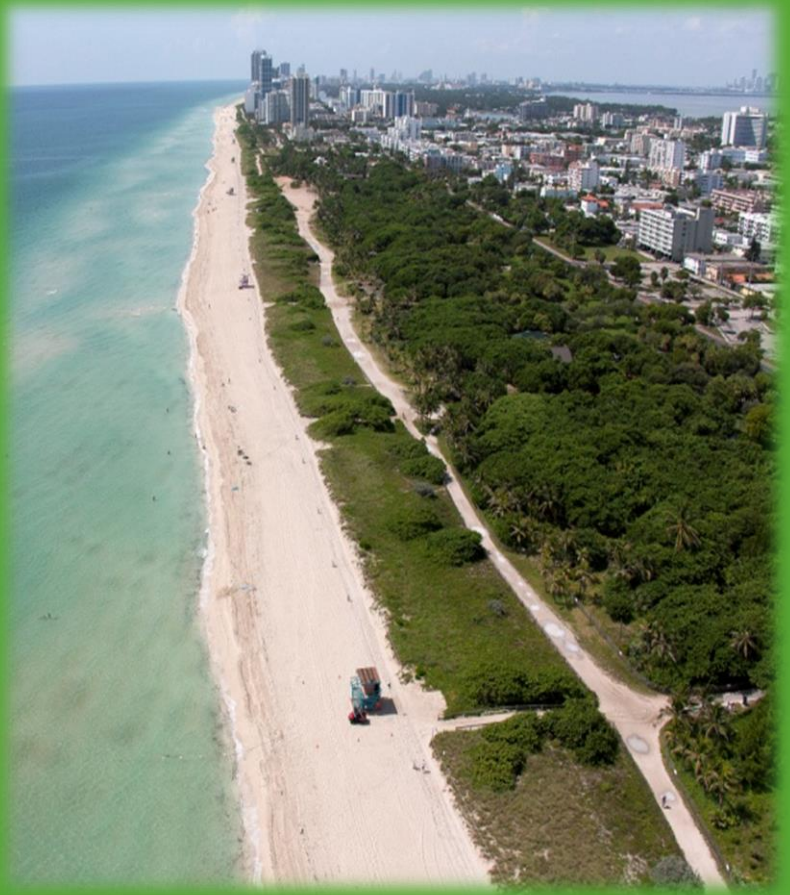


TREE CITY USA®

REGIONAL PARTNERSHIPS



A UNIQUE URBAN FOREST



URBAN LAND INSTITUTE (ULI)



ULI OBSERVATIONS: “Acted with courage to fix sunny day and stormwater flooding”

“Applied good practice for initial pump rollout – engineering and prioritization, initiated street elevations, designed for mid-level climate risk, raised funds through fees, crafted thoughtful communications... collaborated... implemented multiple levers including policy changes, examining cost/benefits...”

April 2018

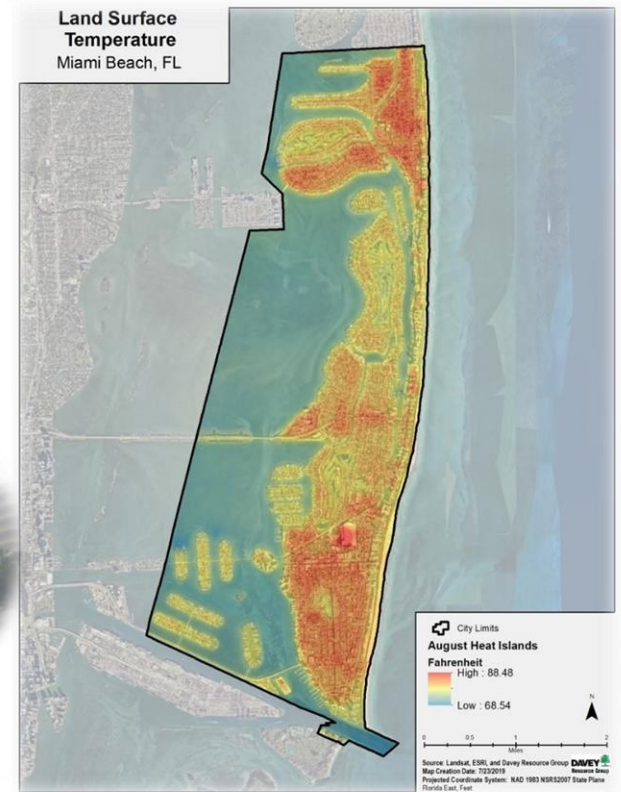


- *Maintained Urgency*
- *Incrementalism & Evaluation*
- *Transparency*
- *Ecological Health*
- *Financial Pragmatism*
- *Co-benefits*
- *Social Equity*
- *Cultural Identity,*
- *Living with Water*
- *Long-term and Regional Perspective*



MIAMI BEACH CLIMATE CHANGE ADAPTATION CHALLENGES AND THE URBAN FOREST

1. Sea Level Rise
2. Salt Inundation
3. Rising Temperatures
4. Sever Weather Events



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2013



2017



SUNSET HARBOUR

2019 KING TIDES 2.8ft Oct 1

2017 Hurricane Irma 2.8ft Sept 10

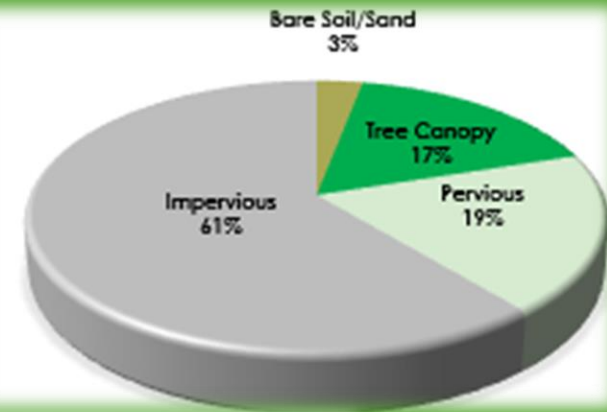
2017 KING TIDES 2.3ft Oct 5

7 Tides over old road

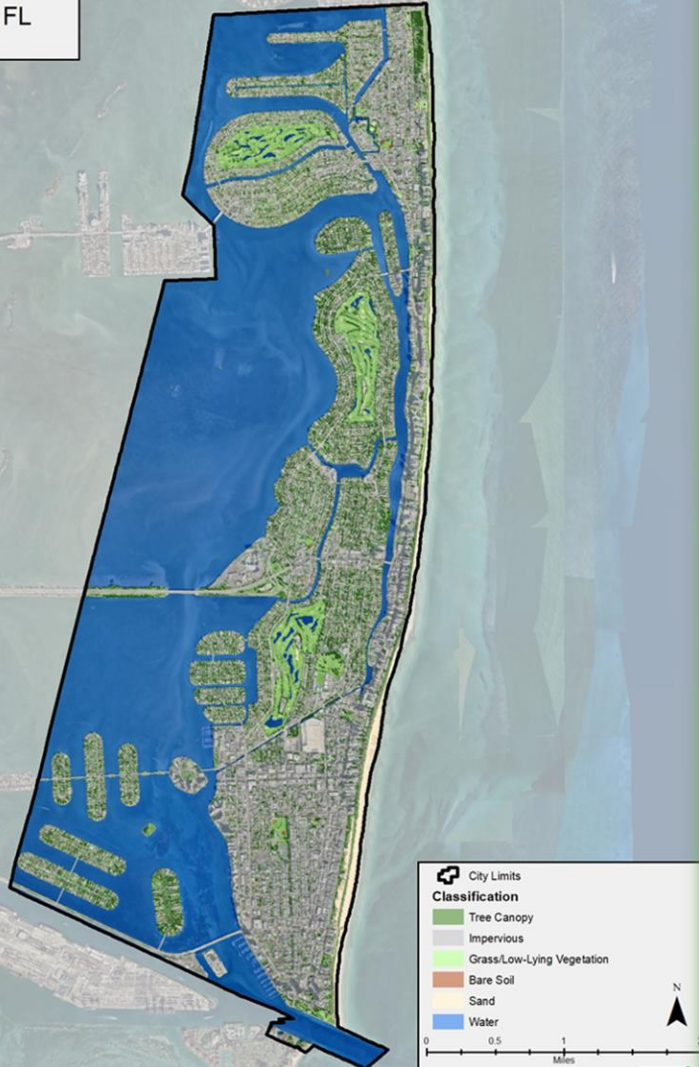
1.7ft Old Crown Road



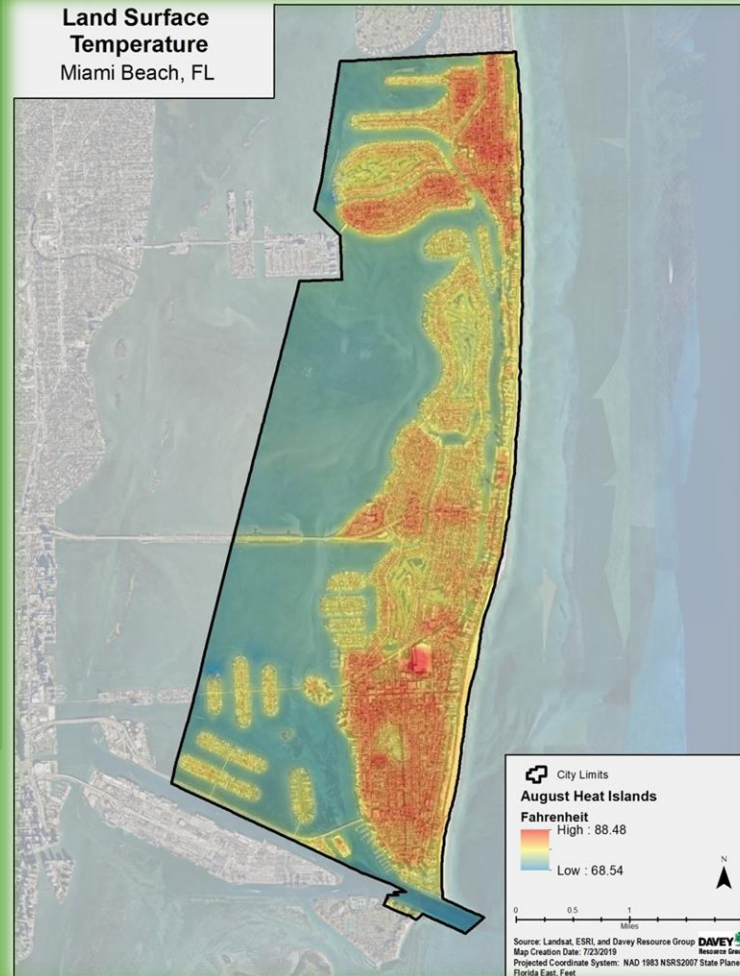
MIAMI BEACH ADAPTATION CHALLENGES TO THE URBAN FOREST



Land Cover
Miami Beach, FL

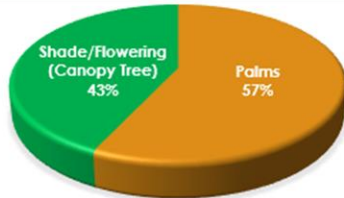


Land Surface Temperature
Miami Beach, FL



IMPLEMENTATION SHAPING THE VEGETATION PALETTE IN MIAMI BEACH













- Species Diversity
 - Palms – moving back to an accent plant



Benefits*	Shade Tree Live Oak (<i>Quercus virginiana</i>)	Palm Cabbage/Sabal Palm (<i>Sabal palmetto</i>)
Carbon Dioxide (CO2) Sequestered (Absorbed)	510 pounds/year	2.71 pounds/year
Rainfall Intercepted	725 gallons/year	81 gallons/year
Ozone removed from the air	20 ounces/year	< 2 ounces/year
Energy Savings (A/C)	60 kWh	26 kWh
Carbon dioxide stored lifetime to date	3,214 pounds over lifetime	26 pounds over lifetime
Annual Value of Benefits	\$31.00	\$6.48

*Based on an analysis of a 16" diameter *Quercus virginiana* and *Sabal palmetto* utilizing the USDA Forest Service's i-Tree MyTree benefits tool – www.itreetools.org.

Palms **substantially underperform** in all environmental benefits when compared to trees

 <p><i>Chrysophyllum cainito</i> Star Apple</p> <p>Tropical fruit tree, slow-growing evergreen tree.</p> <p>Height Range: 25' - 80' Spread: N/A Tree Type: Fruit Tree Growth Rate: Moderate Growth Habit: Round to oval canopy Drought tolerance: Moderate Fertilization Requirements: Three times per year Blossoming Season: Summer / Fall</p>	 <p><i>Coccoloba pubescens</i> Grand-leaf Seagrape</p> <p>Can be used as an ornamental tree. Excellent for seaside locations.</p> <p>Height Range: 15' Spread: 10' - 20' Tree Type: Fruit Tree Growth Rate: Slow Growth Habit: Yucca-like Drought tolerance: High Fertilization Requirements: Moist, well-drained fertile soils Blossoming Season: Spring / Summer / Fall</p>	 <p><i>Coccoloba uvifera</i> Sea Grape</p> <p>Salt tolerant. Good seaside plant. Broad spreading.</p> <p>Height Range: 25' - 35' Spread: 20' - 30' Tree Type: Native Growth Rate: Moderate Growth Habit: Yucca-like Drought tolerance: High Fertilization Requirements: Low</p>	 <p><i>Conocarpus erectus</i> Green Buttonwood</p> <p>Evergreen tree that prefers full sun. Salt and wind tolerant. Good for residences, parks and common areas.</p> <p>Height Range: 30' - 45' Spread: 20' - 30' Tree Type: Native Growth Rate: Moderate Growth Habit: Yucca-like, Spreading Drought tolerance: High Fertilization Requirements: Low Blossoming Season: Spring / Fall</p>	 <p><i>Delonix regia</i> Royal Poinciana</p> <p>Fast growing tree. Produces showy reddish-orange flowers in summer. Long seed pods can be a nuisance. Subject to wind damage. Needs space to develop root system to reduce likelihood of toppling.</p> <p>Height Range: 35' - 45' Spread: 40' - 60' Tree Type: Flowering Growth Rate: Fast Growth Habit: Yucca-like, Spreading Blossoming Season: Summer</p>	 <p><i>Diospyros digyna</i> Black Sapote</p> <p>Tree with novel edible fruits.</p> <p>Height Range: 60' - 80' Spread: 30' Tree Type: Fruit Tree Growth Rate: Slow Growth Habit: Elliptic-oblong Drought tolerance: Moderate Fertilization Requirements: Low Blossoming Season: Fall / Winter</p>
 <p><i>Diospyros virginiana</i> Common Persimmon</p> <p>Irregularly-shaped native tree, for possible naturalizing in yards or parks.</p> <p>Height Range: 40' - 60' Spread: 20' - 35' Tree Type: Native Growth Rate: Moderate Growth Habit: Oval, Pyramidal Drought tolerance: High Fertilization Requirements: Low Blossoming Season: Spring / Summer</p>	 <p><i>Elaeocarpus decipiens</i> Japanese Blueberry</p> <p>Evergreen tree that prefers full to partial sun.</p> <p>Height Range: 30' - 40' Spread: 30' - 40' Tree Type: Shrub Growth Rate: Slow Growth Habit: Pyramidal Drought tolerance: High Fertilization Requirements: Low Blossoming Season: Spring</p>	 <p><i>Erythrina crista-galli</i> Cockspur Coral Tree</p> <p>Wildly planted as a street or garden tree. The flowers produce a light fragrance.</p> <p>Height Range: 15' - 25' Spread: 15' - 25' Tree Type: Flowering Growth Rate: Fast Growth Habit: Umbrella-Shaped Drought tolerance: High Blossoming Season: Summer</p>	 <p><i>Excoecaria agallocha</i> Inkwood Tree</p> <p>Tree with dense foliage maintained close to the ground.</p> <p>Height Range: 25' - 35' Spread: 25' Tree Type: Native Growth Rate: Slow Growth Habit: Oblong to lanceolate Drought tolerance: Moderate Fertilization Requirements: 6 months Blossoming Season: Winter / Summer / Spring</p>	 <p><i>Ficus aurea</i> Strangler Fig</p> <p>The native strangler fig is vine-like while young, later strangling its host with heavy roots and eventually becoming a self-supporting tree.</p> <p>Height Range: 50' - 60' Spread: 50' - 70' Tree Type: Native Growth Rate: Fast Growth Habit: Irregular Drought tolerance: High Blossoming Season: Spring / Summer</p>	 <p><i>Ficus citrifolia</i> Short-Leaf Fig</p> <p>Naturally found in tropical hammocks throughout south Florida and requires full sun for optimal growth.</p> <p>Height Range: 30' - 40' (70') Spread: 50' - 80' Tree Type: Native Growth Rate: Moderate to fast Growth Habit: Oval, Rounded with flowers inside Drought tolerance: High Blossoming Season: Winter / Spring / Fall</p>

- Tree Species Selection
 - Re-prioritize species to those that are more resilient to sea level rise, flooding & increasing salinity, limited growing space, and increasing temperatures and severe weather events

IMPLEMENTATION PLANNING AND PRIORITIZING STREETS BY CHARACTER & USE

- Planning for a city-wide approach
 - Establishing a classification strategy for all streets within the City.
- Street-by-Character
 - Understanding that streets are not only about traffic movement, but also about experience; working in concert with abutting land uses.



NORTH BEACH AREA
MIDDLE BEACH AREA

BISCAYNE BAY

MIDDLE BEACH AREA
SOUTH BEACH AREA

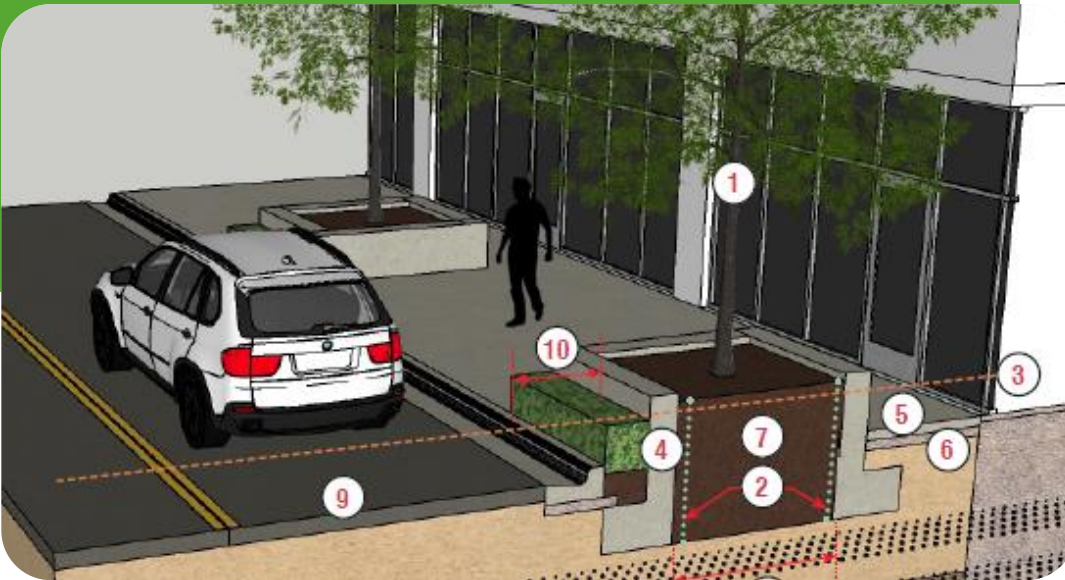
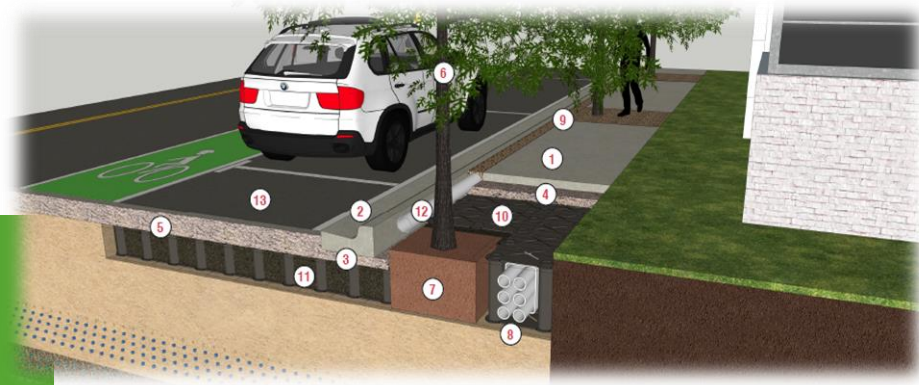
ATLANTIC OCEAN



IMPLEMENTATION

BRIDGING EFFORTS ACROSS ALL STAKEHOLDERS

- Provides strategies for a phased approach to street tree planting considering sea level rise
- How to plan for trees today so that they are not negatively impacted by planned adaptation improvement projects in the future?



IMPLEMENTATION

BRIDGING EFFORTS ACROSS ALL STAKE HOLDERS

- Establishing Tactics for Street Tree Planting
 - Key to maintain and promote trees in Miami Beach's urban condition is to use appropriate green infrastructure.
- Supports design coordination across all stakeholders for review and implementation
 - Minimizes conflicts during plan review and construction processes



Nature Based Infrastructure: Dunes & Beaches

1960s



TODAY



NATURE-BASED DESIGN



NATURE-BASED DESIGN



NATURE-BASED DESIGN



A photograph of a large, well-maintained green lawn. In the background, there is a row of mature trees with dense green foliage. Behind the trees, a white fence and parts of houses are visible. The sky is blue with some light clouds. The foreground is dominated by the grass, and the top of the frame is framed by the branches and leaves of a tree.

THANK YOU