

City of Miami Beach – Public Works Department

Stormwater Modeling and Master Plan Update

Presentation to City Commission

March 13, 2024



AECOM

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Agenda

- 1 Project Objectives
- 2 Stormwater Master Plan Approach
- 3 Neighborhood Improvement Projects
- 4 Proposed Stormwater Infrastructure Summary
- 5 Water Quality Treatment Approach
- 6 Critical Needs Projects
- 7 Implementation Plan

Project Objectives

Update the City's stormwater program:

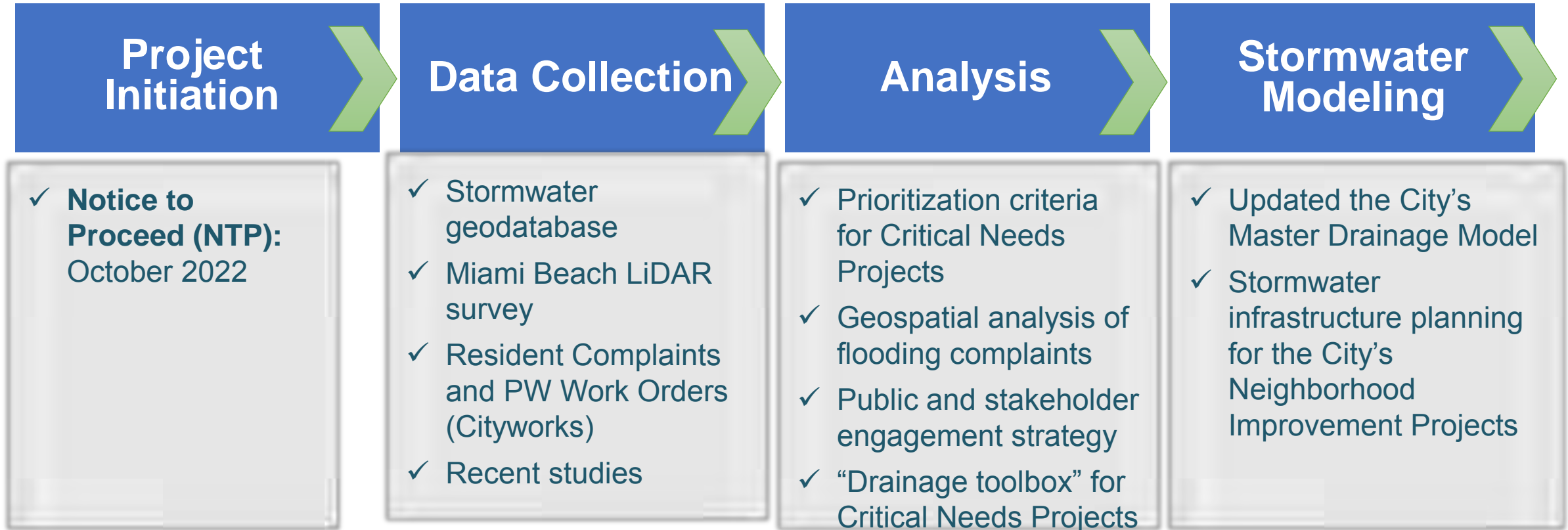
Update the
Citywide
Stormwater
Model

Incorporate
Recent Studies
and Update
Water Quality
Approach

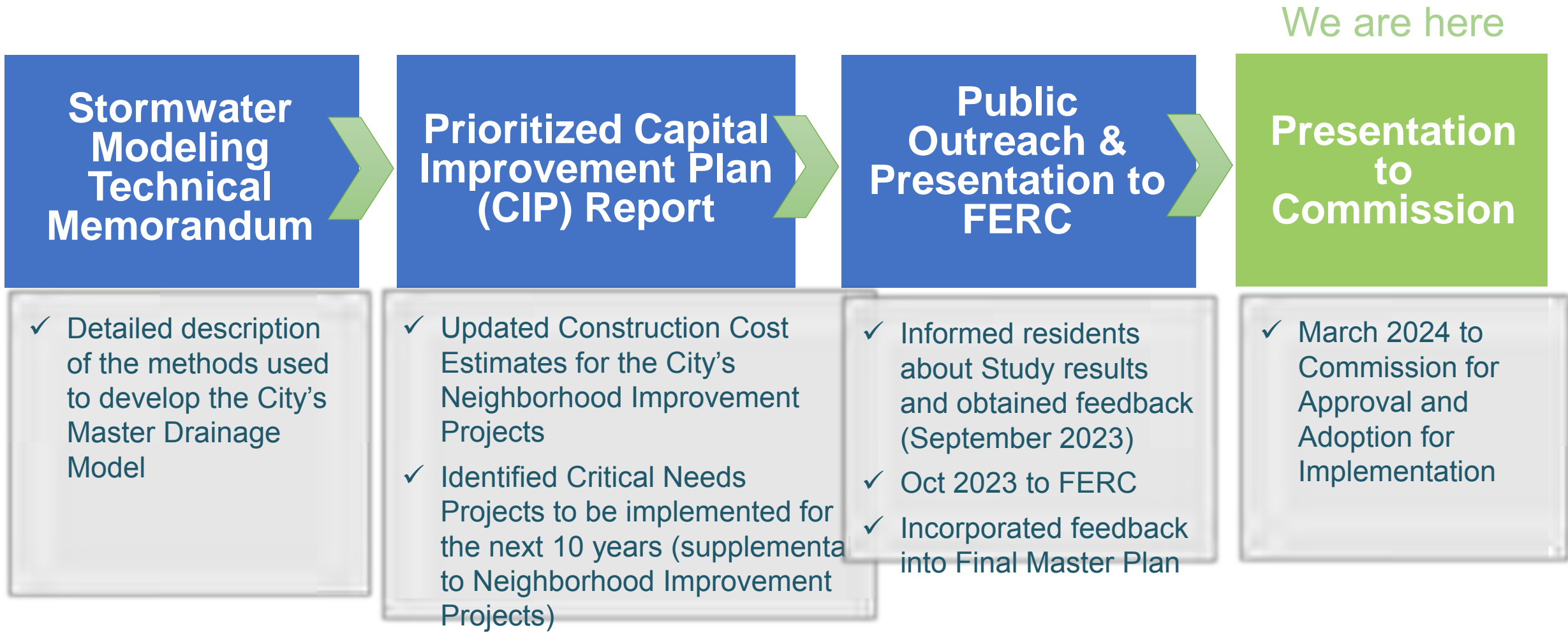
Identify Critical
Needs focused
on the Next
10 Years

Update
Construction
Cost Estimates

Prioritize
Phasing and
Create
Implementation
Plan



Stormwater Master Plan Tasks



Incorporated Recent and Ongoing Studies

- Road Elevation Strategy
- Neighborhood Project Prioritization
- Blue-Green Stormwater Infrastructure Concept Plan
- Stormwater Facilities Plan
- Seawall Prioritization Plan
- Basin Drainage Reports for Flood Mitigation Study
- Stormwater 20-Year Needs Analysis (HB 53)
- Sea Level Rise Vulnerability Assessment and Adaptation Plan (ongoing)



**City of Miami Beach
Flood Mitigation**

Stormwater Facilities Plan

City of Miami Beach

RISING
ABOVE



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Stormwater Master Plan Approach

A combination of...

- ✓ Neighborhood Improvement Projects
- ✓ Water Quality Projects
- ✓ Critical Needs Projects



Neighborhood Improvement Projects (NIPs)



Holistic projects that involve multiple City services to enhance the quality of life in a neighborhood:

- Stormwater improvements (large pipes and pump station)
- Potable water and wastewater collection improvements
- Roadway improvements
- Aboveground components (sidewalks, street lighting, landscaping, etc.)

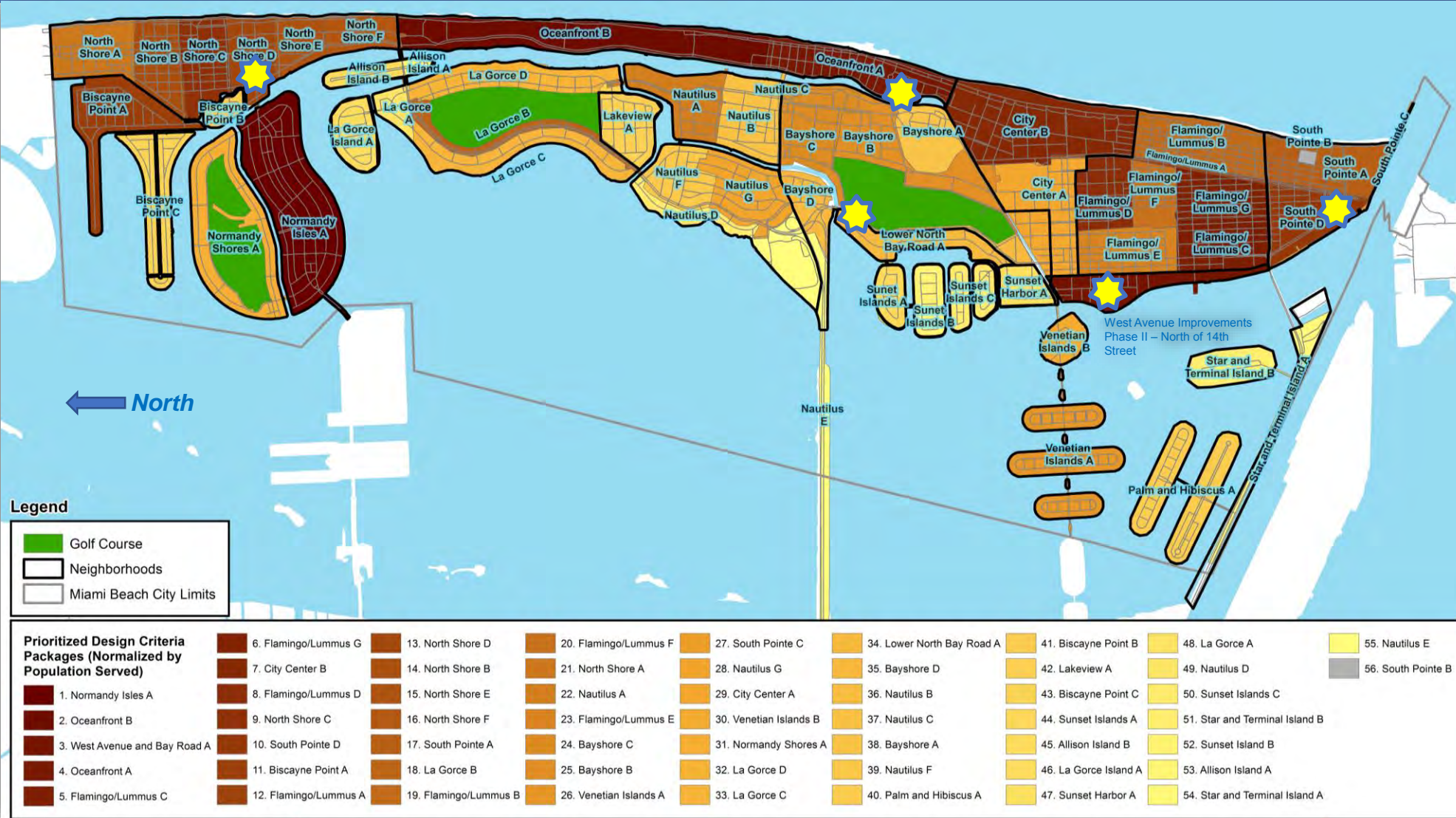
✓ NIPs provide comprehensive long-term tidal and rainfall flood mitigation.

✓ Prioritized NIPs List Adopted by Commission in 2020 and incorporated into this Master Plan.

Neighborhood Improvement Projects

★ Ongoing Projects:

1. Indian Creek Improvements
2. West Avenue Improvements Phase II – North of 14th St
3. FDOT Alton Road (Michigan Avenue to 43rd Street)
4. First Street and South Pointe Stormwater Improvements
5. North Shore D & Town Center Improvements



Level of Service

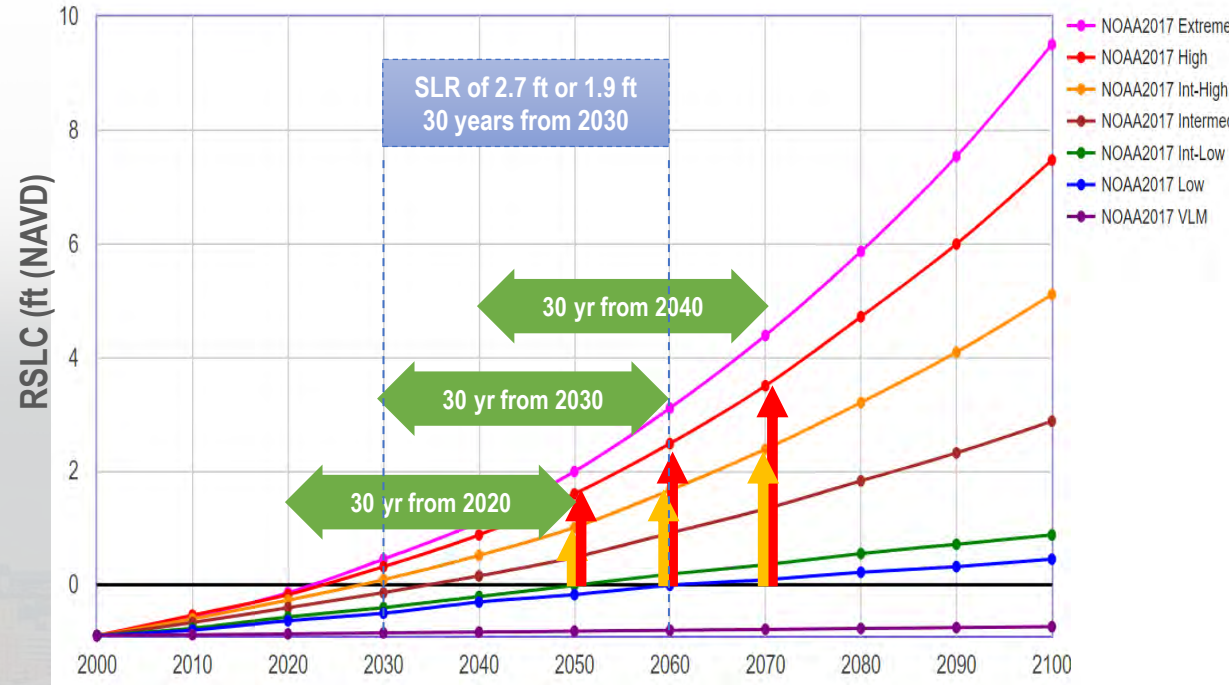


DESIGN STORM
10-year, 24-hour Storm

ROADWAY DESIGN LIFE/RESILIENCE
30 years

SEA LEVEL RISE PROJECTION
NOAA Intermediate High

Relative Sea Level Change Scenarios for Miami Beach (NOAA, 2017)



| | Proposed Edge of Pavement Elevation | | |
|--------------------------------|-------------------------------------|------|------|
| Road Type / Construction Start | 2025 | 2030 | 2035 |
| Arterial and Local Roads* | 4.2' | 4.5' | 4.9' |
| Emergency (FDOT) Roads | 5.2' | 5.7' | 6.2' |

* 1 ft road thickness above bottom of road base.

Proposed Stormwater Infrastructure Summary

- 48 existing, with 33 stormwater pump stations proposed to remain
- Proposed 83 stormwater pump stations
 - Including Best Management Practices (BMP) water quality treatment
- Approx. 104 miles of proposed large stormwater pipes
- 2024 budgetary estimate for the proposed NIPs: **\$3.7 Billion** (City ROW)



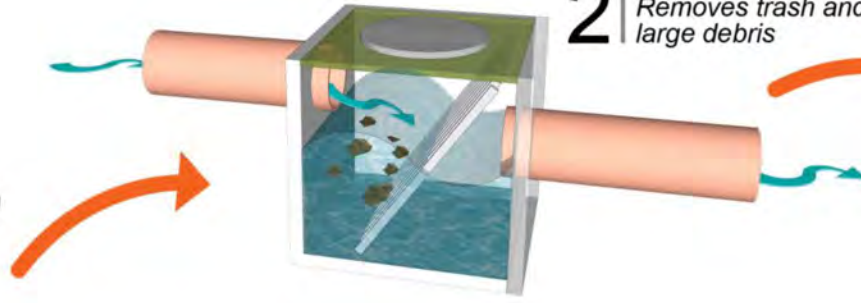
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Water Quality Treatment Approach (*doubles nutrient removal*)

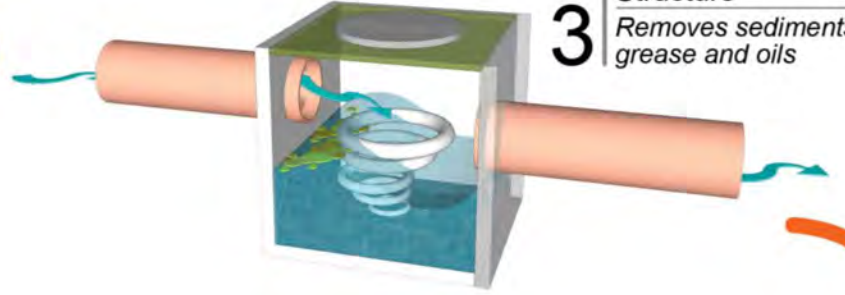
1 Inlets and Stormwater Collection System



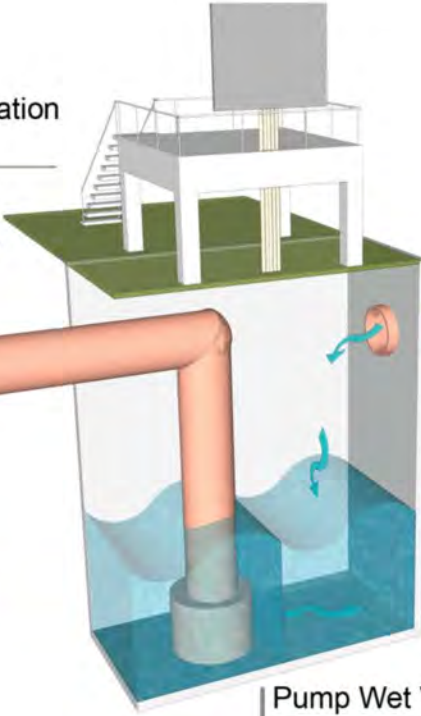
2 Bar Screen Trash Rack
Removes trash and large debris



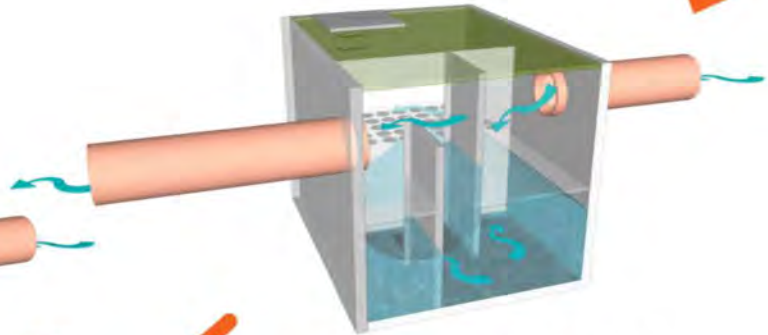
3 Hydrodynamic Water Quality Treatment Structure
Removes sediments, grease and oils



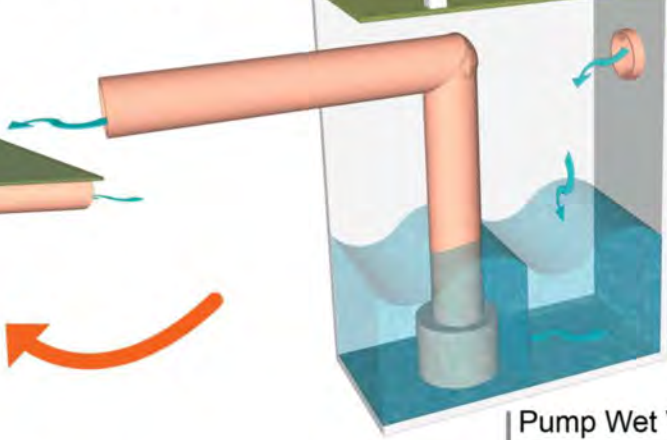
5 Elevated Pump Station Control Panel
Controls pump start sequence and limits initial pumping rates



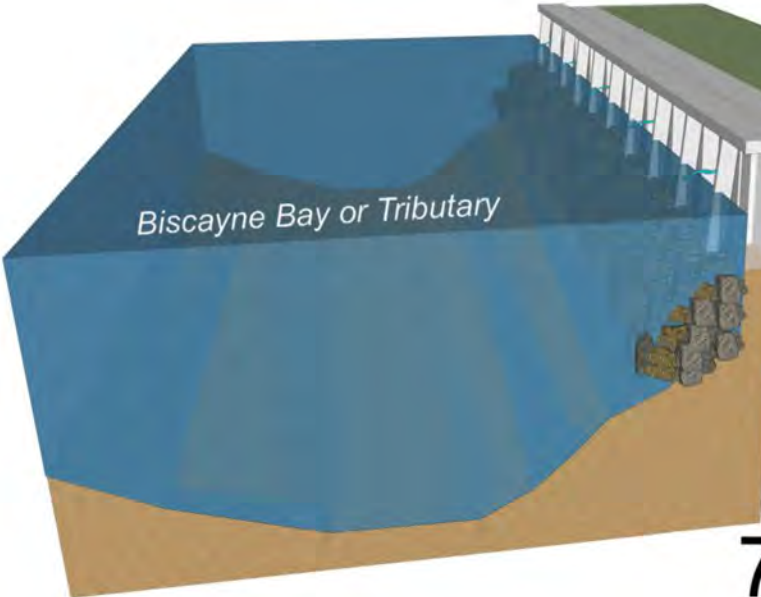
4 Membrane Filtration Water Quality Treatment Device
Removes dissolved nutrients - Total Phosphorus (TP) and Total Nitrogen (TN)



6 Pump Wet Well
Includes both the necessary number of duty and redundant pumps



7 Outfall Structure and Energy Dissipator with Riprap Apron
Reduces discharge velocity - prevents erosion



- Notes:
- 1. Standby / Emergency Generator Not Shown
 - 2. Above Ground Equipment will be Aesthetically Screened or Placed within a Structure

Ongoing Water Quality Projects

★ Ongoing

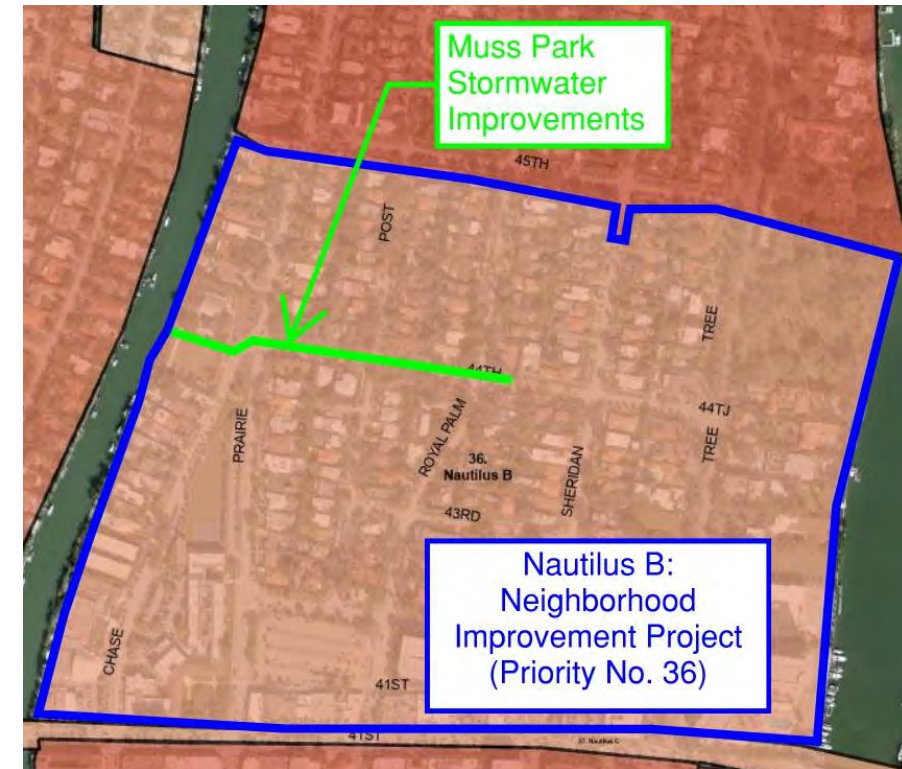
1. PS #24 Water Quality Improvements
2. Portable **Treatment** Devices (*for rainy season temp. pumps*)
3. Park View Outfall Water Quality Improvements
4. PS #32 Water Quality Improvements
5. PS #10 Odor and Water Quality Improvements



What is a Critical Needs Stormwater Project?

- Smaller project aimed at addressing nuisance flooding to provide both **beneficial** and **cost-effective** solutions within targeted areas.
- **Complimentary** and **adaptable** to the future NIPs (not throw-away...)
- Includes a variety of solutions available in the “Drainage Toolbox”.

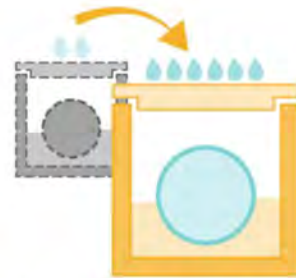
For Example:



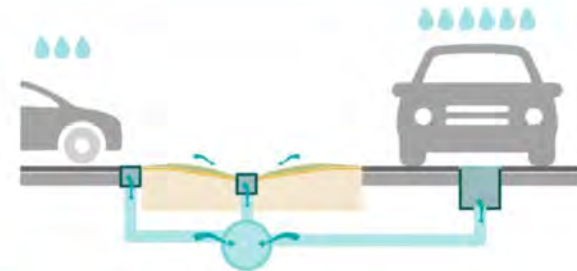
Drainage Toolbox for Critical Needs Projects



Regrading, Repaving, and Minor Road Raising



Upsizing Infrastructure



Connecting Drainage Areas



Adding Catch Basins



Water Quality Improvements



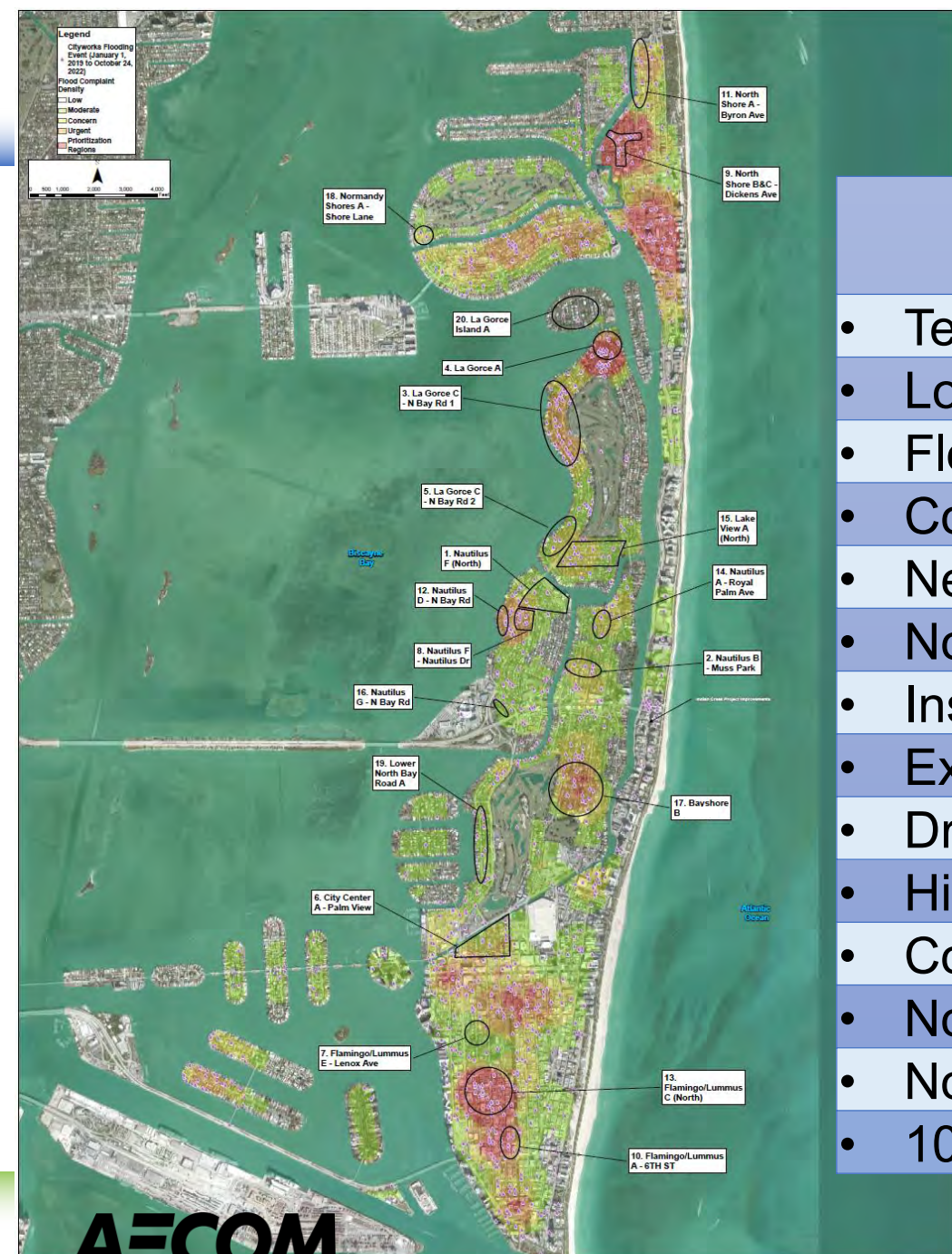
Improving Swales



Enhance Existing Outfalls



Implementing Blue-Green Infrastructure

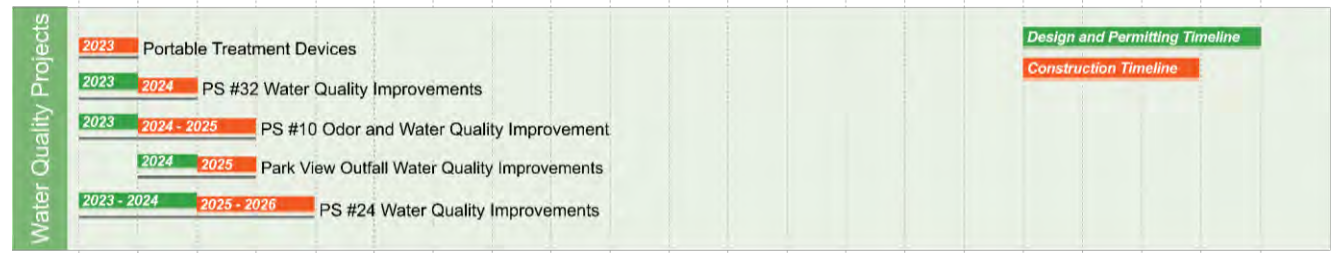
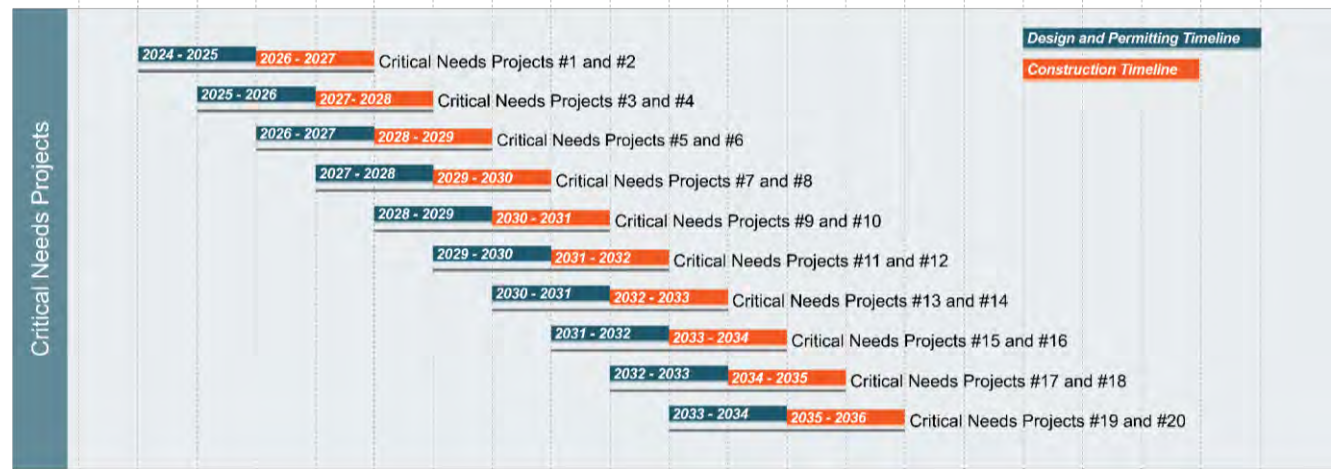
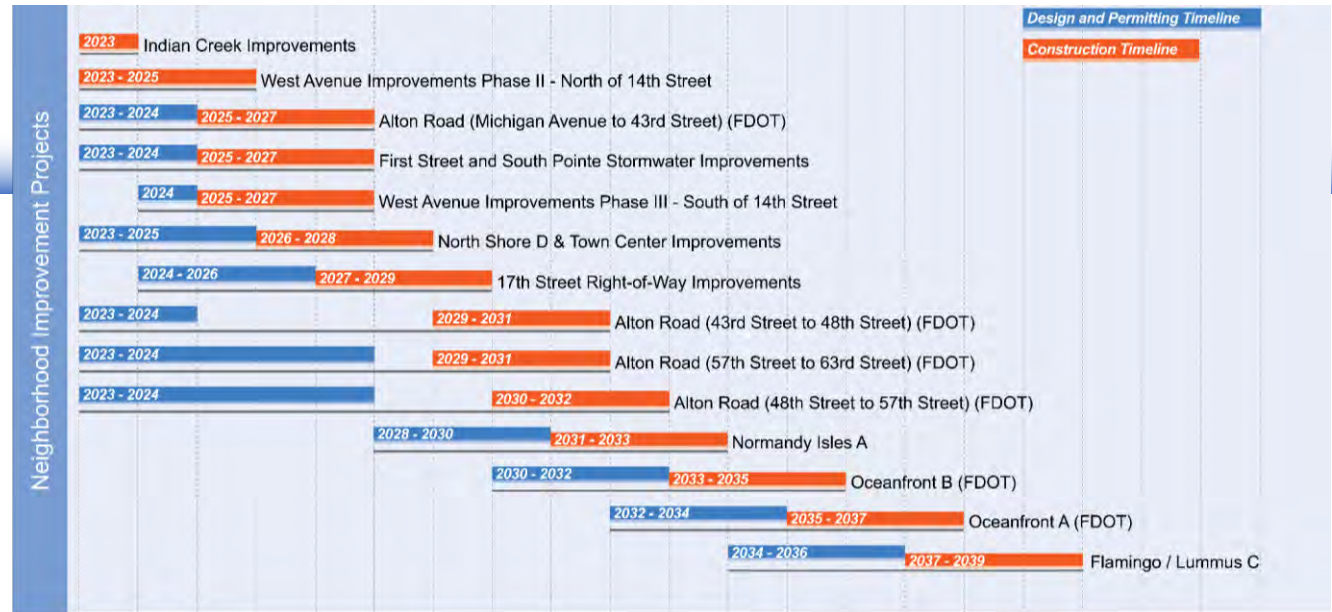


| Criteria | Criteria Weighting |
|--|--------------------|
| • Temporary Pumps Historically Deployed | 7 |
| • Low Topography / Tidal Inundation | 7 |
| • Flooding Complaints | 7 |
| • Constructability/ Ease of Implementation | 7 |
| • Neighborhood Improvement Project Ranking | 6 |
| • No Improvements in the Last 10 Years | 6 |
| • Insufficient Drainage | 4 |
| • Exfiltration Trenches | 4 |
| • Drainage Wells | 4 |
| • Historic District | 3 |
| • Community and Emergency Facilities | 3 |
| • No Permitting Complexity | 3 |
| • No Connection to Outfalls | 1 |
| • 10-Year Design Storm Flooding | 1 |

Recommended Critical Needs Projects

| Critical Needs Rank | NIP Rank | Critical Needs Project Name | FY 2023 Budgetary Estimate | Anticipated Construction Commencement | Escalated Budgetary Estimate | Critical Needs Score |
|---------------------|----------|------------------------------------|----------------------------|---------------------------------------|------------------------------|----------------------|
| 1 | 39 | Nautilus F (North) | \$ 4,000,000 | FY 2026 | \$ 4,900,000 | Ongoing |
| 2 | 36 | Nautilus B - Muss Park | \$ 4,300,000 | FY 2026 | \$ 5,300,000 | Ongoing |
| 3 | 33 | La Gorce C - N Bay Rd 1 | \$ 4,300,000 | FY 2027 | \$ 5,400,000 | 247 |
| 4 | 48 | La Gorce A | \$ 3,000,000 | FY 2027 | \$ 3,800,000 | 243 |
| 5 | 33 | La Gorce C - N Bay Rd 2 | \$ 4,000,000 | FY 2028 | \$ 5,200,000 | 239 |
| 6 | 29 | City Center A - Palm View | \$ 4,800,000 | FY 2028 | \$ 6,200,000 | 236 |
| 7 | 23 | Flamingo/Lummus E - Lenox Ave | \$ 1,300,000 | FY 2029 | \$ 1,800,000 | 216 |
| 8 | 39 | Nautilus F - Nautilus Dr | \$ 800,000 | FY 2029 | \$ 1,000,000 | 216 |
| 9 | 9 | N Shore B & C - Dickens Ave | \$ 2,600,000 | FY 2030 | \$ 3,700,000 | 202 |
| 10 | 6 | Flamingo/Lummus A - Jefferson Aven | \$ 1,900,000 | FY 2030 | \$ 2,600,000 | 200 |
| 11 | 21 | North Shore A - Byron Ave | \$ 5,900,000 | FY 2031 | \$ 8,600,000 | 194 |
| 12 | 49 | Nautilus D - N Bay Rd | \$ 3,500,000 | FY 2031 | \$ 5,100,000 | 192 |
| 13 | 5 | Flamingo/Lummus C - Lenox Ave | \$ 3,100,000 | FY 2032 | \$ 4,600,000 | 187 |
| 14 | 22 | Nautilus A - Royal Palm Ave | \$ 2,400,000 | FY 2032 | \$ 3,600,000 | 187 |
| 15 | 42 | Lakeview A (North) | \$ 3,200,000 | FY 2033 | \$ 5,000,000 | 185 |
| 16 | 28 | Nautilus G - N Bay Rd | \$ 3,400,000 | FY 2033 | \$ 5,300,000 | 175 |
| 17 | 25 | Bayshore B (North) | \$ 4,200,000 | FY 2034 | \$ 6,700,000 | 170 |
| 18 | 31 | Normandy Shores A - Shore Lane | \$ 1,200,000 | FY 2034 | \$ 1,900,000 | 170 |
| 19 | 34 | Lower North Bay Rd A | \$ 1,800,000 | FY 2035 | \$ 3,000,000 | 167 |
| 20 | 36 | La Gorce Island A | \$ 6,800,000 | FY 2035 | \$ 11,300,000 | 164 |
| TOTAL | | | \$ 66,500,000 | | \$ 95,000,000 | |

Master Plan Proposed 10-Year Implementation Schedule



2023 2025 2027 2029 2031 2033 2035 2037 2039 2041

**The Master Plan recommends to continue implementing Neighborhood Improvement Projects at the same time as Critical Needs and WQ Projects.*



Questions?