NORTH BEACH
STORMWATER IMPROVEMENTS

WATER LEVELS
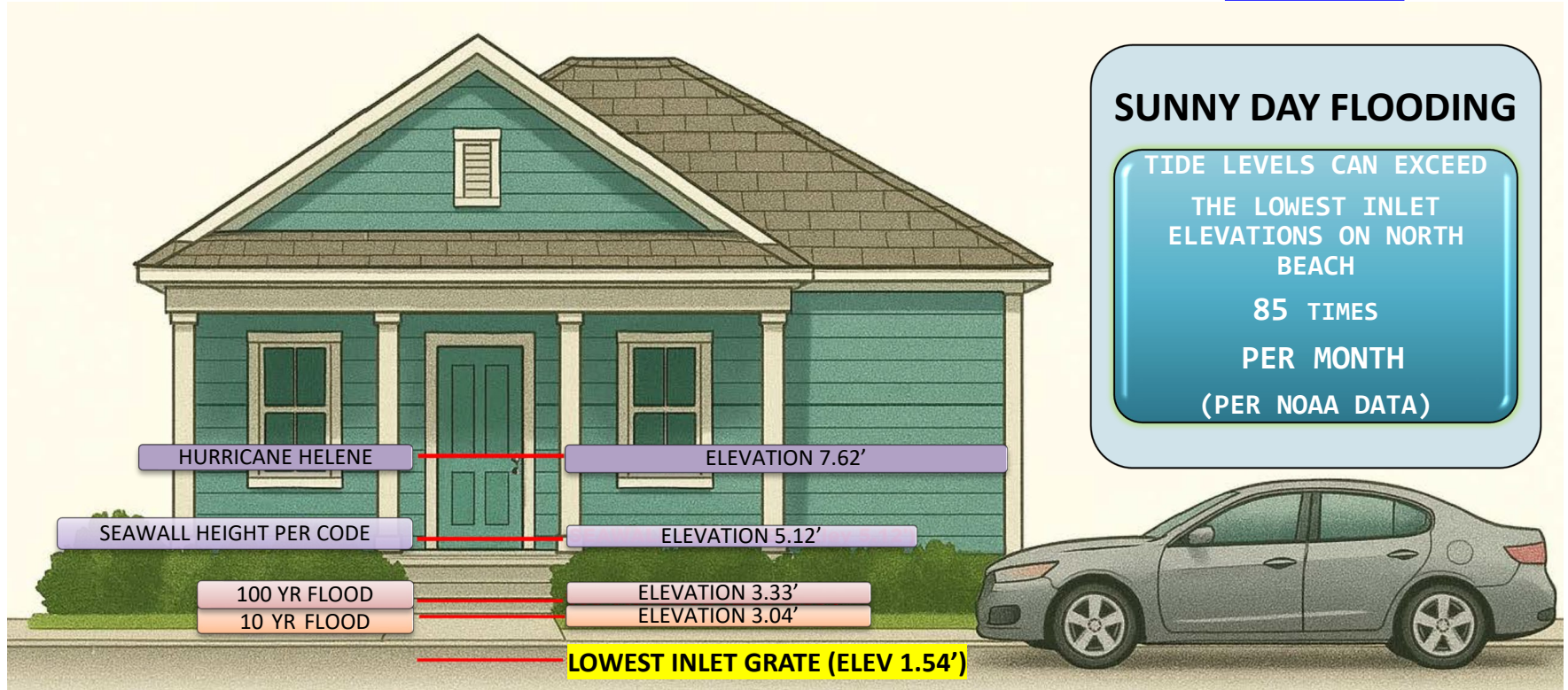
ELEVATION OF SOME SEAWALLS

5.12'

Location	Elevation
laurel	2.7'
somerset	2.8'
kipling pl	2.9'
eldorado	3.0'
aster	3.2'
iris	3.3'
mango	3.6'
carlouel	3.7'
bruce	3.8'
acacia	3.9'
verbena	4.5'
gardenia	4.7'
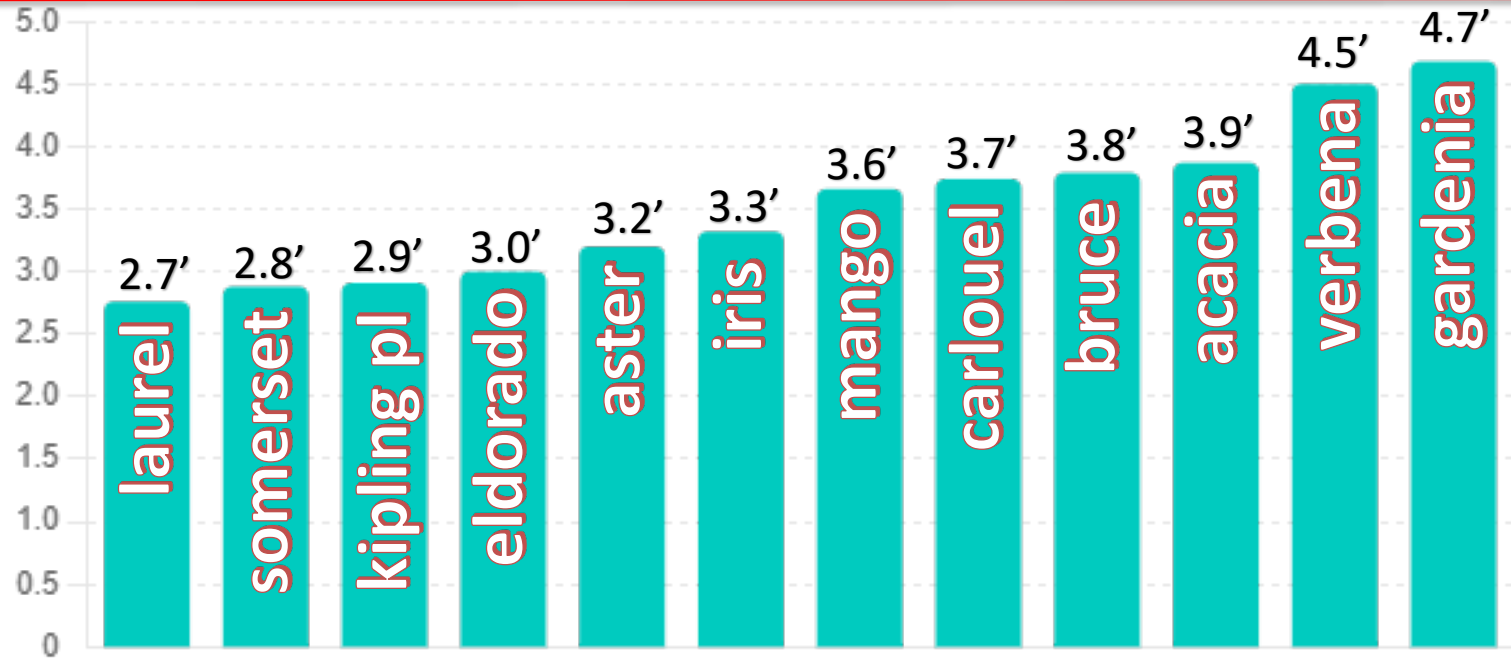
INDUNATION MAP – Ground Elevation lower than 5.12'
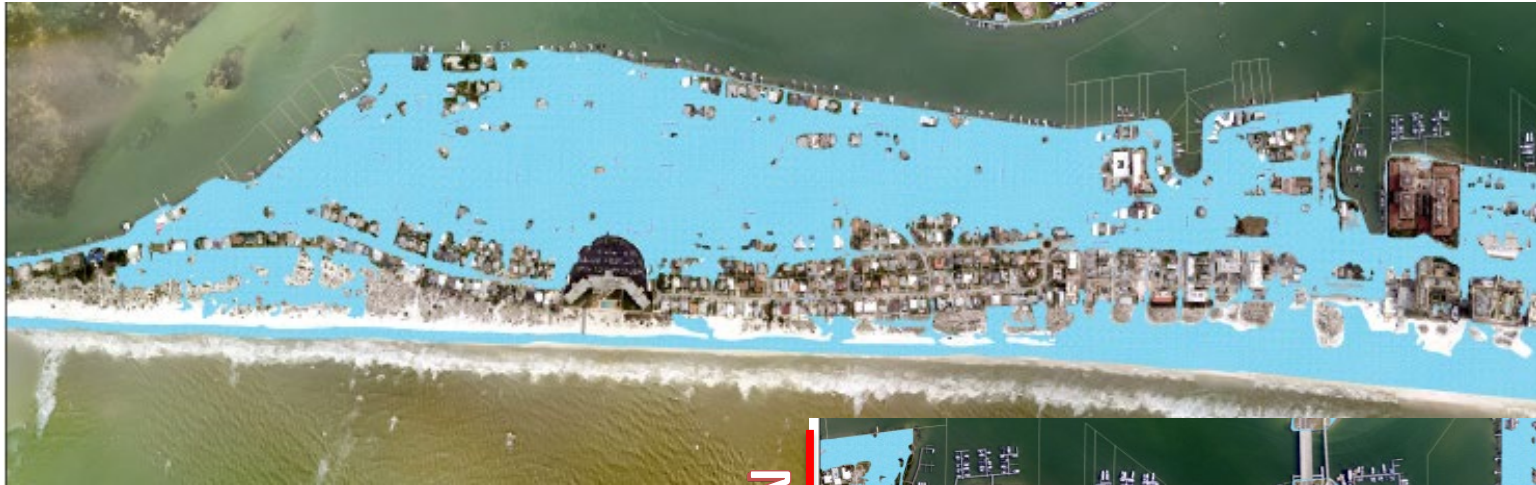
MATCH LINE

MATCH LINE

5.12' IS THE MINIMUM SEAWALL HEIGHT REQUIRED PER CITY CODE

WHAT WE'RE UP AGAINST

Flooding Bruce Avenue Winter 2023

Island's lowest seawall overtopping

Typical Bowl Condition

Bay Esplanade @ Mandalay Ave 3 days after King Tide Storm
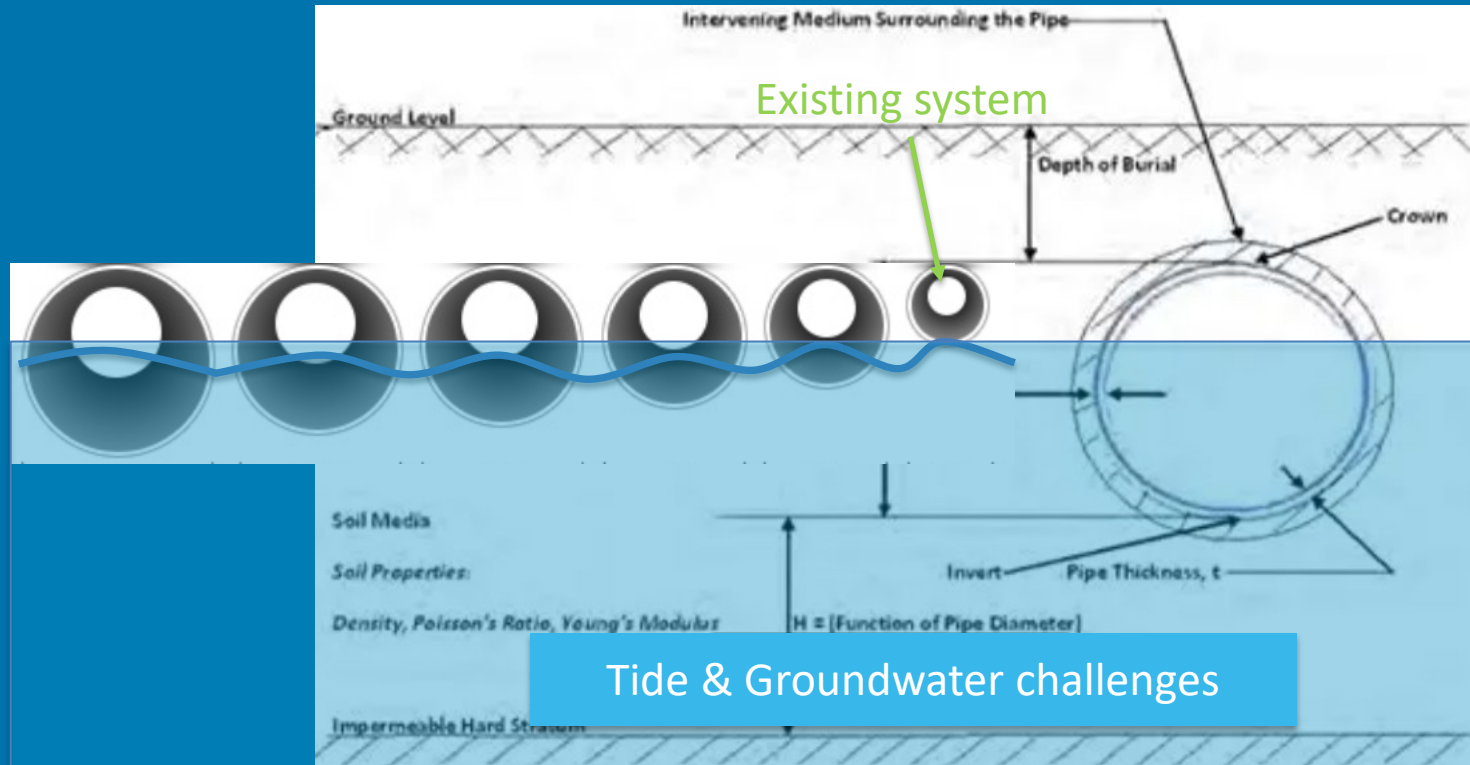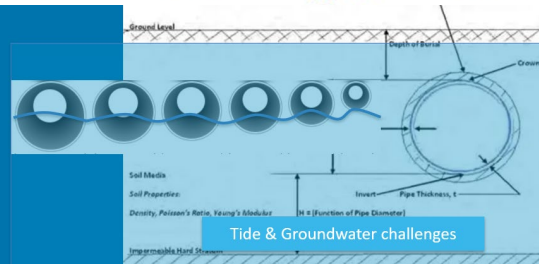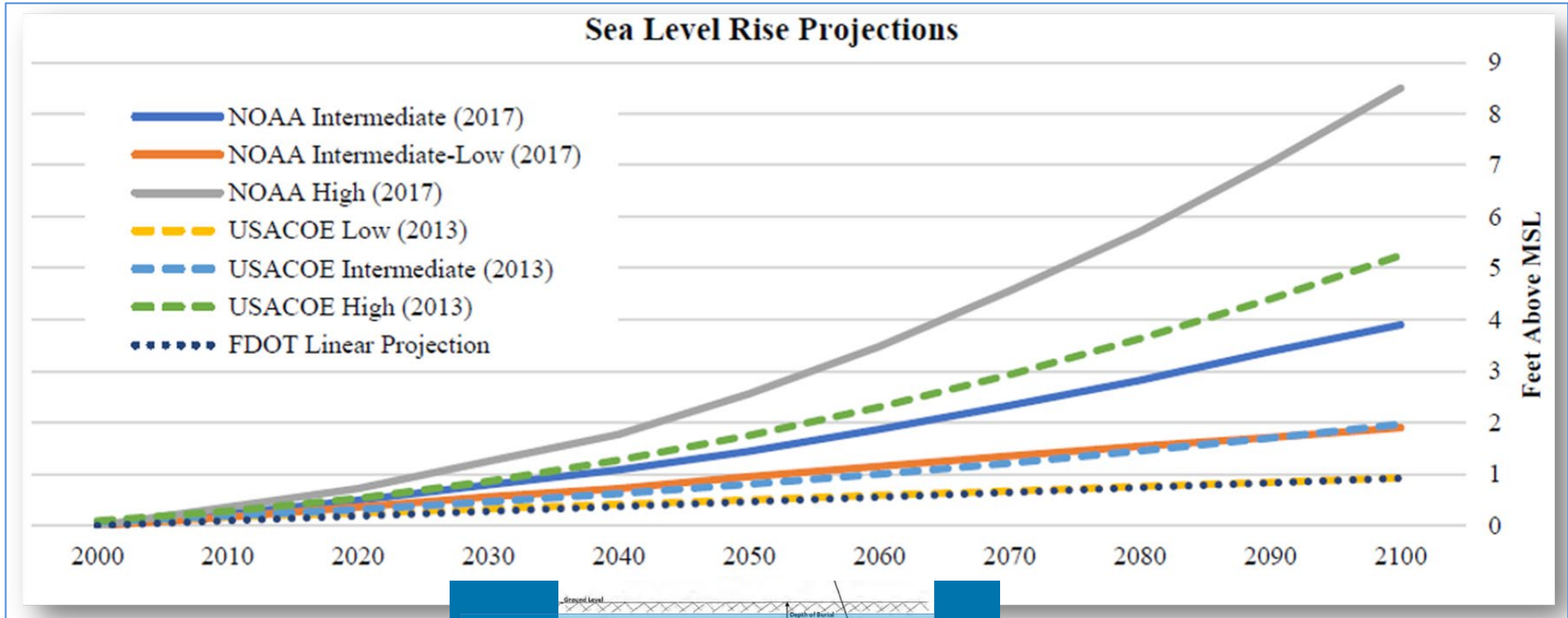
FRAMING THIS PROJECT

✓**This project is not about rare storms;** it's about frequent flooding events**.**

✓Rainfall events are more manageable than sea walls overtoppings.

✓This project will reduce the time roadways drain, **but flooding will not be eliminated due to high sea levels and low island elevations**.

✓**3 main factors** influence the flooding: **high sea levels** (including seawall overtopping), rain events, and a limited conveyance system.

✓Additional challenges include higher tides, more intense storm events, high groundwater table, flat topography, low-lying elevations, lack of easements/city property, limited road network, permitting timelines, etc.

✓Project phasing helps mitigate **permitting constraints** and existing **land/easement ownership**.

✓Taking a modular design approach allows for upgrades later as sea level rises.

Animation: How the stormwater system works during heavy rain

Discussion Graphic- Larger pipe outfall challenges

Existing system

Intervening Medium Surrounding the Pipe

Ground Level

Depth of Burial

Crown

Tide & Groundwater challenges

Soil Media

Soil Properties:

Density, Poisson's Ratio, Young's Modulus

$H =$ [Function of Pipe Diameter]

Invert   Pipe Thickness, t

Impermeable Hard Stratum

Discussion: Cocktail straw vs large straw

NOAA SEA LEVEL RISE PROJECTIONS

INUDATION MAP: SEAWALL OVERTOPPING
AREAS MOST VULNERABLE

Laurel & other seawalls overtop 5 times/year on average

WHAT'S TAKING SO LONG?

✓ Phased design takes longer upfront but moves faster long-term and yields a much better construction cost.

✓ Evaluated about 40 different system simulations to refine design direction.

✓ Incorporated lessons learned from recent large storm events and tidal influences.

✓ Held preliminary permitting coordination with USACE and SWFWMD to help expedite approvals.

✓ Efforts to standardize pump stations to simplify operations and long-term maintenance which will reduce costs.

✓ Analyzed interconnecting stormwater basins to improve redundancy.

✓ Evaluated historical data (30yr+) to better understand recurrence and identify main reasons for flooding.

✓ Electrical and underground utility coordination.

These careful steps are leading to a better design and long-term outcome

INUNDATION MAP – 10 YR RAIN EVENT
Existing Conditions

Map assumes no seawall overtopping

Map assumes tide level of 2.95 ft

10-Year Storms (only 3 since 2012)

TS Debby 2012

Hurricane Milton 2024

Hurricane Helene 2024

System Recovery Time

➡ **13-24 Hours**

Map assumes no seawall overtopping

Map assumes tide level of 2.95 ft

System L.O.S. is achieved after 2 hours

Existing - T2

Pipe Upgrades (only) - T2

Pipe & Pumping Upgrades - T2

PROPOSED PUMP STATIONS – PHASE I

1- Bruce Ave	**2- Carlouel Dr**	**3- Laurel Dr**	**4- Gardenia St**	**5- Verbena St**	**6- Mango St**
• City owns outfall • Neediest basin • Flooding reductions of up to 23 hours	• City owns outfall • Interconnect system to Bruce • May be constructed in Phase II or relocated	• City owns outfall • Pumping alone reduces flooding duration by 12.5 hrs	• City owns outfall • Most gravity-challenged basin • Pump reduces flooding duration by 6.5 hours	• City owns outfall • 2nd neediest basin • Pump reduces durations by 16 hrs	• City owns outfall • Pump relieves flooding due to low seawall

PUBLIC WORKS RECOMMENDATIONS

Phase 1
5 to 6 new pump stations, upgrading of existing pump station's (Kipling) electrical system, and add first interconnection. Install LIVE monitoring, warning & data collection system. Upgrade our Tidal Valve Program (including maintenance).

Phase 2
Extend and upgrade gravity system, secure easements for new outfalls (Eldorado, Kipling Plaza and Acacia-Somerset) and possible additional pump stations. Study alternatives (permeable pavements/driveways, green area swales).

Continuous improvements analysis
Sitework and gravity system upgrades for remaining areas/basins & analyze additional future needs based on seawall elevations
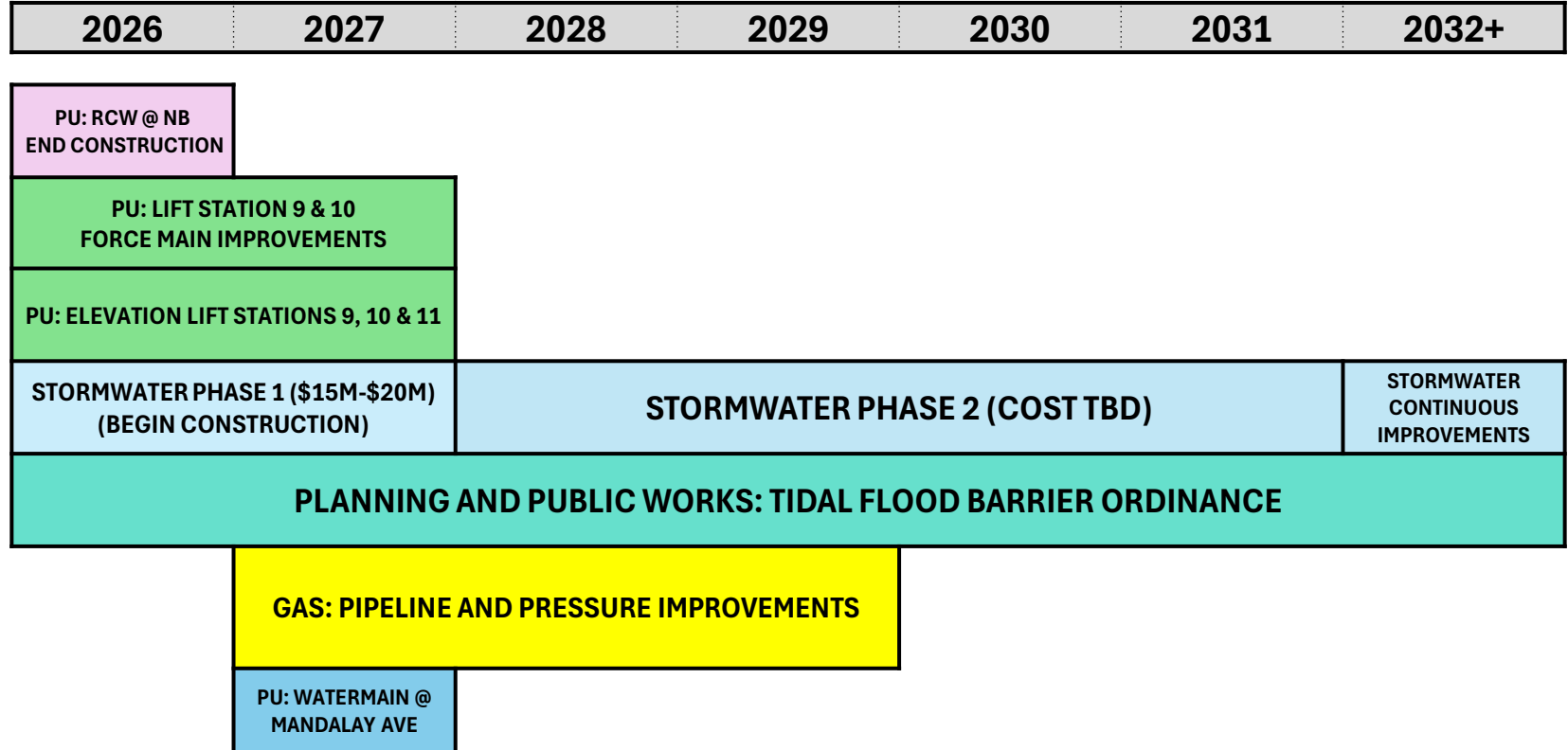
In Parallel Phase
Research grants (inc. grant opportunities for residents raising their seawalls)
Seawall Ordinance

Rendering shown (R) is *conceptual only* and does not represent the final design.
Provided for illustrative purposes to show potential design approach.

ESTIMATED TIMELINE & OTHER PROJECTS

2026	2027	2028	2029	2030	2031	2032+

PU: RCW @ NB END CONSTRUCTION

PU: LIFT STATION 9 & 10 FORCE MAIN IMPROVEMENTS

PU: ELEVATION LIFT STATIONS 9, 10 & 11

STORMWATER PHASE 1 ($15M-$20M) (BEGIN CONSTRUCTION)

STORMWATER PHASE 2 (COST TBD)

STORMWATER CONTINUOUS IMPROVEMENTS

PLANNING AND PUBLIC WORKS: TIDAL FLOOD BARRIER ORDINANCE

GAS: PIPELINE AND PRESSURE IMPROVEMENTS

PU: WATERMAIN @ MANDALAY AVE

INTERCONNECTIONS

WHAT'S AN INTERCONNECTION?

- It's a pipe that links two drainage areas together, so if one floods, the other can help carry the extra water away.

- This helps the whole system drain faster & reduces the flood levels!
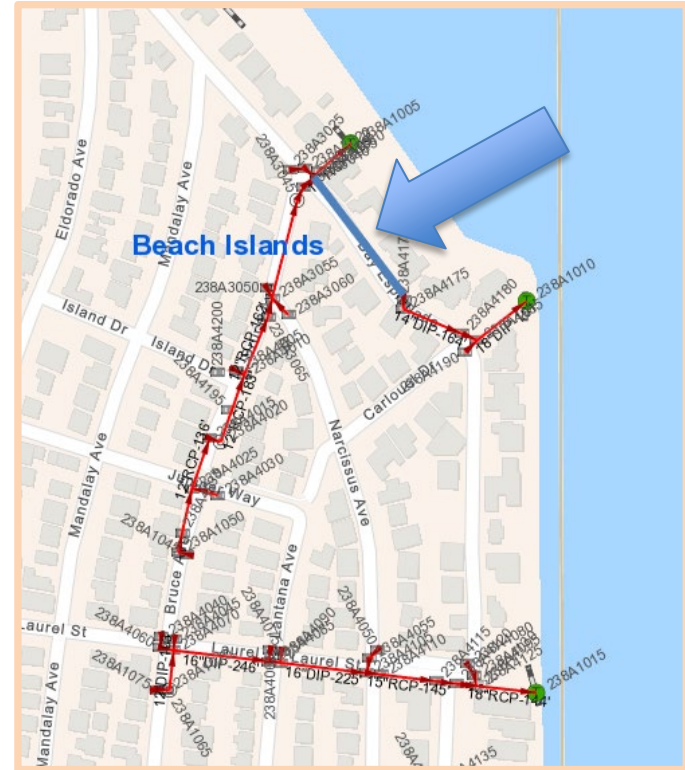
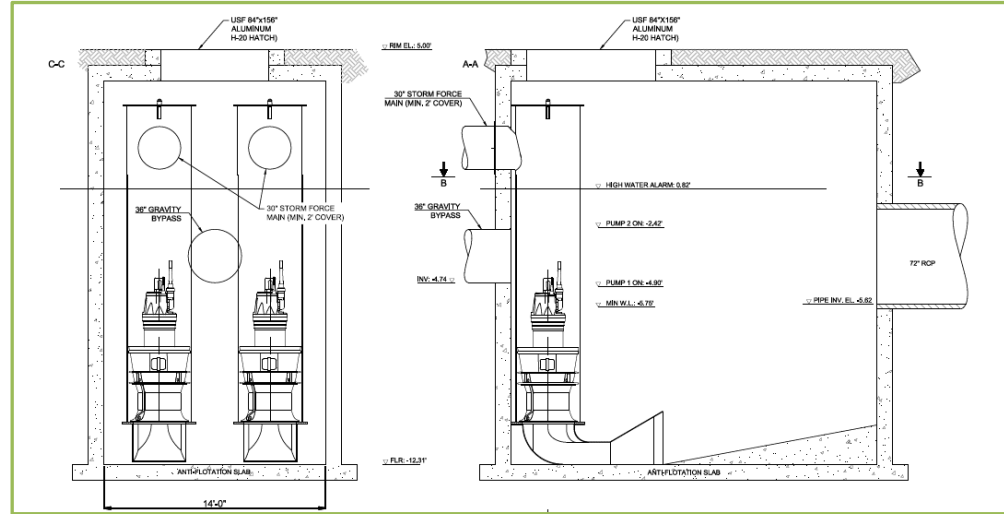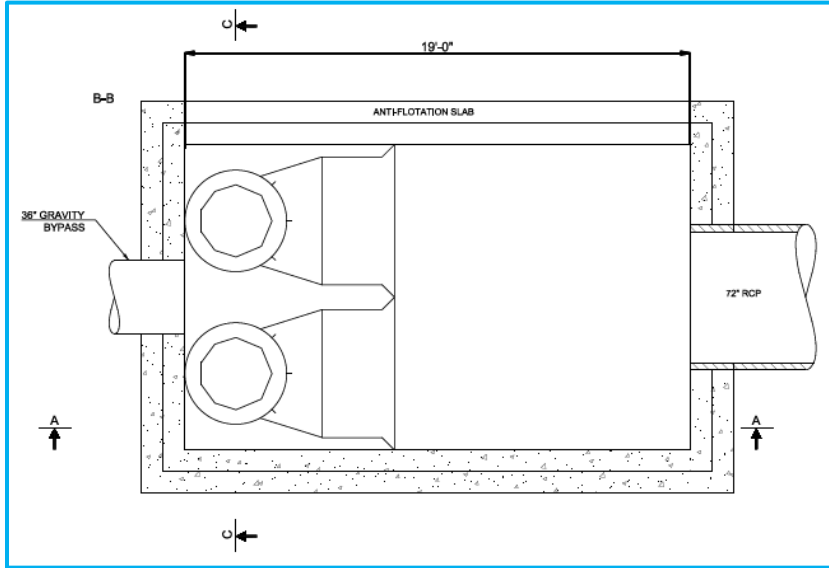# PRELIMINARY DETAIL OF PUMP STATION

Runoff Treatment

- Not required by permits for this type of project (size), but added to help our ocean waters
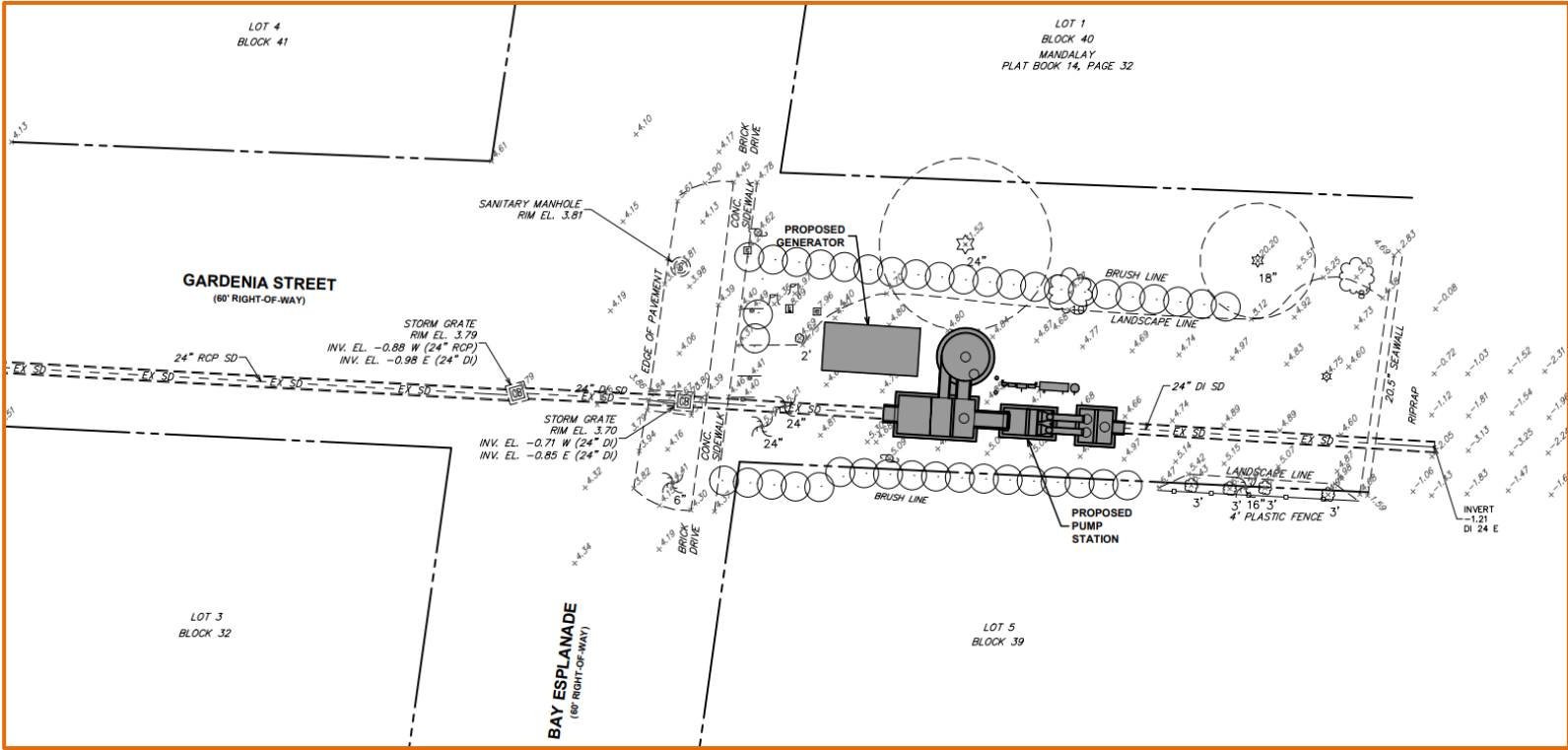
Relocating the tidal valve

- Move tidal valve to a vault accessible regardless of high tides
- Easier to inspect and maintain. Faster response.

NEW VALVE IN VAULT

EXISTING VALVE AT SEAWALL
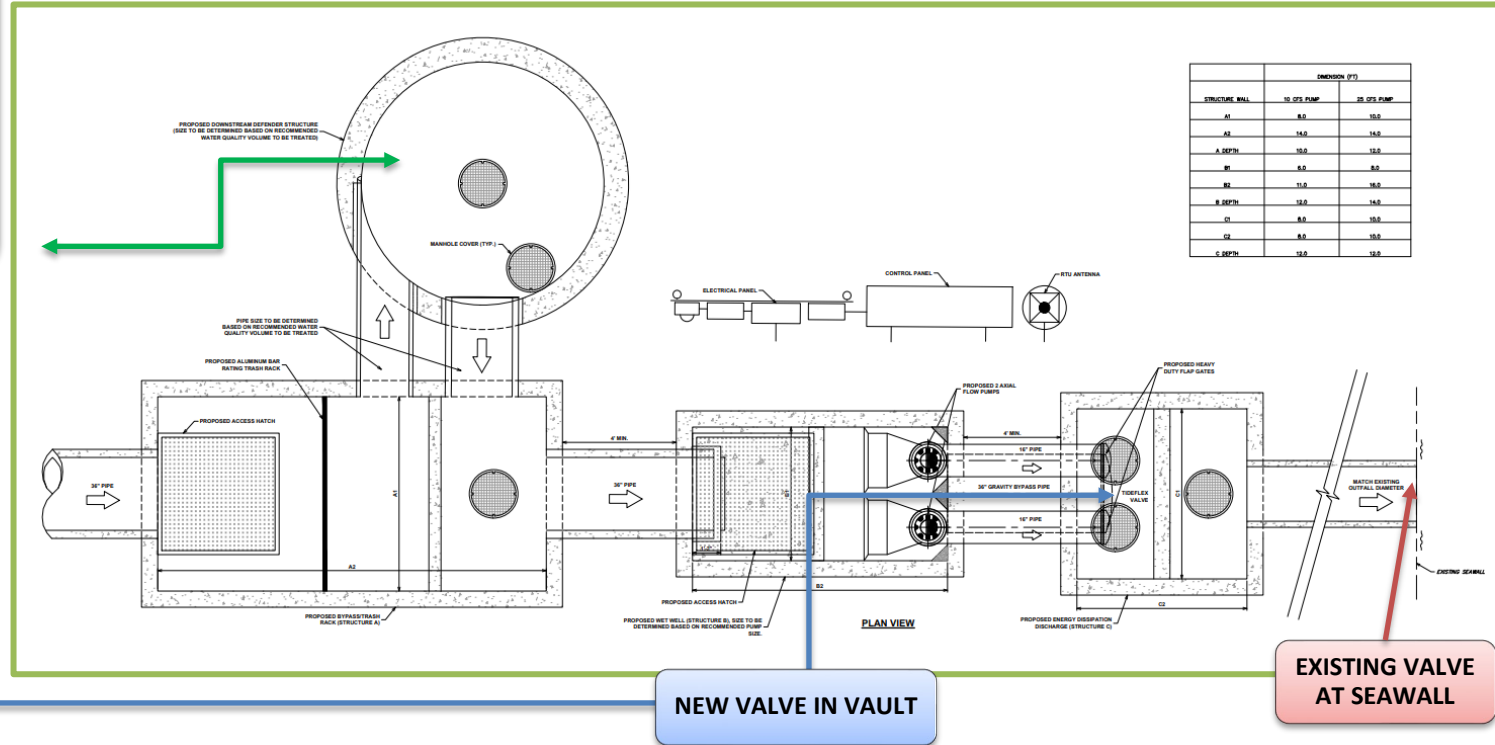
PRELIMINARY PUMP STATION DETAILS

PRELIMINARY SITE PLAN

FUNDING EFFORTS

Already Approved
• **$3M State appropriations**

Submitted – Undergoing Committee Process
• **Rep Luna efforts for $1.75M in federal funding**

Currently Working/Submitting
• **$7.5M HMGP Grant request**
• **$3.75M Florida Resiliency Grant request**

Approach
City is looking to leverage a grant stacking approach we target multiple grants and use them in combination to help reduce overall bill to the City.

Engineers awarded design effort had very impressive grant team and engagements that we expect to be very successful.

City included funding for these improvements as part of stormwater budgeting efforts. Grants help reduce impact to taxpayers, so we are looking to maximize efforts. Phased construction approach assists with this effort.

Questions?