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7 North Dixie Highway
Lake Worth, FL 33460
561.586.1600

AGENDA
CITY OF LAKE WORTH BEACH
CITY COMMISSION WORK SESSION - COASTAL RESILIENCY
CITY HALL COMMISSION CHAMBER
THURSDAY, NOVEMBER 05, 2020 - 6:00 PM

ROLL CALL:

PLEDGE OF ALLEGIANCE: led by Commissioner Herman Robinson

CLIMATE CHANGE SEA LEVEL RISE

A. Coastal Resilience Partnership – Update on the Climate Change Vulnerability Assessment

B. Discussion of 2020 FEMA Flood Zone Maps for Lake Worth Beach

C. Update on City's storm water and sanitary sewer collection system

CEMETERY

A. Pinecrest Cemetery Expansion Solutions

ADJOURNMENT:

If a person decides to appeal any decision made by the board, agency or commission with respect to any matter considered at such meeting or hearing, he or she will need a record of the proceedings, and that, for such purpose, he or she may need to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is to be based. (F.S. 286.0105)

EXECUTIVE BRIEF
WORK SESSION

AGENDA DATE: November 5, 2020 **DEPARTMENT:** Public Works

TITLE:

Coastal Resilience Partnership – Update on the Climate Change Vulnerability Assessment

SUMMARY:

Update the Commission and the Public on the Climate Change Vulnerability Assessment Process and Status.

BACKGROUND AND JUSTIFICATION:

The City of Lake Worth Beach is one of eight public agencies within Palm Beach County that is a part of the Coastal Resiliency Partnership (CRP). The CRP was created to bridge the common interests of each agency in planning for coastal and climate resilience, given their location, topography and geography. The CRP members (Lake Worth Beach, Lantana, Boynton Beach, Delray Beach, Highland Beach, Ocean Ridge, Boca Raton and Palm Beach County) are dedicated to partnering to address the impacts of climate change, protecting infrastructure and the built environment, fostering a resilient economy, safeguarding the natural environment, promoting social equity, promoting effective emergency response, and fostering science-based, non-partisan, and transparent communications together and to the Public

A major component of the CRP is to provide a detailed assessment of each of the participating agencies climate change vulnerabilities, risks and solutions. On May 4, 2020, the City of Lake Worth Beach, acting as Fiscal Agent for the CRP, awarded a professional services agreement to “Collective Water Resources, LLC” to perform a comprehensive Multi-Jurisdictional Climate Change Vulnerability Assessment. The assessment is fully underway and the following Tasks comprise the assessment:

1. Explore Climate Threats
2. Assemble data on Community Assets
3. Assess Vulnerabilities and Risks
4. Investigate Potential Adaptation Strategies
5. Prepare Final Report and Interactive Map

DIRECTION: N/A

ATTACHMENT(S):

Fiscal Impact Analysis N/A
Presentation

COASTAL RESILIENCE PARTNERSHIP

SOUTHEAST PALM BEACH COUNTY

November 1, 2020

City of Lake Worth Beach

Update on the Southern Palm Beach County Climate Change Vulnerability Assessment

Presentation Agenda

1. Coastal Resilience Partnership
2. Climate Change Vulnerability Assessment
3. Preliminary Flood Threat Results
    - Tidal Flooding
    - Storm Surge
    - Rainfall Induced Flooding
4. October 2020 Flooding
5. Regional Comparisons

Coastal Resiliency Partnership (CRP) Timeline

2017	2018	Early 2019	Late 2019	Early 2020	Today	Spring 2021
Began meeting to discuss common climate threats and needs	PBC opened Office of Resilience, CRP decided to pursue joint CCVA	Inventoried GIS data, developed CCVA scope, Drafted ILA	Revised and executed ILA, prepared RFP	Hired consultants, conducted 3 workshops, completed Steps 1-2 of CCVA	CCVA Step 3: Vulnerability Assessment	

Florida Department of Environmental Protection

Florida Department of Environmental Protection

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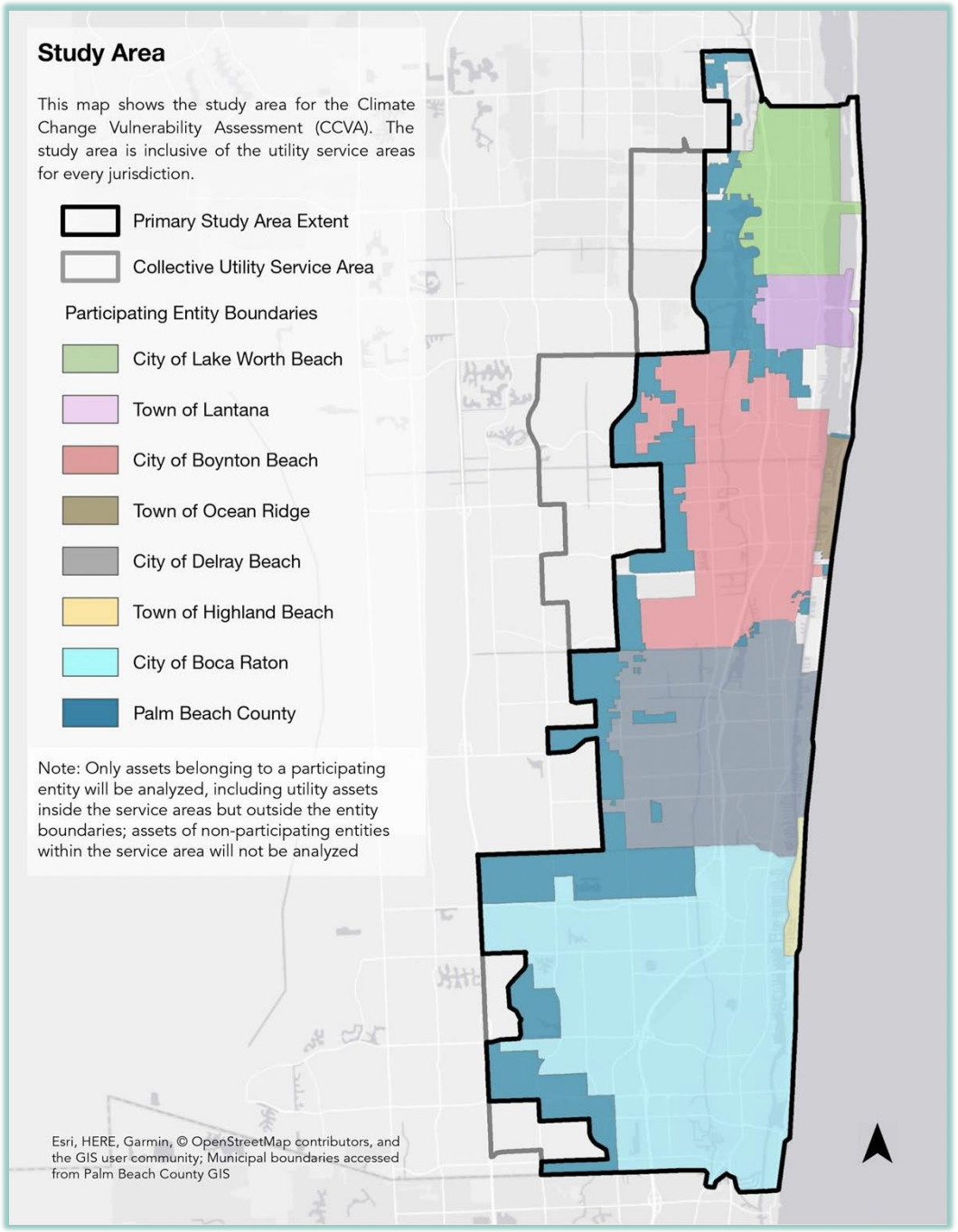
HARVARD LAW SCHOOL

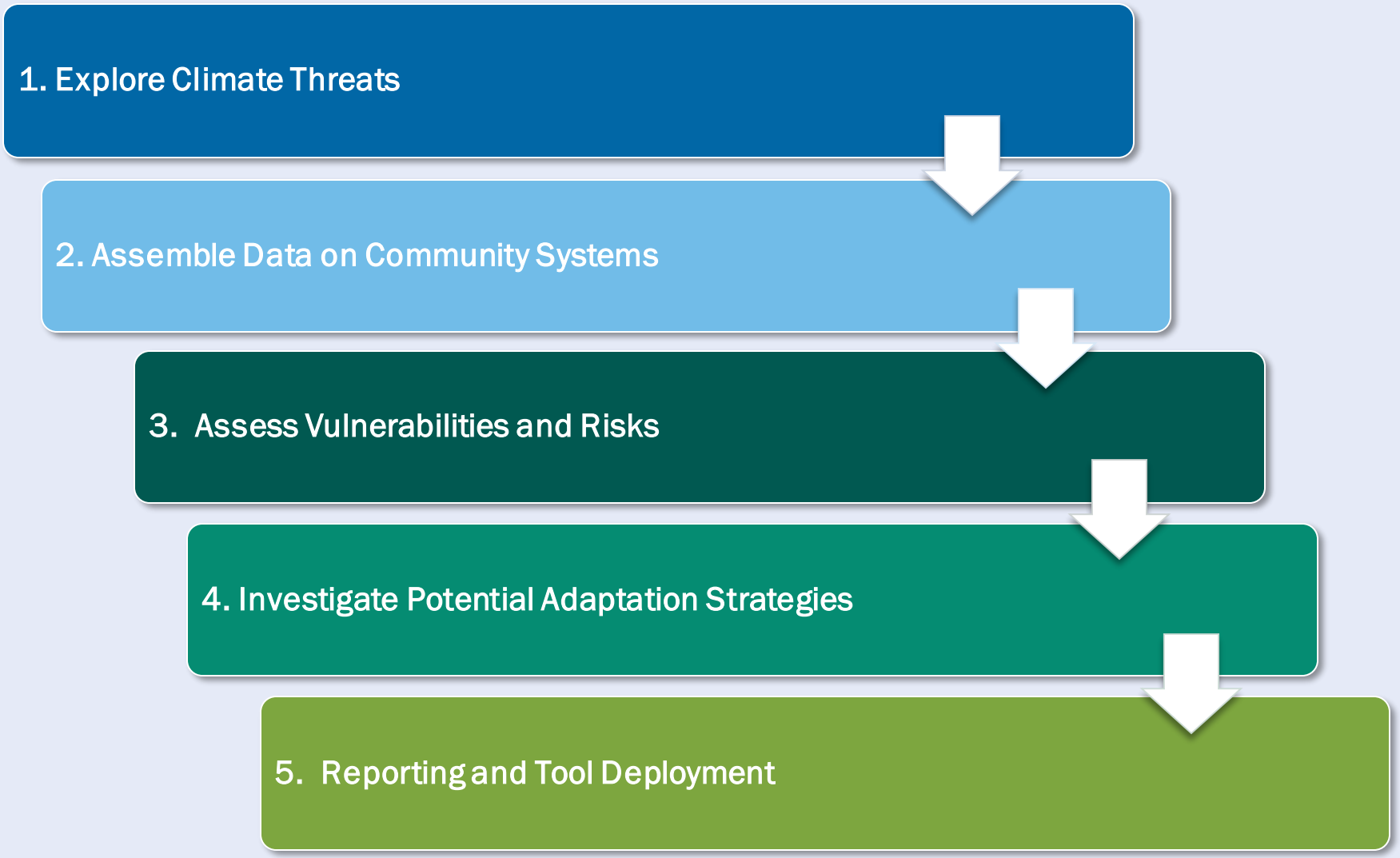
Collective
WATER RESOURCES

STUDY AREA



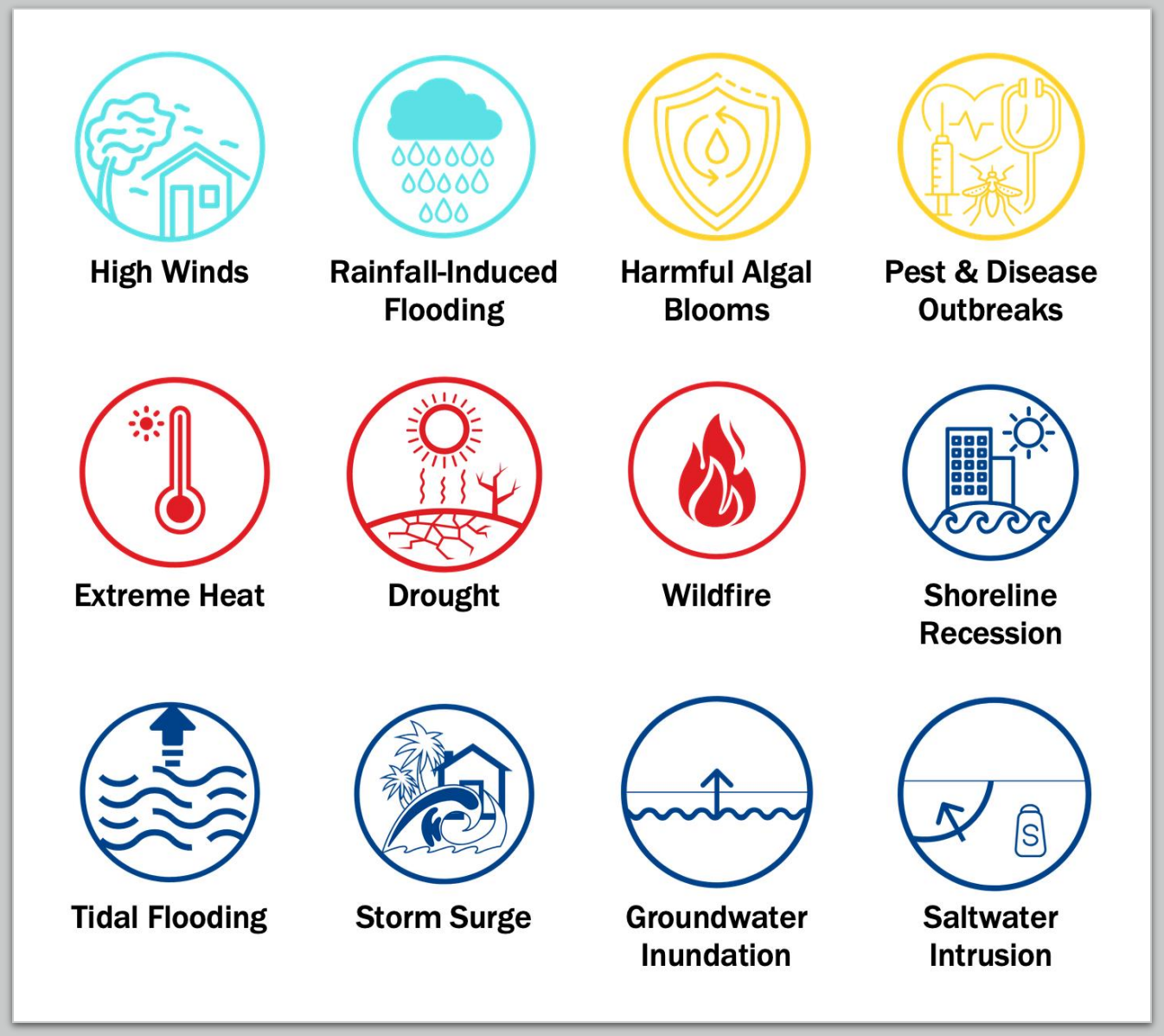
CRP

Climate Change Vulnerability Assessment: The Process



CRP

Top Dozen Threats

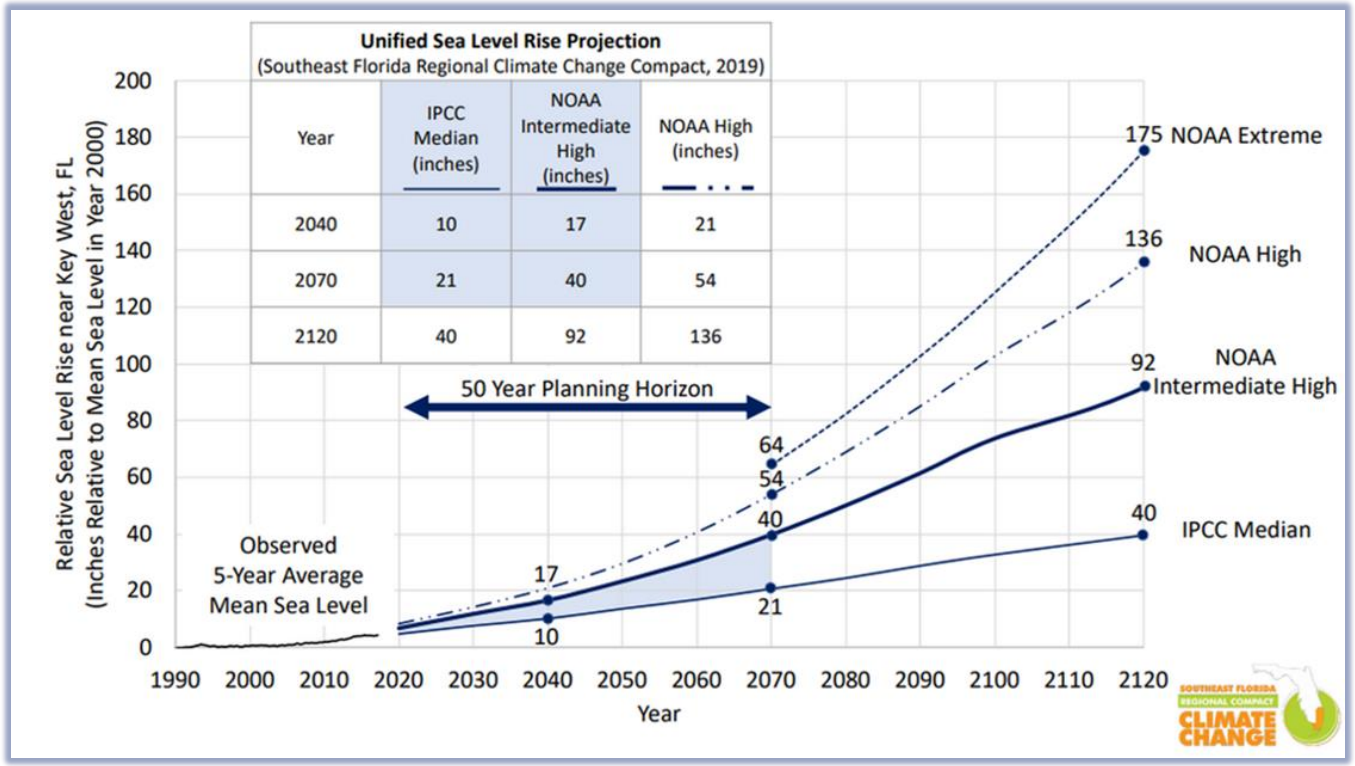


CRP

Sea Level Rise is a Threat Multiplier

It is not a threat on its own.

- **Storm Surge:** SLR is a component that increases risk
- **Tidal Flooding:** SLR will increase frequency and severity until a threshold of persistent inundation could be reached
- **Groundwater/Saltwater Intrusion:** SLR is the primary cause of these threats
- **Rainfall-Induced Flooding:** SLR interacts as a compounding event in coastal areas
- **Shoreline Recession:** SLR accelerates the movement of shoreline



CRP

Tidal Flooding*

**exacerbated by sea level rise*

Technical Lead: Steve Peene, PhD

Indicates above normal high tide events, unrelated to a storm, where water levels flow over the tops of sea walls and onto streets or force water into stormwater outfalls.

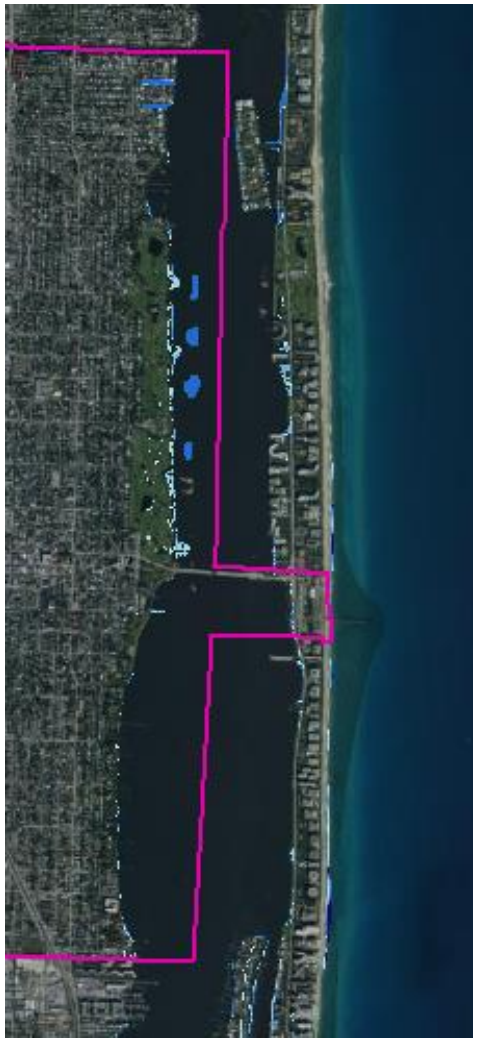
Analysis Type: Spatial

Climate Stressors:
- Sea level rise

Non-Climate Stressors:
- Aging infrastructure
- Level of Service (LOS) requirements

Data Sources:
- SWMP
- Measured and Predicted Tides within Study Area
- Sea Level Rise Projections
- Digital Elevation Model (DEM)
- NOAA Studies and Reports

2020



2040

2070

Analysis by ATM, Inc., S. Peene & N. Pisarello

Storm Surge*

**exacerbated by sea level rise*

Technical Lead: Steve Peene, PhD

Coastal flooding caused by an abnormal rise in tide from a storm (e.g. hurricane) over and above the usual, astronomical tide.

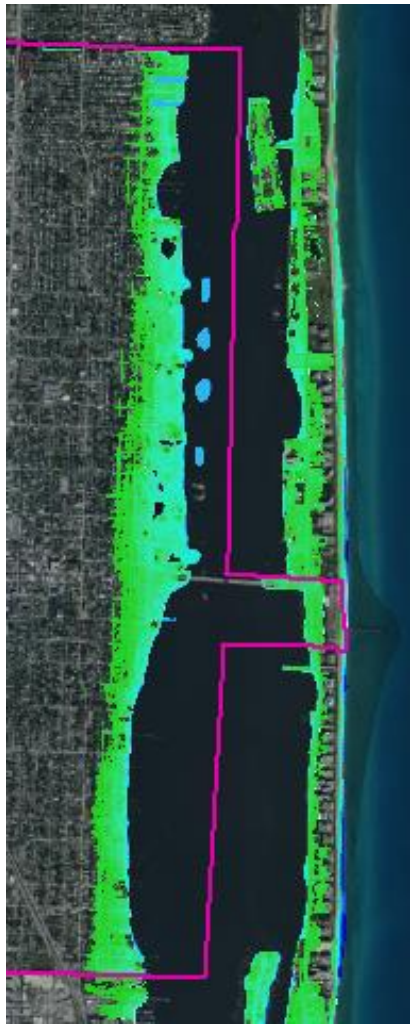
Analysis Type: Spatial

Climate Stressors:
- Sea level rise
- More frequent, stronger storms

Non-Climate Stressors:
- Aging infrastructure
- Density of development in coastal risk areas
- Level of Service (LOS) requirements

Data Sources:
- South Florida Flood Insurance Study Reports
- FEMA Base Maps; Flood Zones with (BFE)
- Still Water Elevations (SWEL)
- ADCIRC Wave Projections
- WHAFIS Model Information
- Sea Level Rise (SLR) Projections
- 2016 Digital Elevation Model (DEM)

2020



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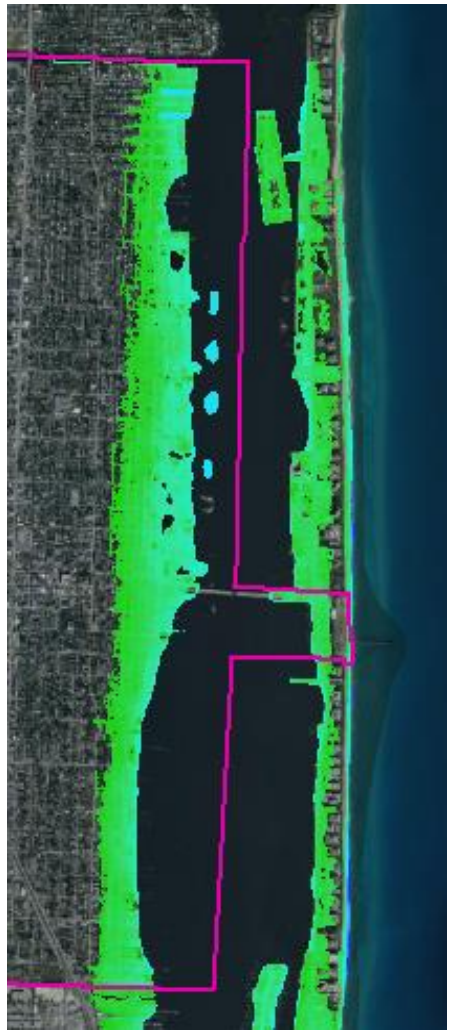

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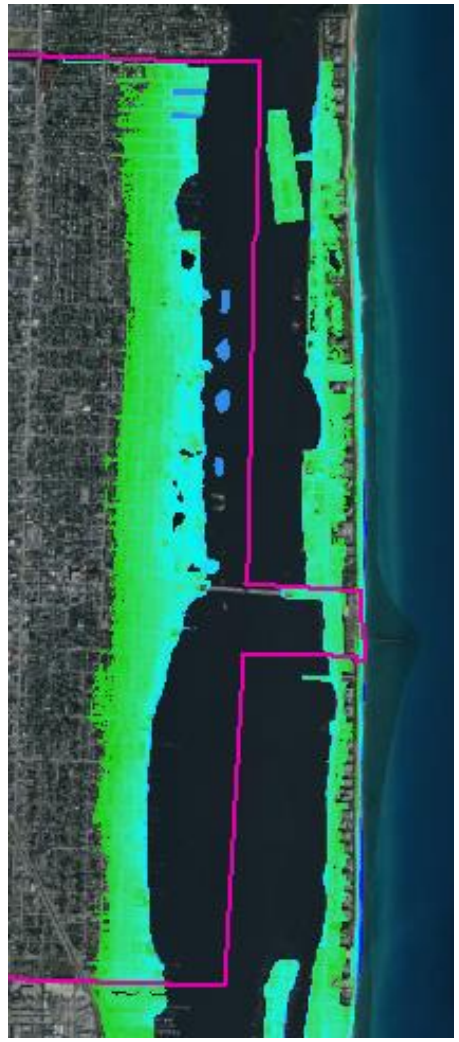
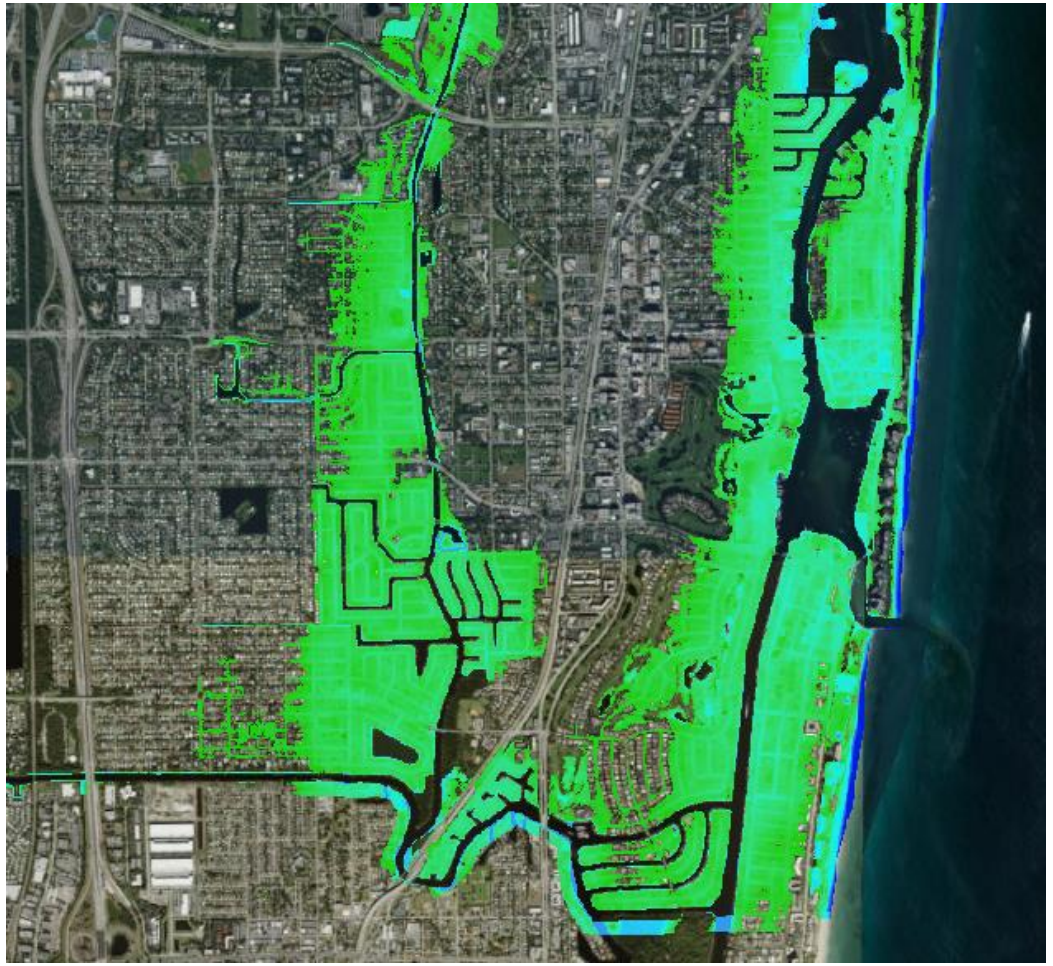


Analysis by ATM, Inc., S. Peene & N. Pisarello

Tidal Flooding and Surge Flooding is a Regional Issue

Other Communities in the CRP Project Area Face Similar Challenges



CRP

Rainfall Induced Flooding

Flooding due to the accumulation of rainwater on normally dry land.

Analysis Type:
- Spatial

Climate Stressors:
- Changes in spatial and temporal variability of rainfall

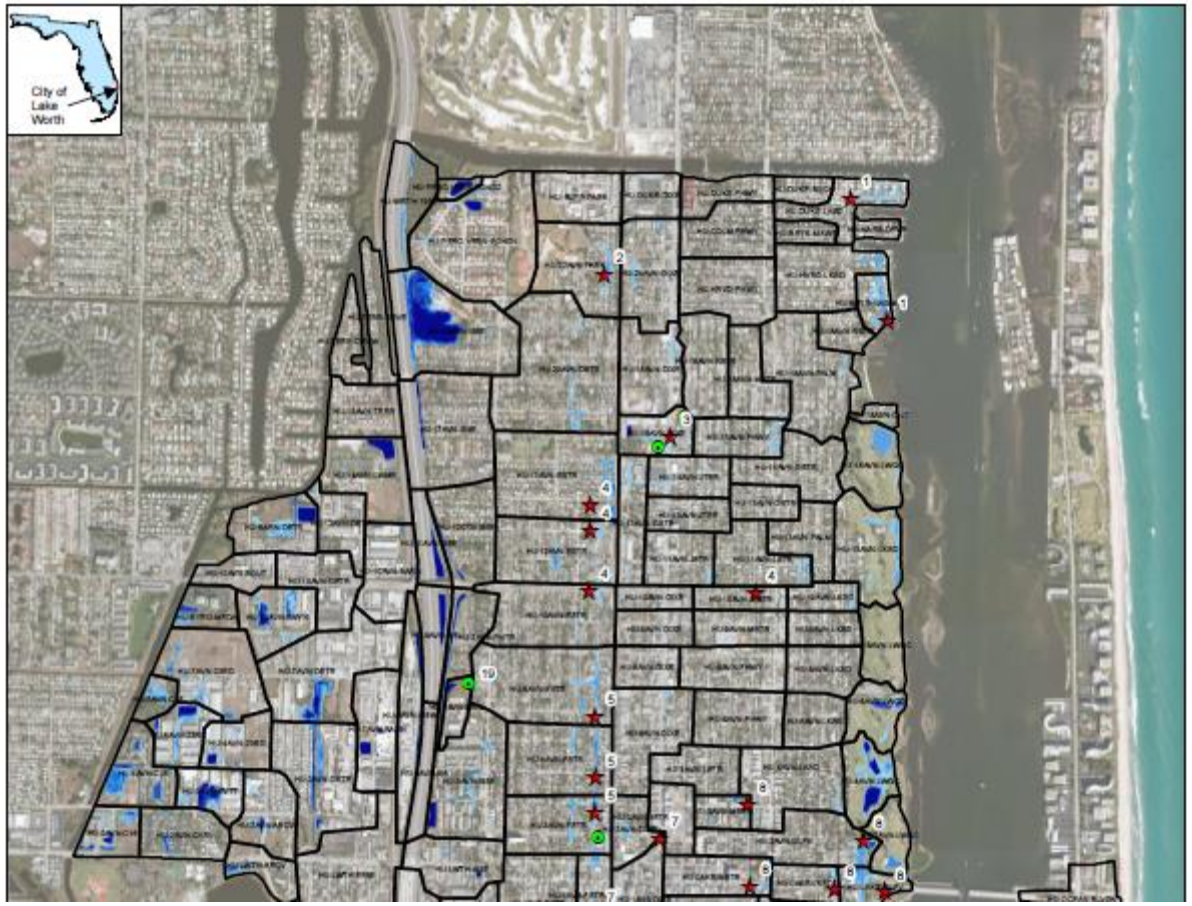
Non-Climate Stressors:
- Increases in impervious surfaces
- Aging infrastructure
- Development & floodplain alteration
- Maintenance challenges related to stormwater infrastructure

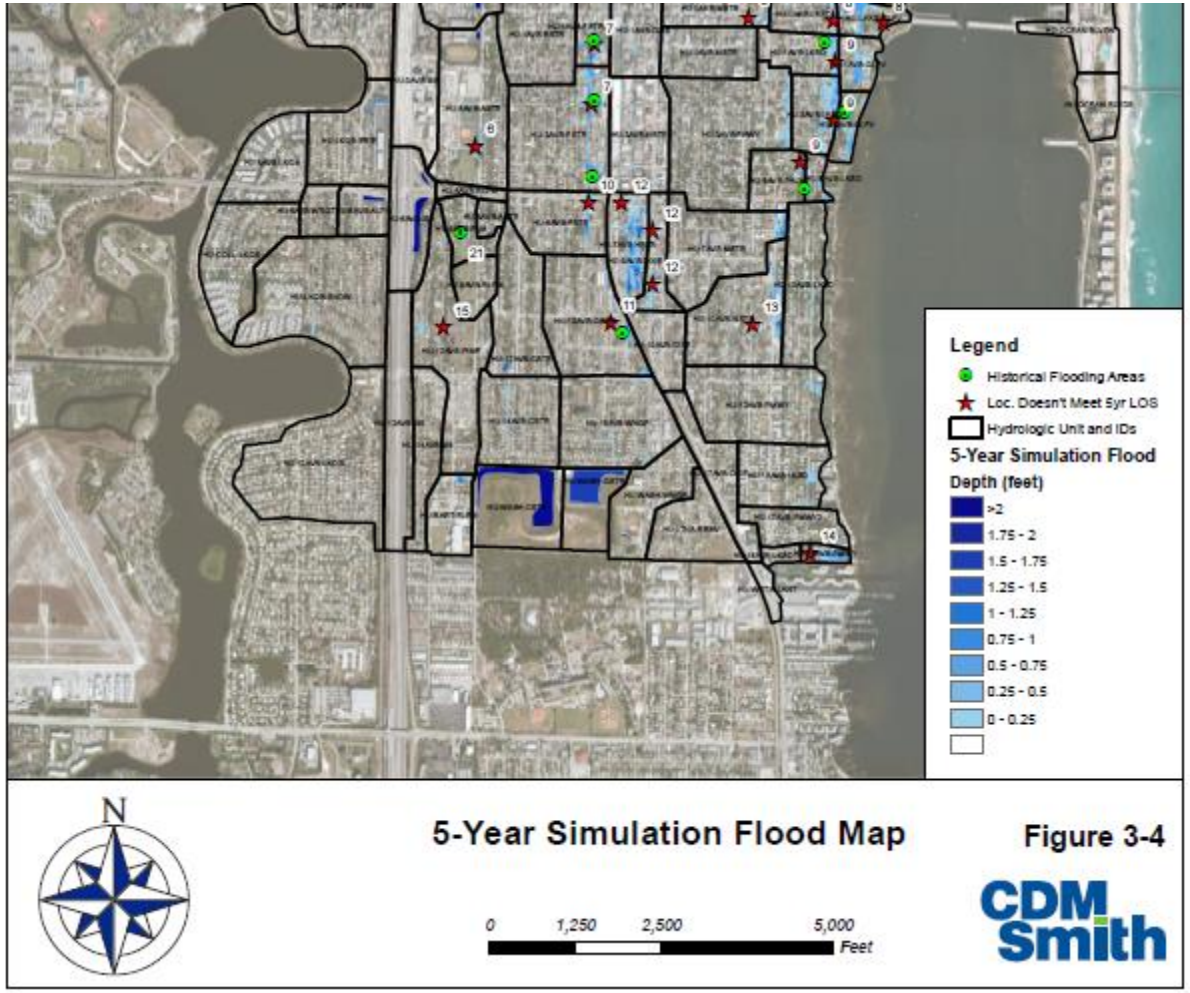
Data Sources:
- Stormwater master plans
- H&H/stormwater Models
- FEMA Maps/"Riverine" Floodplain Mapping
- Problem area reports
- Inundation mapping

CRP

CRP Regional Modeling - Not High Resolution Locally

2012 Stormwater Master Plan (CDM-Smith) – 5 year Design Storm

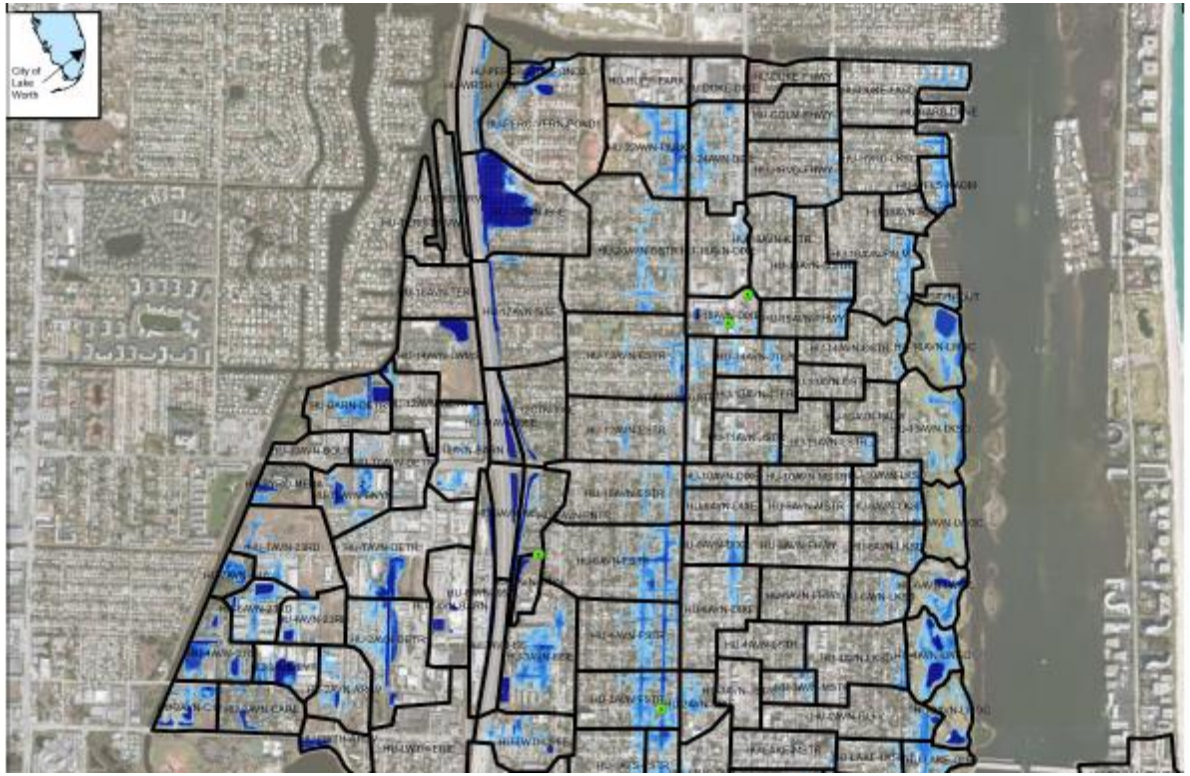


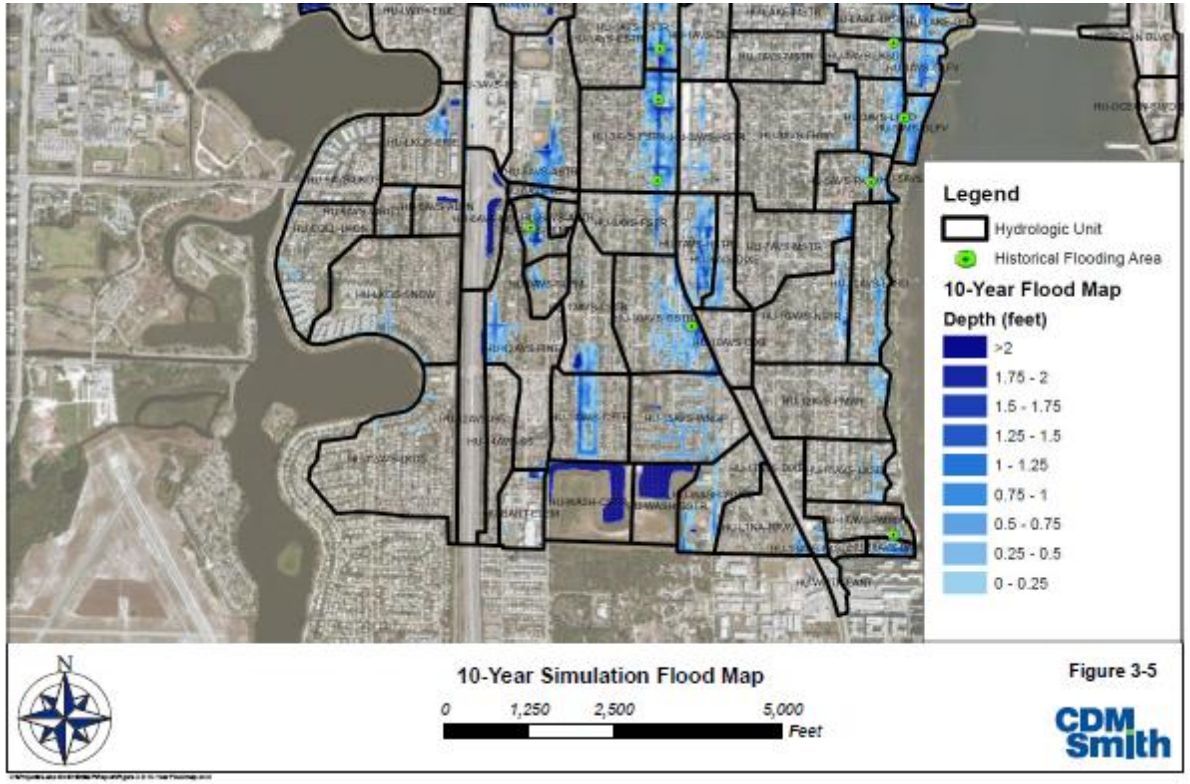


CRP

CRP Regional Modeling - Not High Resolution Locally

2012 Stormwater Master Plan (CDM-Smith) – 10 year Design Storm





CRP

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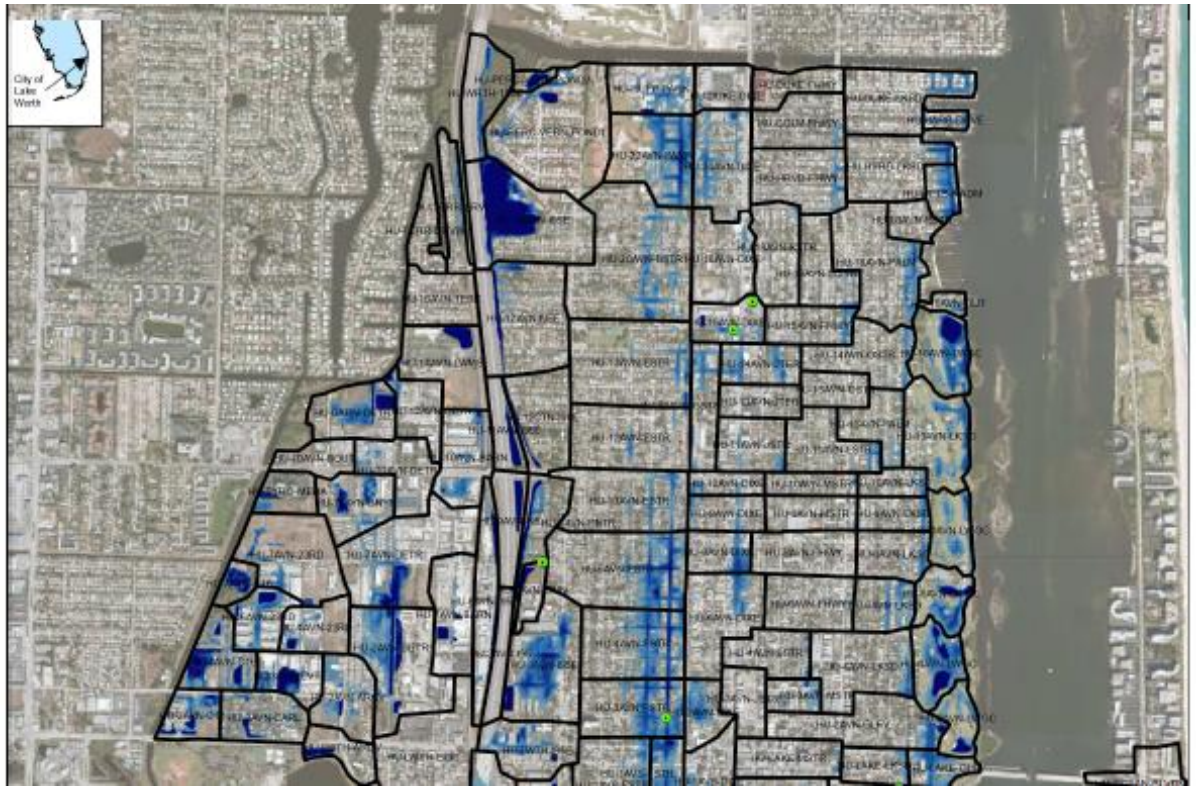

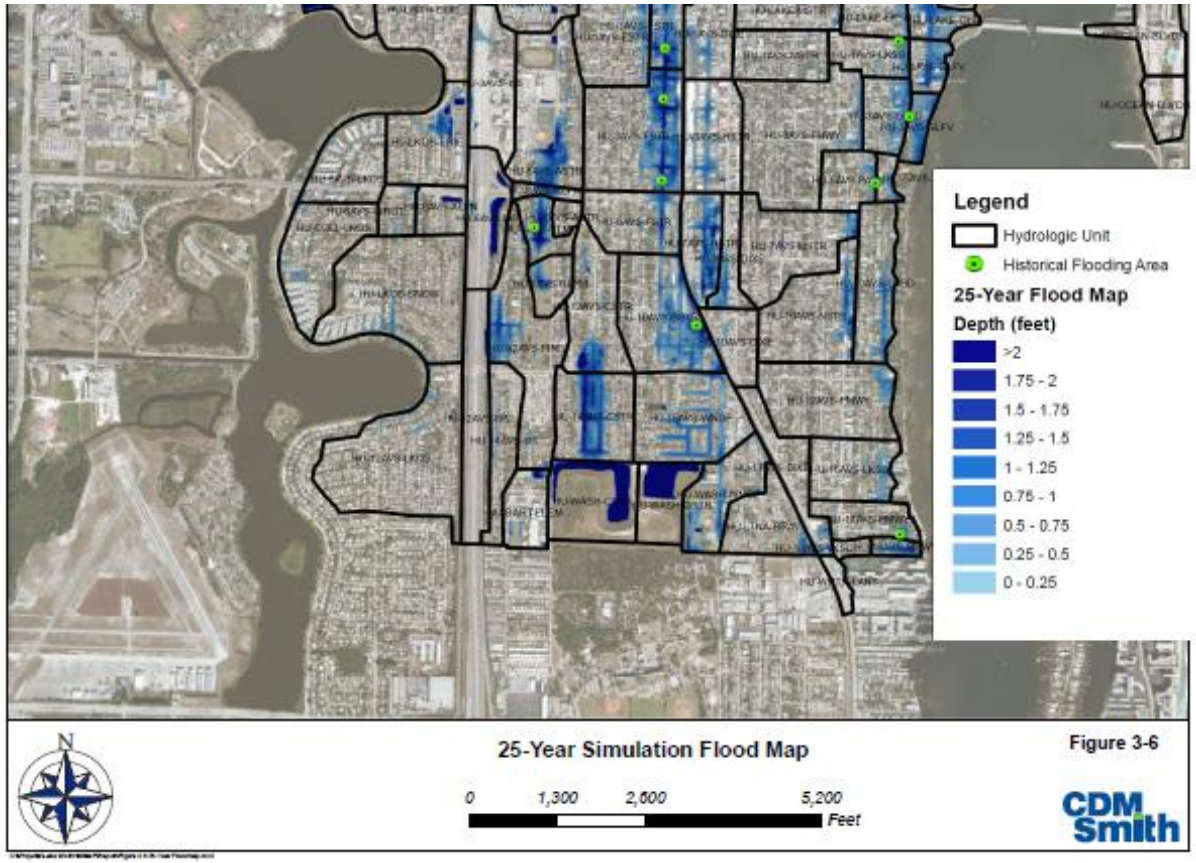

CRP

CRP Regional Modeling - Not High Resolution Locally

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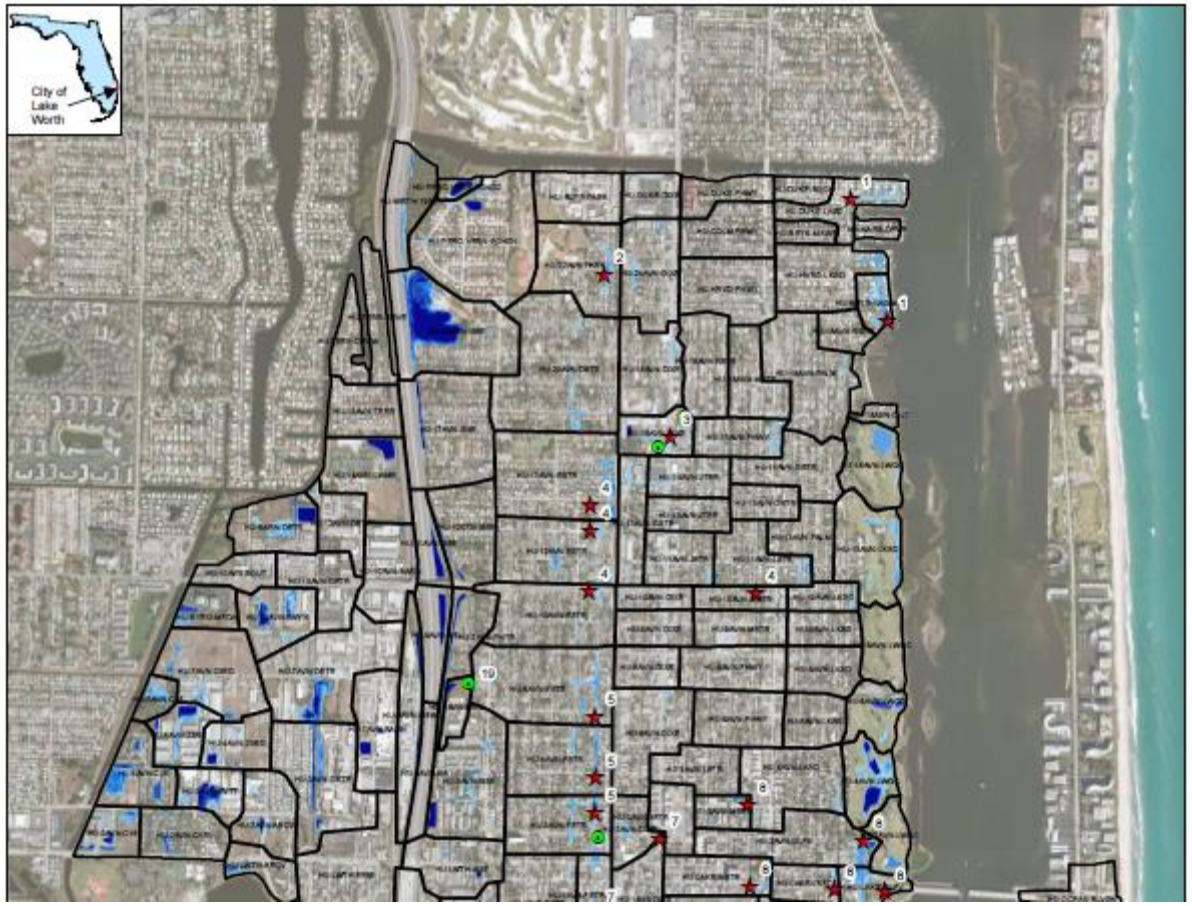
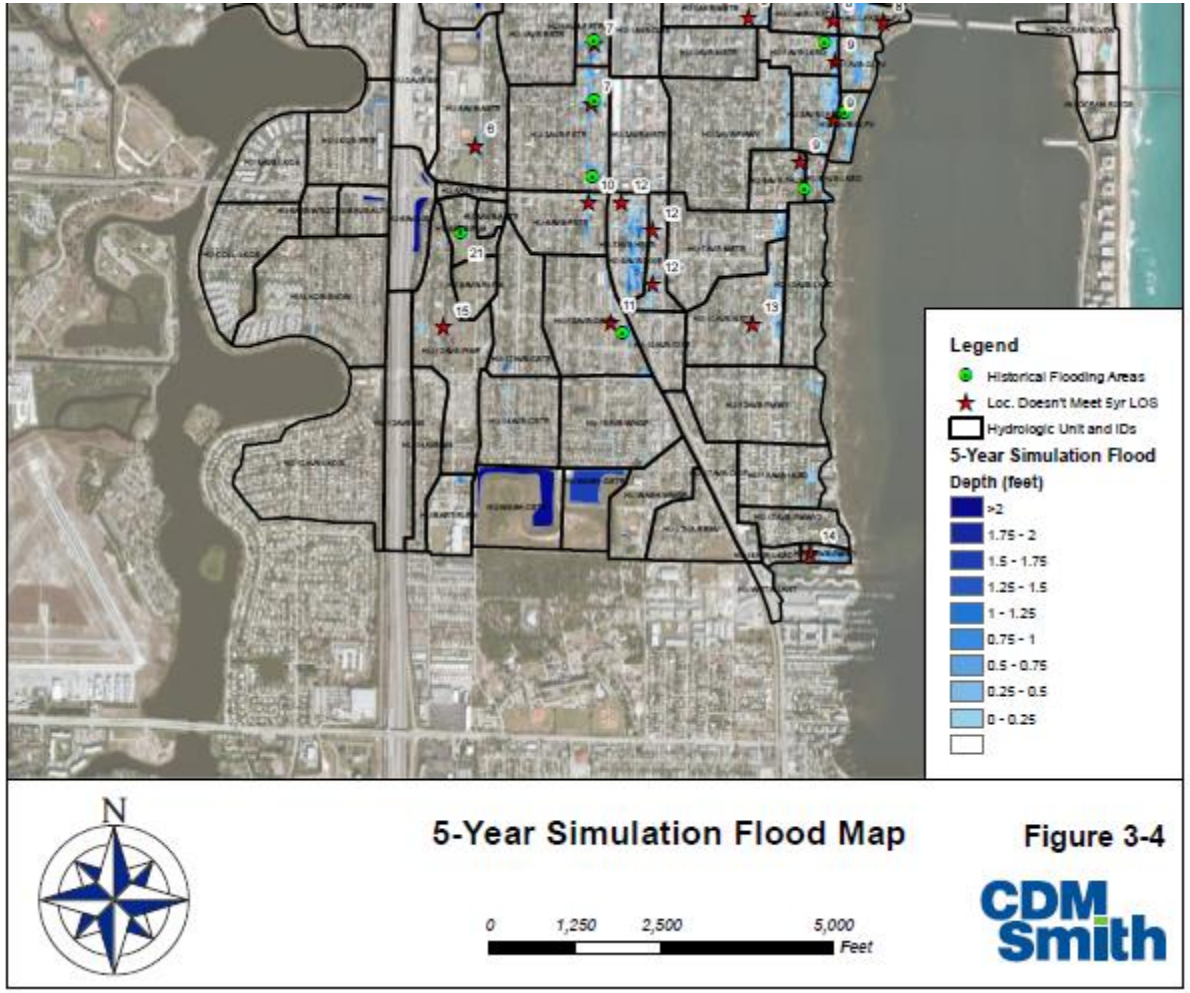




CRP

Recent Flooding (October 24-25) was a Regional Issue

Simo Volanen stands in knee-deep water after heavy rain flooded the Sea Pines neighborhood in Lantana on Monday. Residents are urged to call the Town of Lantana to report damage. GREG LOVETT/PALM BEACH POST

Lantana neighborhood that flooded could get aid

Kimberly Miller
Palm Beach Post
USA TODAY NETWORK

Palm Beach County officials are hoping there may be some emergency money available to help a Lantana neighborhood that found itself underwater after a weeklong deluge.

A rain gauge near the Sea Pines community east of Interstate 95 and north of Hypoluxo Road measured 9.86 inches in the week that ended Sunday, as tropical moisture was pushed into South Florida by the system that became Hurricane Zeta.

Palm Beach County Emergency Management Director Bill Johnson said the community might be eligible for disaster money and urged residents to call the Town of Lantana to report damage at 561-540-5775.

The rain gauge at Palm Beach International Airport measured 6.5 inches in the week that ended Sunday. The gauge about a mile northeast of the Sea Pines community is monitored by the Southeast Regional Climate Center.

Johnson said the Boynton Lakes community in Boynton Beach also may be eligible and that he is collecting damage information from both municipalities.

"I would encourage anyone to notify their flood insurance folks also," Johnson said. "Some of those people in Sea Pines are stranded. Their home may be fine, but their truck or car is sitting in their driveway and they would have to wade through water to get out of the area."

The county sent pumps into Sea Pines to remove the water. Lantana Town Manager Deborah Manzo said more than 1 million gallons of water was pumped out of the community overnight Sunday.

Johnson said it didn't appear that there was a problem with clogged drains, which had been cleared the week before.

"I was told it wasn't because there was junk sitting in the drainage system," he said. "I think it's just a matter of complete saturation."

In a statement to WPTV-Channel 5, Manzo said the town and county's drainage systems were functioning properly.

The National Weather Service in Miami had predicted a rainy week after a low pressure system stalled south of Cuba. The system became Hurricane Zeta on Monday and is forecast to reach the Gulf Coast between western Louisiana and the west end of Florida's Panhandle mid-week.

Kmiller@pbpost.com
@Kmillerweather

NEWS

Days of heavy rain flood Boynton Beach neighborhood

October 23, 2020 at 7:10 PM EDT - Updated October 23 at 7

After several days of rain in Palm Beach Co

There was sunshine after the rain Friday at flooding along Southwest Fourth Avenue.

Flooded Fort Lauderdale hit with 30% of annual rainfall in just one week

Several areas in Broward under water

FORT LAUDERDALE, Fla. – Streets are looking more like lakes in many areas of Broward County, making it hard for people to get into and out of their homes.

To give some perspective, officials with the City of Fort Lauderdale say 30% of the annual rainfall they were expecting in 2020 came down within the past week.

BROWARD COUNTY

Stormy Weekend Leaves Many Parts of Broward County Flooded

Published October 25, 2020 • Updated on October 26, 2020 at 5:27 am

6's Laura Rodriguez shows us how some residents plan on drying out with the watch going until Monday night.

er a wet 48 hours, nearly all of Broward County is dealing with flooding, leaving many in the a to deal with the stormy aftermath.

CRP

Assets – What will we analyze?

Asset Type	Primary Asset Categories	Asset Category Description
Critical Facilities	Public Safety	Emergency services including police and fire
	Food, Water, Shelter	Food distribution centers, SNAP retailers, shelters
	Health and Medical	Hospitals, clinics, extended care facilities, pharmacies
	Energy and Communications	Electrical utilities, substations, radio/cell tower properties
	Government Facilities	Schools (public and private), City/County buildings, and any other government-owned property (federal, state, municipal)
Water Infrastructure	Stormwater	Stormwater lines, BMPs, structures
	Wastewater	Wastewater lines, treatment plants, structures, lift stations
	Potable Water Supply	Water supply, lines, structures, treatment plants
Economic	Annual Sales Volume	Annual sales for businesses
	Jobs/Employees	Number of employees for business locations
Natural Resources	Beaches & Coastal Areas	Beaches or natural coastal property
	Natural Areas and Parks	Parks, greenways, waterbodies
People	Population/Social Vulnerability	Socioeconomics with a focus on sensitive or socially vulnerable populations, seasonal populations
Property	Commercial & Industrial Property	Retail, offices, industrial or manufacturing,
	Cultural Property	Religious or cultural property, landmarks, historical properties
	Residential Property	Any multi or single residence, group homes, public housing, apartments and condos
Transportation & Mobility	Roads & Transportation Systems	All major and minor roads, transportation facilities

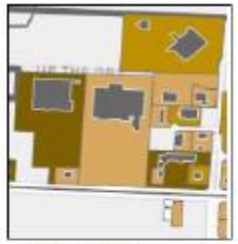
CCVA – Next Steps

Investigate Potential Mitigation Strategies:

- Infrastructure Recommendations
- Policy Recommendations

Reporting and Tool Development:

- AccelAdapt

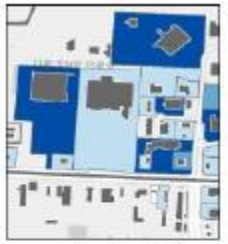


Potential Impact

High (dark tan): business structure exposed
Med: storage structure exposed
Low (light tan): only land inundated

Adaptive Capacity

Low (dark green): exposed structure built before BFE requirement
Med: exposed structure at BFE
High (light green): exposed structure built 1-2ft above BFE

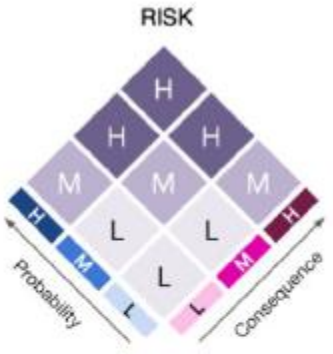


Probability

High (dark blue): in 10-yr inundation extent
Med: In 100-yr inundation extent
Low (light blue): in 500-yr inundation extent

Consequence

High (dark purple): exposed structure > median value
Med: exposed structure < median value
Low (light purple): no exposed structure



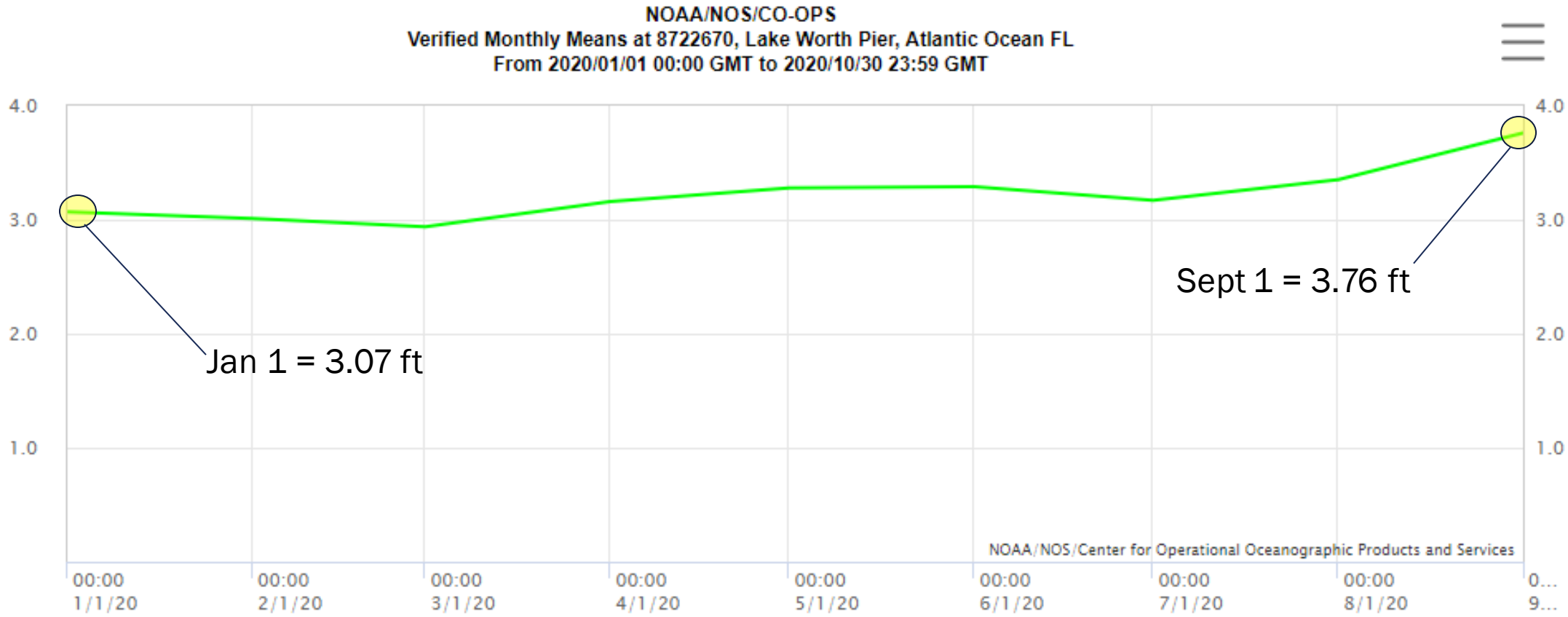
Vulnerability

Risk Scoping

October 2020 Flooding

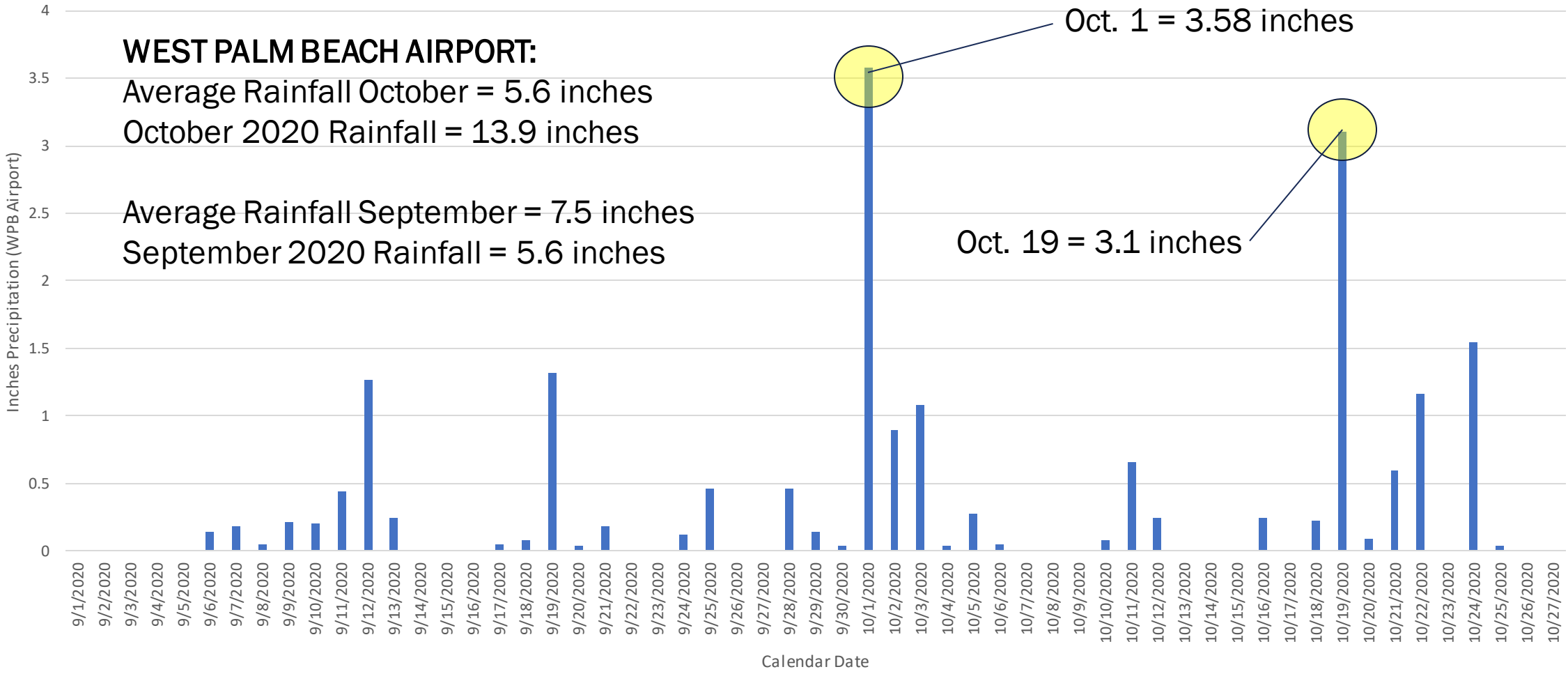
1. Tidal Conditions
2. Antecedent Conditions
3. Weekend Rainfall

NOAA Tide Gage Data
Lake Worth Pier

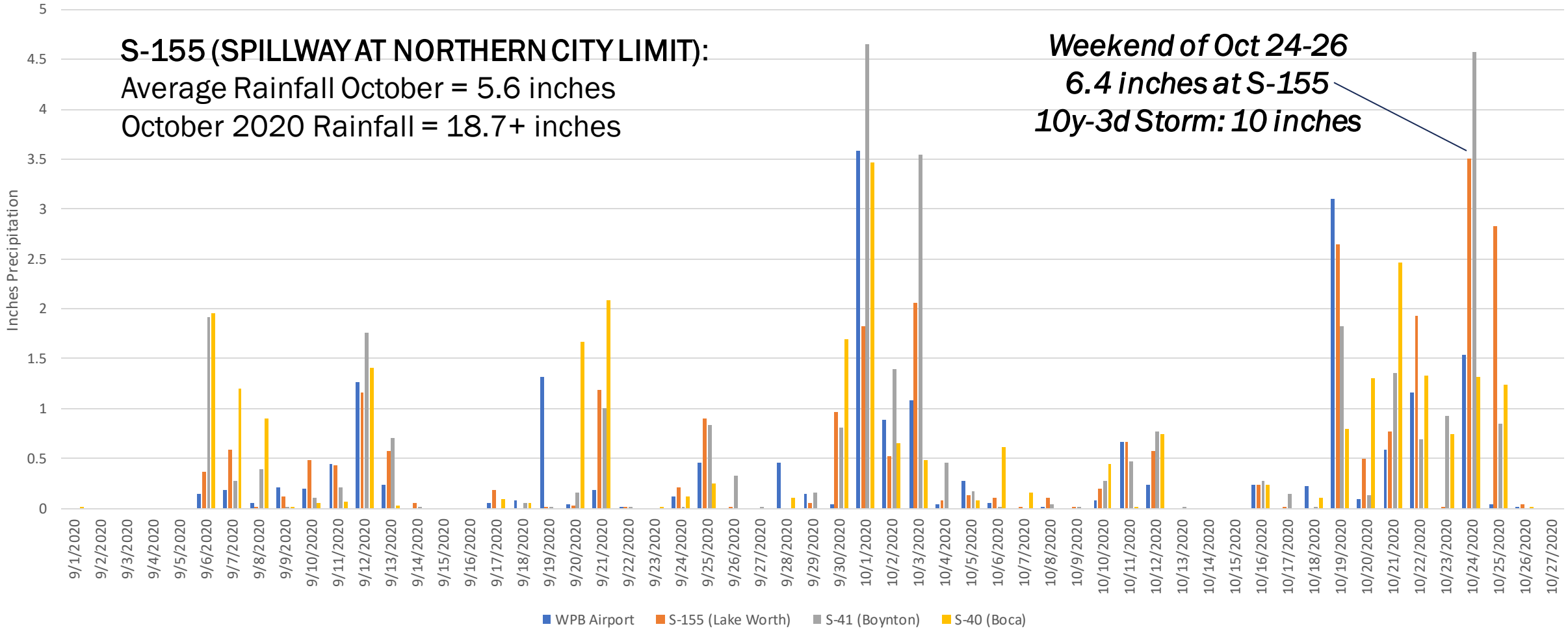


Seasonal increases in tides diminish the capacity to discharge runoff by gravity

Antecedent Conditions Daily Precipitation September-October 2020



Daily Precipitation at S-155 / S-40 / S-41 September-October 2020



Higher Tides + Higher Rainfall = Flooding in Low Lying Areas

CRP

QUESTIONS

EXECUTIVE BRIEF
WORK SESSION

AGENDA DATE: November 6, 2020 **DEPARTMENT:** Community Sustainability

TITLE:

Discussion of 2020 FEMA Flood Zone Maps for Lake Worth Beach

SUMMARY:

Preliminary FEMA Flood Maps were published in February 2020 for the region. The formal adoption of the new maps will have a number of consequences including more properties will be required to have flood insurance and new structures will be required to have finished floor elevations as high as 11'-0" NAVD. Federal regulations have required that the City implement the new maps and rules even though they have not been formally adopted.

BACKGROUND AND JUSTIFICATION:

The last flood zone maps adopted and in effect for Lake Worth Beach are from 2016. Over the past several years, FEMA (Federal Emergency Management Agency) has been evaluating the entire coast line of Florida. This study included new wave run up analysis with current topography. The 2016 maps were still using the data from the 1970's. The new maps include anticipated 100-year and 500-year flood occurrence projections. The new data is based upon the latest studies, and the City has been required to enforce the new elevation requirements of the 2020 maps prior to their formal adoption.

The new maps extend the 100-year flood zone to the east all the way to Federal Highway in many areas. The 500-year flood zone will extend almost to Dixie Highway. The most significant impact of the new maps is the required finished floor elevations that new structures and expansions for existing structures must meet. In addition, the Florida Building Code has incorporated a one-foot freeboard elevation requirement. In the 2020 Florida Building Code, effective December 31st, 2020, there will be additional requirements. The result is that both new buildings and expansions of existing buildings will be required to be substantially higher than they are currently and have historically been.

Another significant consequence of the map changes will be the limitation being placed on existing structures in terms of improvements, upgrades and changes. Existing buildings will be limited to improvements that do not exceed fifty percent (50%) of the building's value. If improvements exceed this threshold, then the entire building will need to be raised to the new required flood elevation height. The improvements will need to be tracked for a five- year period. If the total value of the improvements reaches 50% of the structure's value, the structure will need to be elevated. Contributing historic structures are afforded some exemptions from these requirements including variances from the required finished floor elevations that must be approved by the Historic Resources Preservation Board.

Finally, many additional properties will be required to have flood insurance, which will add to the cost of owning a property in flood zones. Most homeowner insurance policies do not include either storm surge or flooding from rain protections as standard coverage.

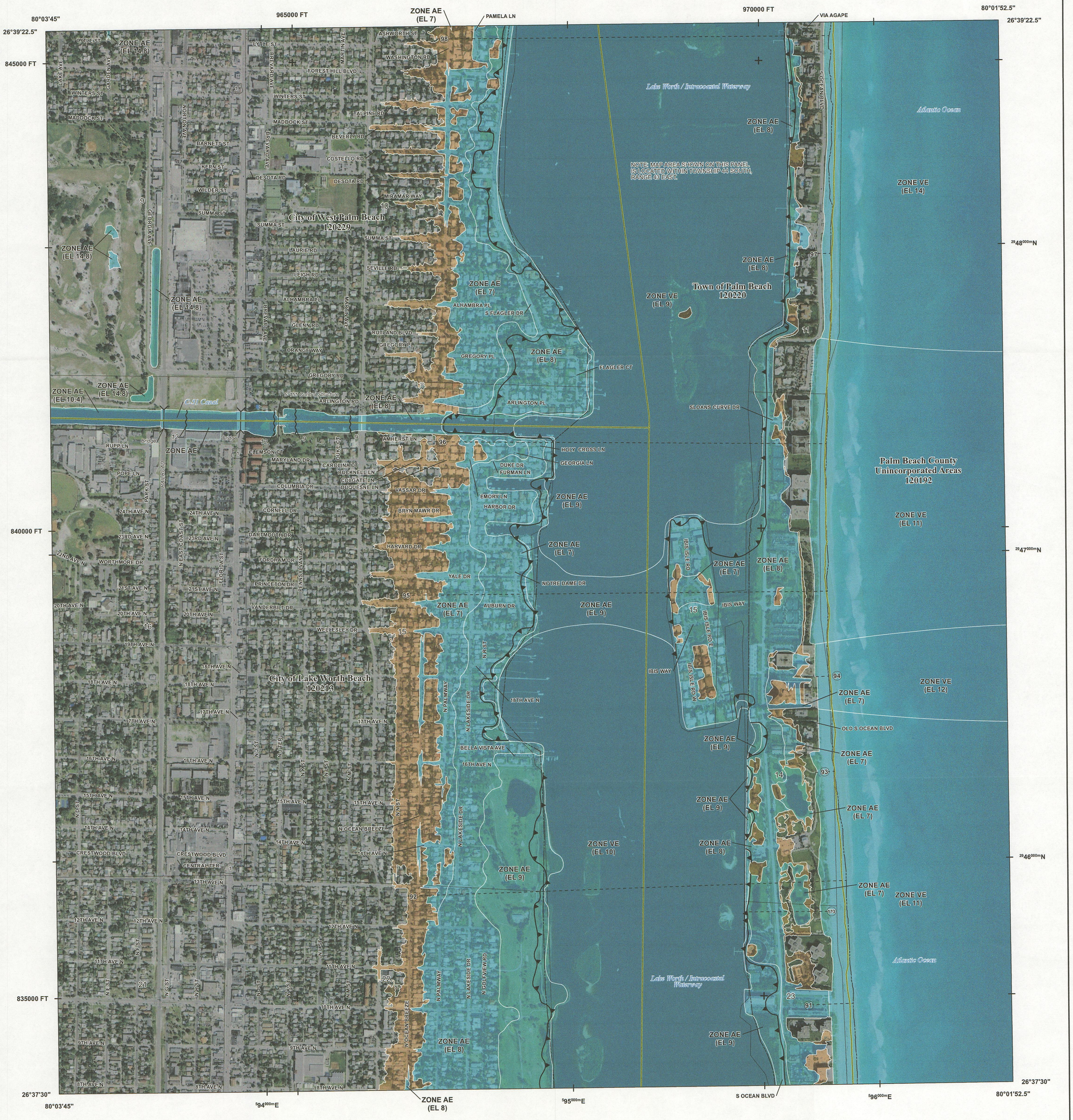
The future of development and investment within the City will be changing. Regulatory requirements from both the Federal and state levels that address the local impacts of sea-level rise and climate change will continue to have both a financial and visual impact on the city and its many existing structures east of Federal Highway. Local governments in both Monroe and Miami-Dade Counties already have begun the process of modifying local code and land development regulations to adapt to the changing climatic and environmental conditions.

DIRECTION:

Information only

ATTACHMENT(S):

Fiscal Impact Analysis – N/A
2020 maps
2016 maps
Presentation



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS

- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- E 18.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided by Palm Beach County, dated 2009 and 2019; the United States Geological Survey, dated 2004; and the Federal Emergency Management Agency, dated 2014 and 2017. Aerial imagery was provided by the United States Department of Agriculture, dated 2017, and has a ground sample resolution of 1 meter.

LIMIT OF MODERATE WAVE ACTION: Zone AE has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between Zone VE and the LiMWA (or between the shoreline and the LiMWA for areas where Zone VE is not identified) will be similar to, but less severe than, those in the Zone VE.

Limit of Moderate Wave Action (LiMWA)

SCALE

N

Map Projection:
State Plane Transverse Mercator, Florida East Zone 0901; North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 250 500 750 1,000 2,000 feet

0 125 250 500 meters

PANEL LOCATOR

*PANEL NOT PRINTED

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

PALM BEACH COUNTY, FLORIDA
and Incorporated Areas

PANEL 593 OF 1200

Panel Contains:

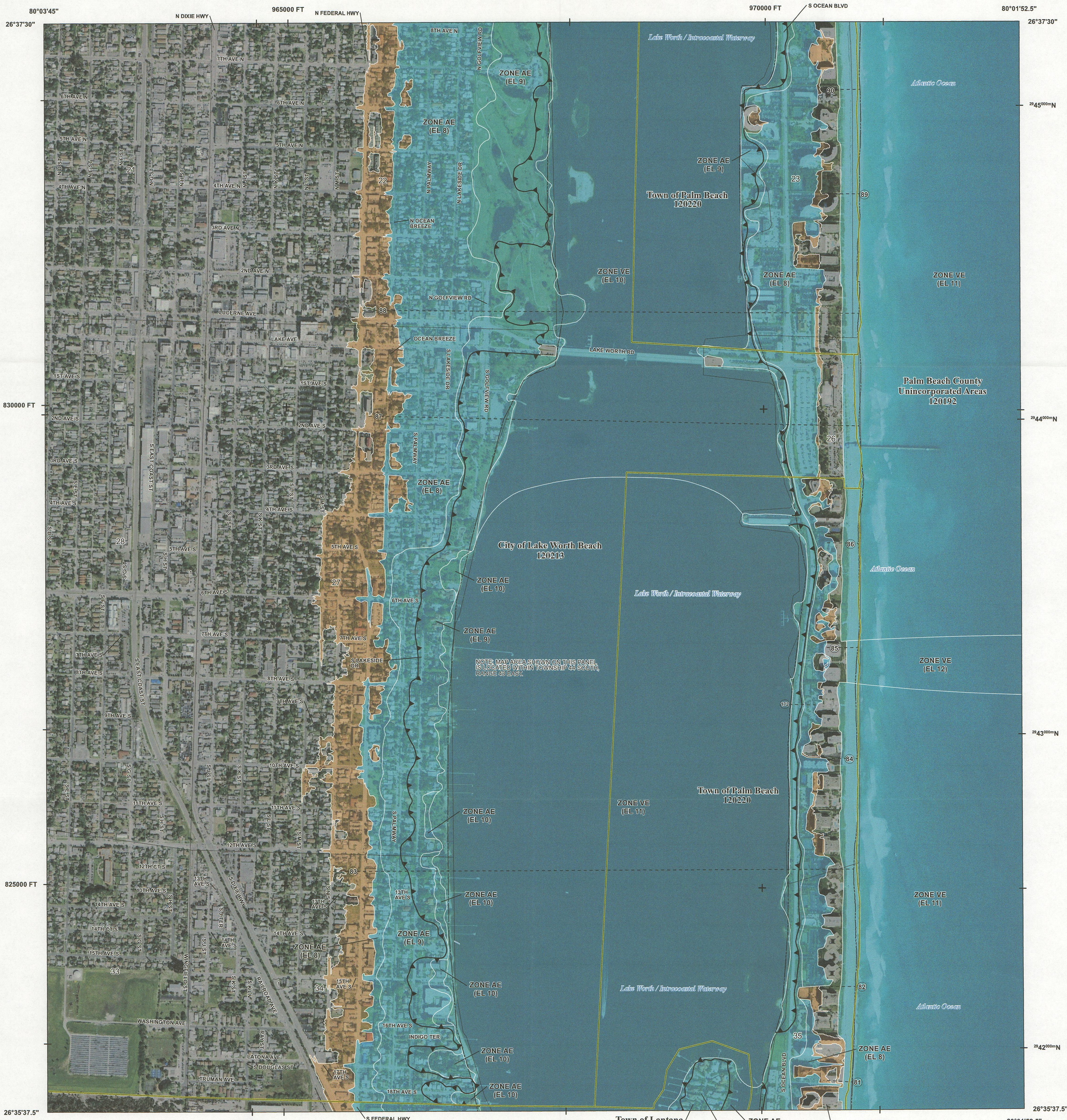
COMMUNITY	NUMBER	PANEL	SUFFIX
LAKE WORTH BEACH, CITY OF	120213	0593	G
PALM BEACH COUNTY	120192	0593	G
PALM BEACH, TOWN OF	120220	0593	G
WEST PALM BEACH, CITY OF	120229	0593	G

PRELIMINARY
12/20/2019

VERSION NUMBER
2.6.3.4

MAP NUMBER
12099C0593G

MAP REVISED



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- E 18.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 — Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided by Palm Beach County, dated 2009 and 2019; the United States Geological Survey, dated 2004; and the Federal Emergency Management Agency, dated 2014 and 2017. Aerial imagery was provided by the United States Department of Agriculture, dated 2017, and has a ground sample resolution of 1 meter.

LIMIT OF MODERATE WAVE ACTION: Zone AE has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between Zone VE and the LiMWA (or between the shoreline and the LiMWA for areas where Zone VE is not identified) will be similar to, but less severe than, those in the Zone VE.

Limit of Moderate Wave Action (LiMWA)

SCALE

N

Map Projection:
State Plane Transverse Mercator, Florida East Zone 0901; North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 250 500 750 1,000 2,000 feet

0 125 250 500 meters

PANEL LOCATOR

*PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

PALM BEACH COUNTY, FLORIDA
and Incorporated Areas

PANEL 781 OF 1200

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LAKE WORTH BEACH, CITY OF	120213	0781	G
LANTANA, TOWN OF	120214	0781	G
PALM BEACH COUNTY	120192	0781	G
PALM BEACH, TOWN OF	120220	0781	G

PRELIMINARY 12/20/2019

VERSION NUMBER
2.6.3.4

MAP NUMBER
12099C0781G

MAP REVISED

NOTES TO USERS

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To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded tenth-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

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Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Transverse Mercator State Plane Florida East FIPS Zone 0901 Feet. The **horizontal datum** was NAD83 HARN, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

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LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- 513 (EL 987) — Base Flood Elevation line and value; elevation in feet* / Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A — A: Cross section line
- 23 — 23: Transect line
- 97°07'30", 32°22'30": Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4276000mE / 6000000 FT: 1000-meter Universal Transverse Mercator grid ticks, zone 17
- 5000-foot grid values: Florida State Plane coordinate system, East Zone (FIPSZONE = 901), Transverse Mercator projection
- DX5510 ×: Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5: River Mile

MAP REPOSITORIES
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EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
OCTOBER 5, 2017

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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250 0 250 500 750 1,000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0593F N.E.

FIRM

FLOOD INSURANCE RATE MAP

PALM BEACH COUNTY, FLORIDA AND INCORPORATED AREAS

PANEL 593 OF 1200

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

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WEST PALM BEACH, CITY OF	120229	0593	F

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MAP NUMBER
12099C0593F
EFFECTIVE DATE
OCTOBER 5, 2017

Federal Emergency Management Agency

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ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

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M1.5 River Mile

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EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
OCTOBER 5, 2017

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0781F S.E.

FIRM

FLOOD INSURANCE RATE MAP

PALM BEACH COUNTY, FLORIDA AND INCORPORATED AREAS

PANEL 781 OF 1200

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

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MAP NUMBER 12099C0781F

EFFECTIVE DATE OCTOBER 5, 2017

Federal Emergency Management Agency

CITY OF LAKE WORTH BEACH

Community Sustainability℠

City Commission Workshop

November 5, 2020

Discussion of new 2020 FEMA Flood Zone Maps

And

City Impacts

FEMA Flood Maps 2020 Discussion

Discussion of pending new 2020 FEMA Flood Maps for the City of Lake Worth Beach.

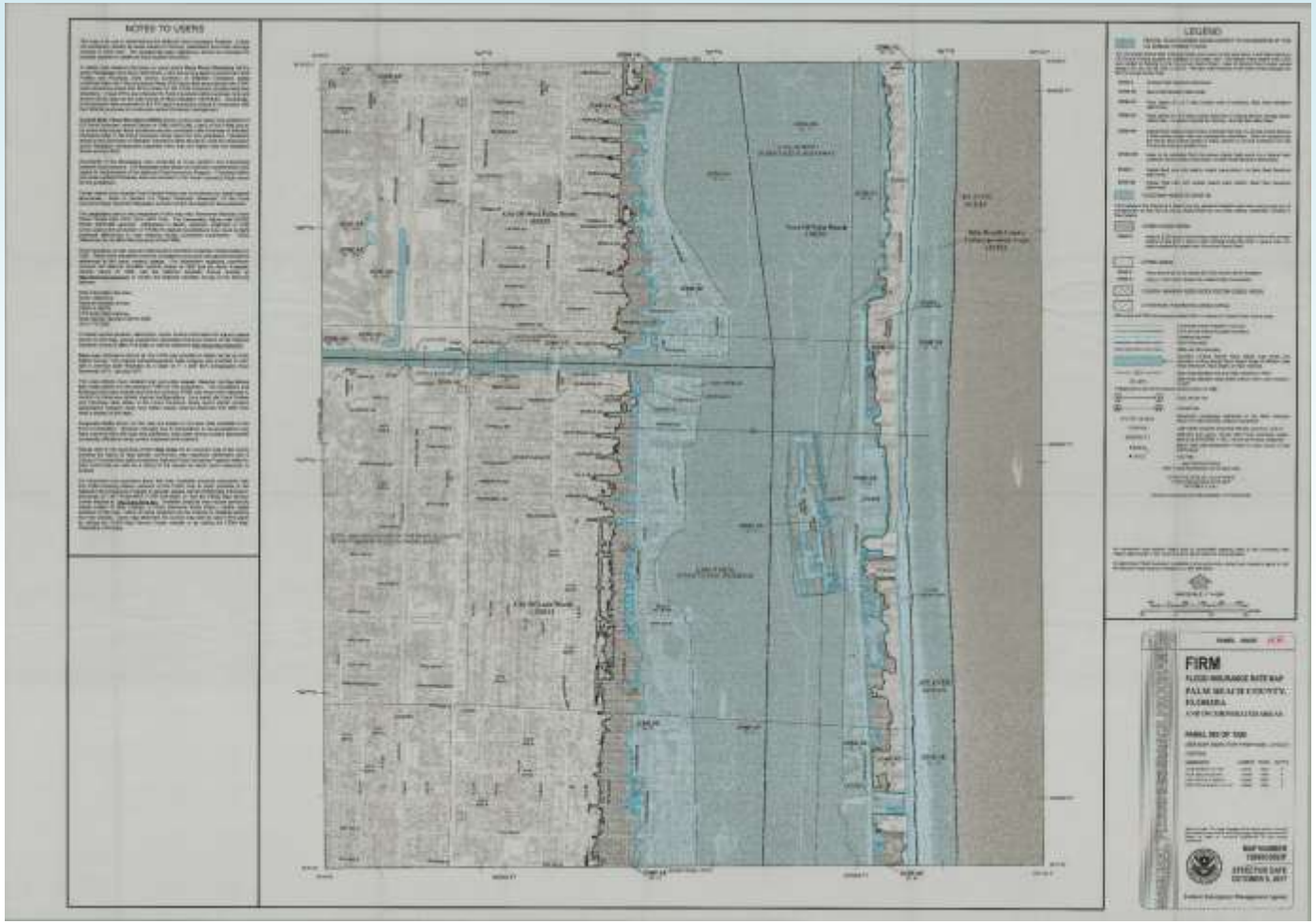
New maps were released in February 2020 and will go into effect the first of the year.

New maps are based on recent statistical data, topographic information and flooding evalutions

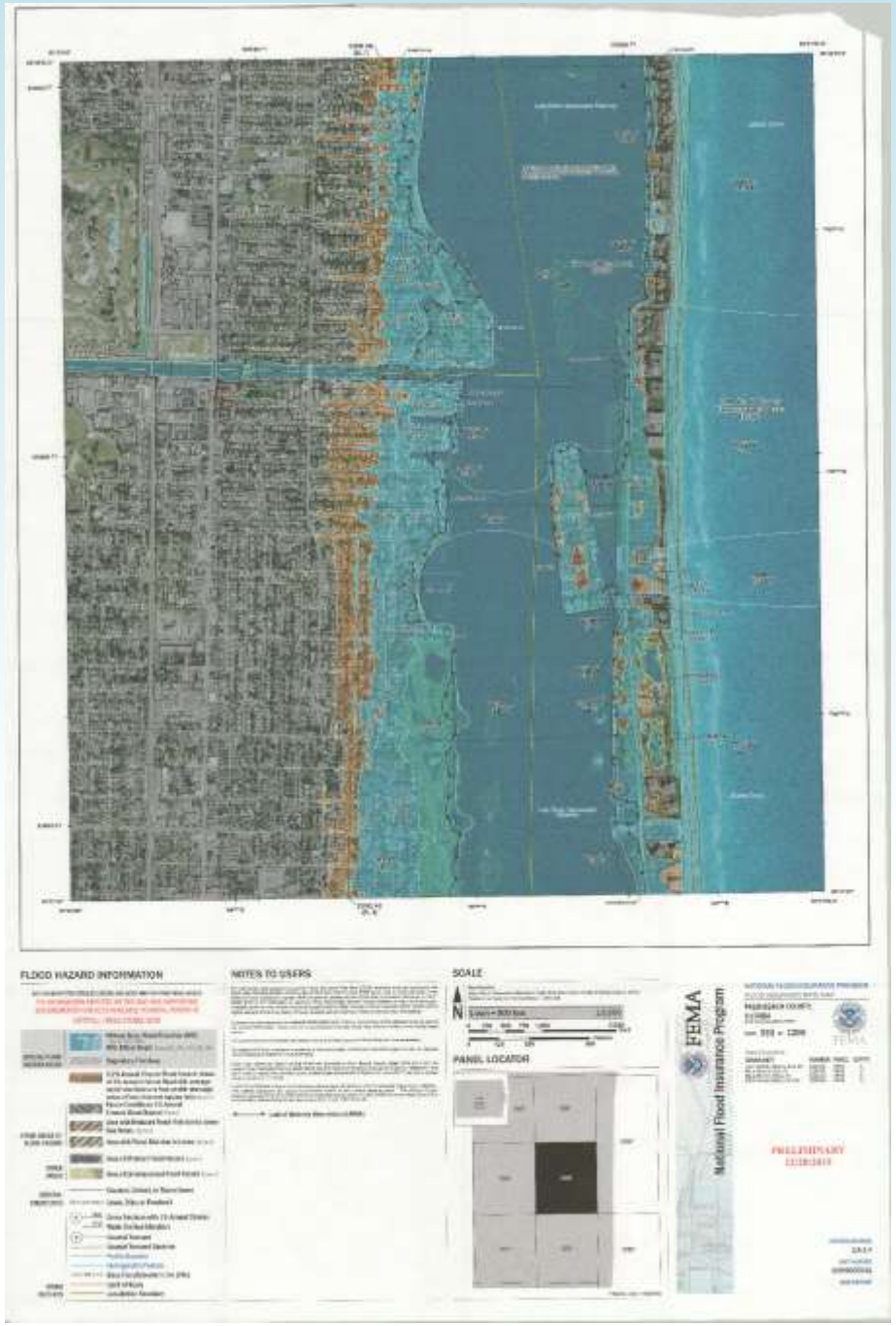
Maps demarcate flood impact zones as well as 100 year and 500 year flood potentials.

Significant changes in the maps will impact many properties east of east of Federal Highway and especially Lakeside Drive, Golfview and Palmway.

North Maps

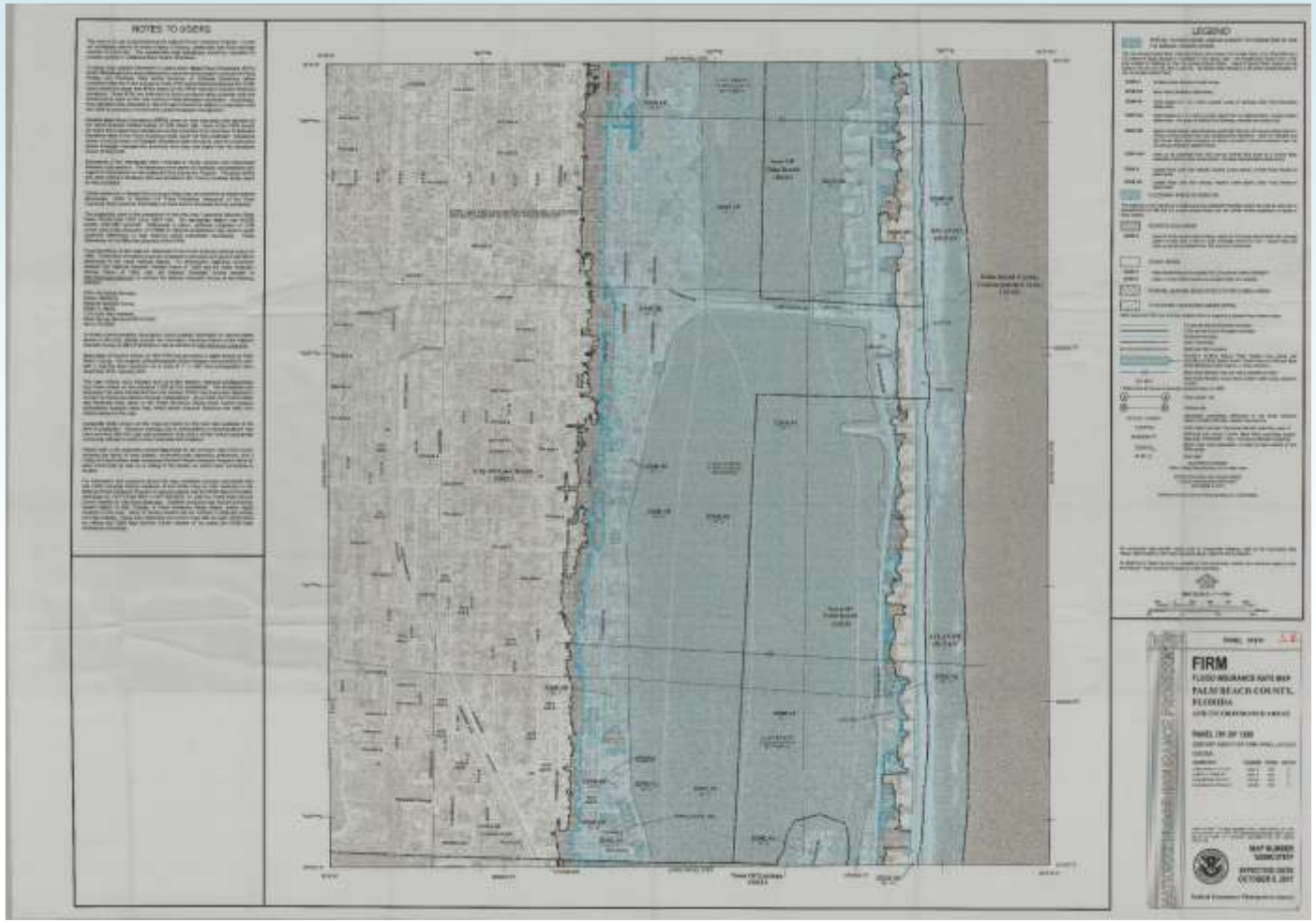


2016 North Map

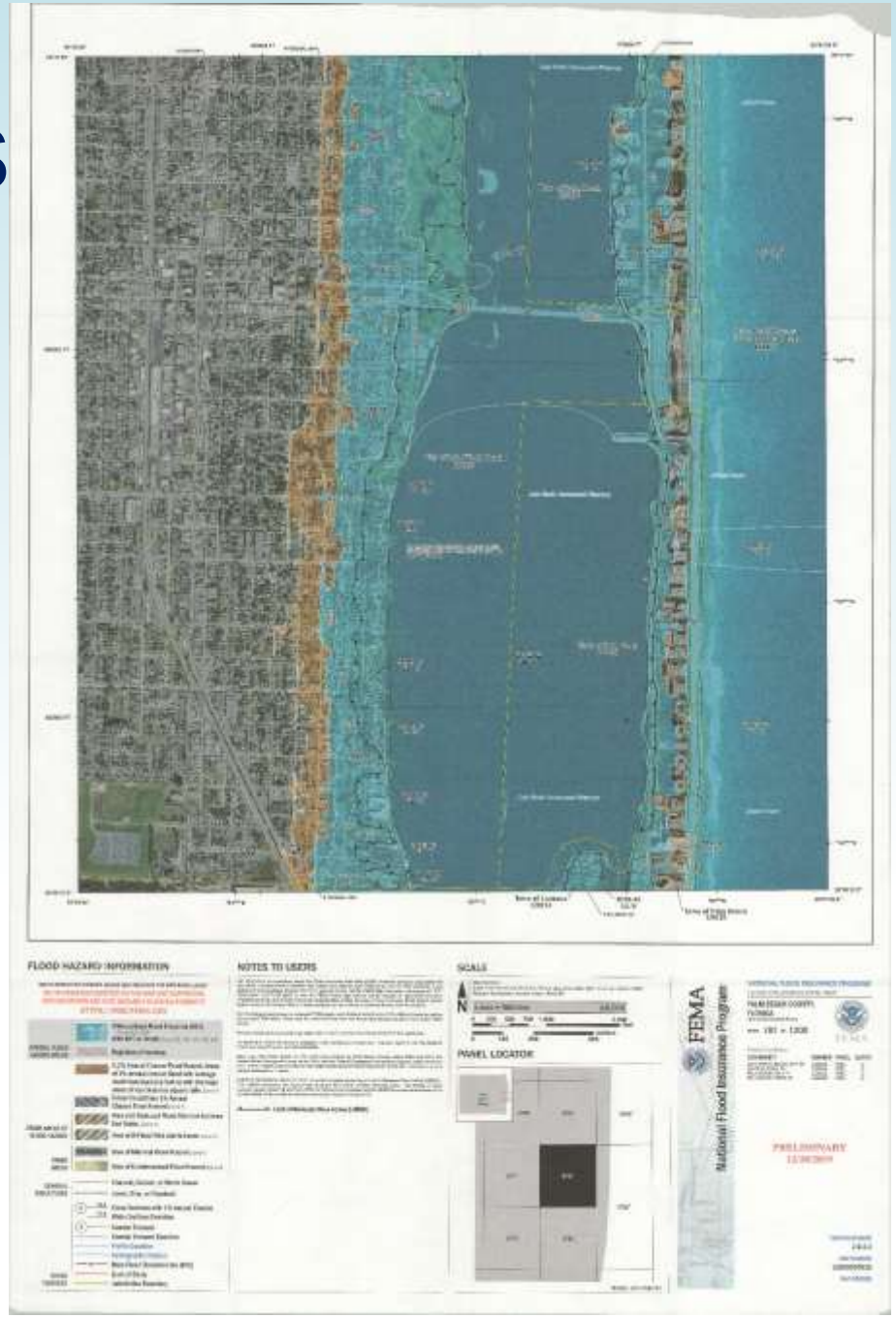


2020 North Map

South Maps



2016 South Map



2020 South Map

Impacts of New Maps

- New construction, additions, expansions and substantial improvements with in flood zones will be required to be constructed at significantly higher elevations.
- Some parts of the City along South Lakeside Drive will have elevation requirements of 12’-0” above sea level.
- Improvements to existing buildings will be limited to a five year cumulative fifty percent (50%) building value threshold before elevation requirements will need to be met.
- Larger areas of the City will be required to obtain and maintain flood insurance.
- Contributing structures in the City’s historic districts will have still some exemptions from these requirements.
- The overall character and streetscape of Lakeside Drive, Golfview, Palm Way, and Ocean Breeze as well as parts of Federal Highway will be changing.

The Future

- New construction will be required to built at higher elevations than historically have been seen in the City.
- Many structures in flood zones will be limited to the extent they can be improved due to their existing elevations.
- The cost to maintain, insure and purchase properties in flood zones will be increasing.
- Some structures may be declared obsolete due to repetitive losses and inability to be upgraded and improved.
- Adjustments to the City's Land Development Regulations, Historic Preservation Guidelines and Stormwater Management Policies may be necessary.

CITY OF LAKE WORTH BEACH

Community Sustainability℠

EXECUTIVE BRIEF
WORK SESSION

AGENDA DATE: November 5, 2020 **DEPARTMENT:** Water Utilities

TITLE:

Update on City's storm water and sanitary sewer collection system

SUMMARY:

Update of Commission and the public on the storm and sanitary sewer collection systems following storm Zeta.

BACKGROUND AND JUSTIFICATION:

The weekend of October 24th and 25th South Florida experienced a heavy rainfall event from the named storm Zeta which caused flooding throughout the state. In light of the consequences of the recent flooding events, the water utilities department gathered data and a list of areas that were affected by the system Zeta, to share with the Commission and public as well as future plans for resiliency.

ATTACHMENT(S):

Fiscal Impact Analysis N/A

LAKE WORTH BEACH Water Utilities SM

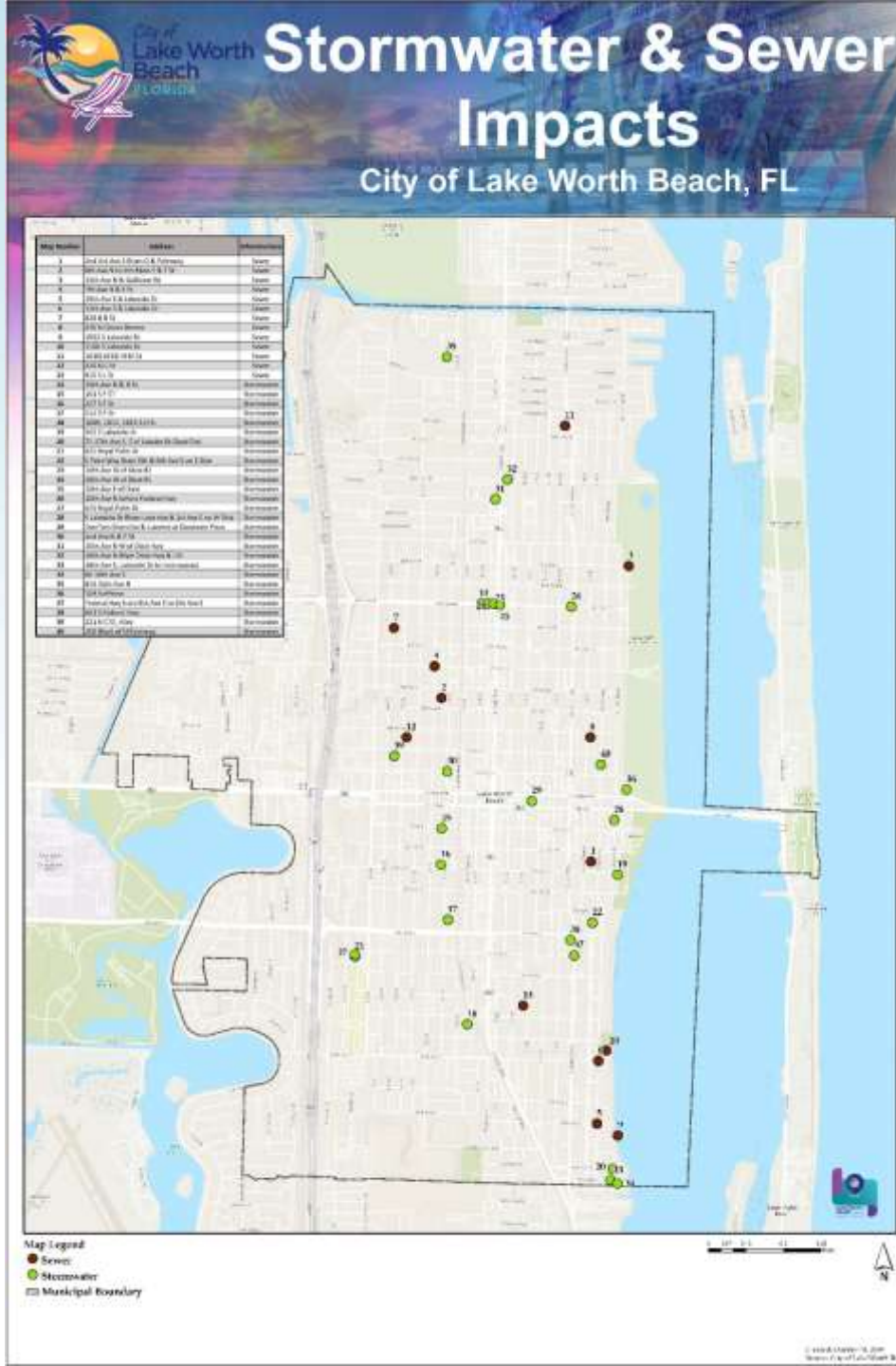
Stormwater and Sanitary Sewer Resiliency

Julie Parham, P.E.
Assistant Water Utilities Director

LAKE WORTH BEACH Water Utilities SM

Recent Extreme Storm Event:

- Stormwater and Sanitary Sewer Impacts from Hurricane Zeta 10/24-25/20, over 8 inches of rain
- 100-year flood event– means 1% annual chance of flooding occurring in the FEMA designated 100-year floodplain
- Followed King Tides that occurred Oct 14-21
- Experienced sanitary sewer overflows and flooding in several areas of City, as did many municipalities around CLWB
- City ROW and stormwater system designed to handle 3-year storm. SFWMD guidance allows 25-year storm to accumulate in ROW and must recede within 72 hours; water receded in less than 24 hours!



Stormwater

Issues & Mitigation Strategies

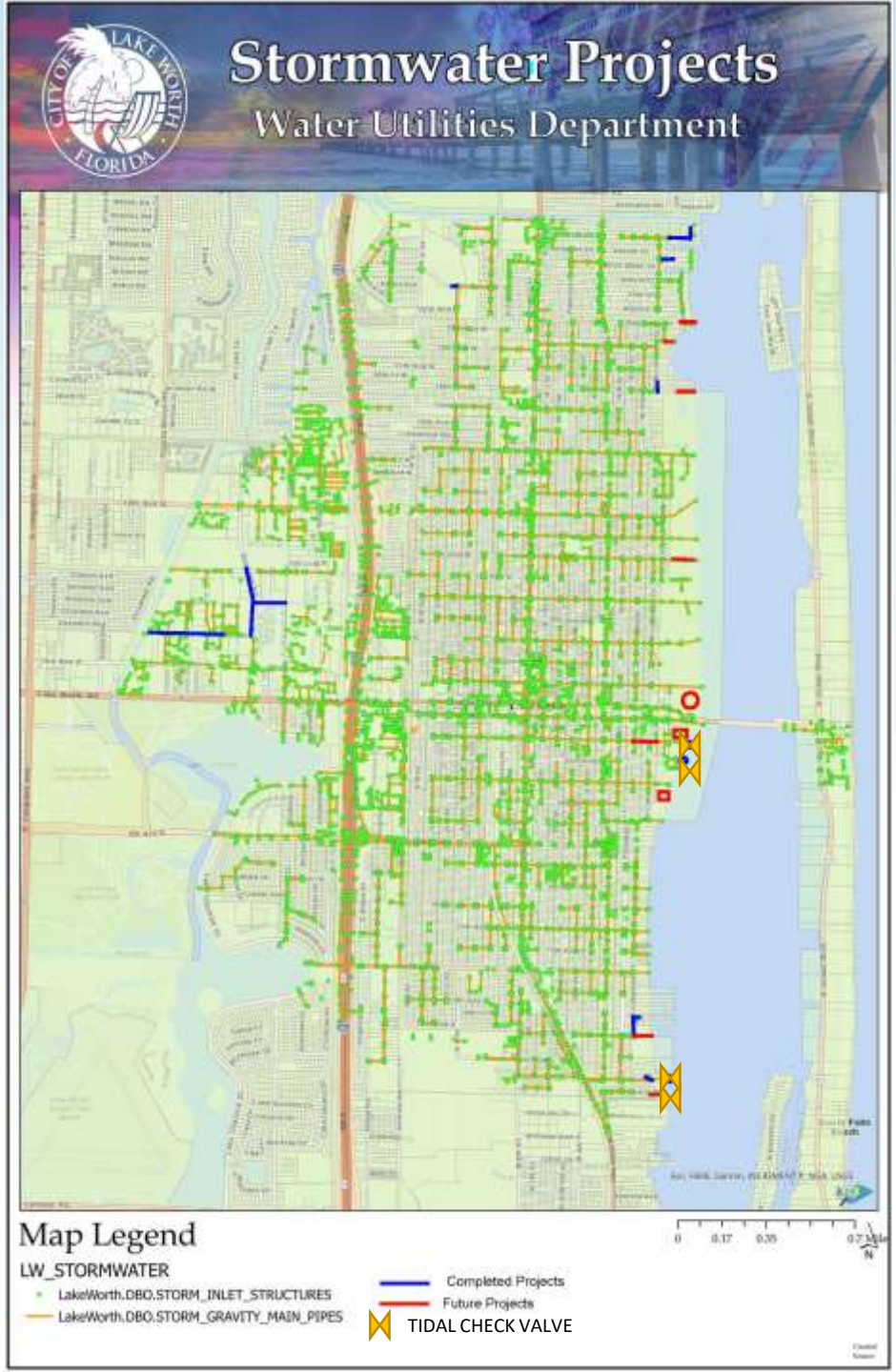
Issue:

- STORMWATER FLOODING – Near 100-year storm event, system is designed for 3-year event. Takes system longer to drain the more intense and less frequent storm, so water finds way to sanitary system and other places until it can be drained

Mitigation Strategies for Worst Areas:

- Installation of tidal check valves to prevent king tide influence on storm system
- Reevaluate storm systems – check for blockages, televise lines.
- Stormwater pump stations, additional retention areas, underground storage chambers

LAKE WORTH BEACH Water Utilities SM



Stormwater

Recent Projects:

- Tidal outfall check valve installations
- Drainage upgrades as part of Neighborhood Road Program:
  - District 2: 22nd Avenue North and N D St;
  - District 3: Duke Drive and Holy Cross Lane, Georgia Lane and Furman Lane; 16th Ave N and N Lakeside
  - District 4: S Lakeside Drive & 15th Ave S and Lakeside Palms Ct; 17th Ave S east of S Lakeside
- Stormwater Assessment Master Plan Update 2016 by CDM Smith

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Stormwater

Future Projects:

- Stormwater Master Plan updated in 2016. Projects identified based on historical problem flood areas, modeling of system and stormwater quality improvements to reduce nutrient discharges to the Intracoastal and Lake Osborne - $21 million; portion of remaining projects are stormwater quality improvements
- Projects' components:
  - Underground storage at Bryant Park
  - Increase lake size on golf course
  - New outfall and upgrades to existing
  - New inlets, culverts, catch basins, exfiltration trench, weirs
- Annual budget of $50k for tidal check valve install, repair, maintenance
- CLWB has consistently pursued grants and filed for state assistance for projects
- CLWB part of Coastal Resilience Partnership and Climate Change Compact that provide guidance on best management practices and collaboration and information sharing

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Stormwater

Capital Projects:

Project	Location	Capital Cost	Status
1	North Lakeside Drive, Duke Drive, Notre Dame Drive and Wellesley Drive, Federal Highway	$ 3,196,000	Complete
2	15th Avenue North and N Dixie Highway	$ 574,000	
3	10th Avenue North to 13th Avenue North, E and F Streets	$ 735,000	
4	3rd Avenue North to 6th Avenue North and N F Street	$ 2,076,000	
5	6th Avenue South and South A Street	$ 380,000	
6	2nd Avenue North to 1st Avenue South, South F Street and Dixie Highway	$ 2,983,000	
7	Lake Avenue, 1st Avenue South, South M Street and Golfview Road	$ 3,011,000	
8	3rd Avenue South, 5th Avenue South, South Palmway and South Lakeside Drive	$ 3,411,000	
9	6th Avenue South and South F Street	$ 229,000	
10	10th Avenue South and South G Street	$ 759,000	
11	10th Avenue South and Dixie Highway	$ 528,000	
12	10th Avenue South and South N Street	$ 528,000	
13	18th Avenue South and South Palmway		
14	Palmetto Avenue and South Pine Street	$ 171,000	
15	15th Ave South, Lakeside Drive, 18th Avenue South	$ 2,373,000	
16	16th Avenue North, 8th Avenue North, North Golfview Road	$ 601,000	Partially Complete
17	1st Avenue South storm repairs	$ 300,000	
	TOTAL:	**$ 21,855,000**	

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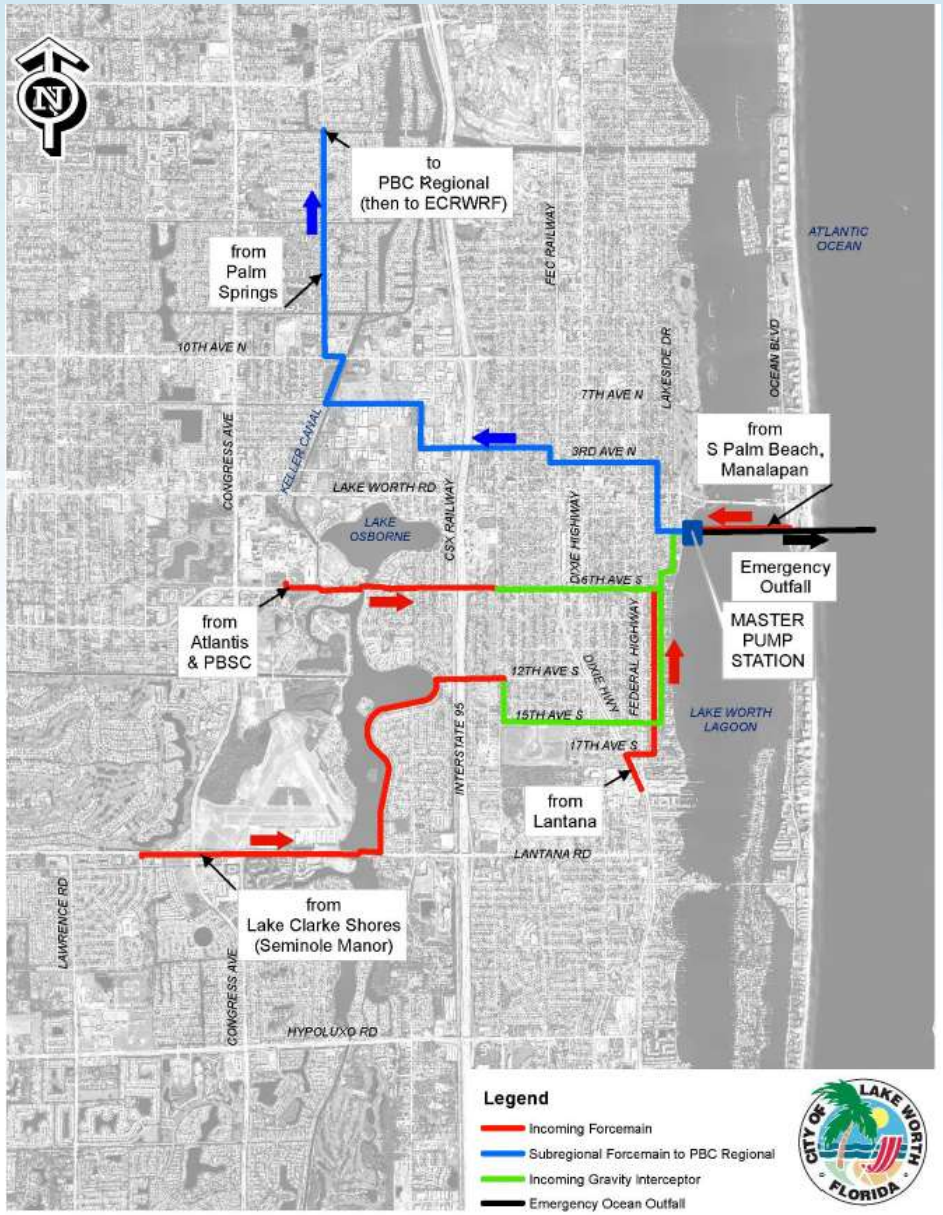
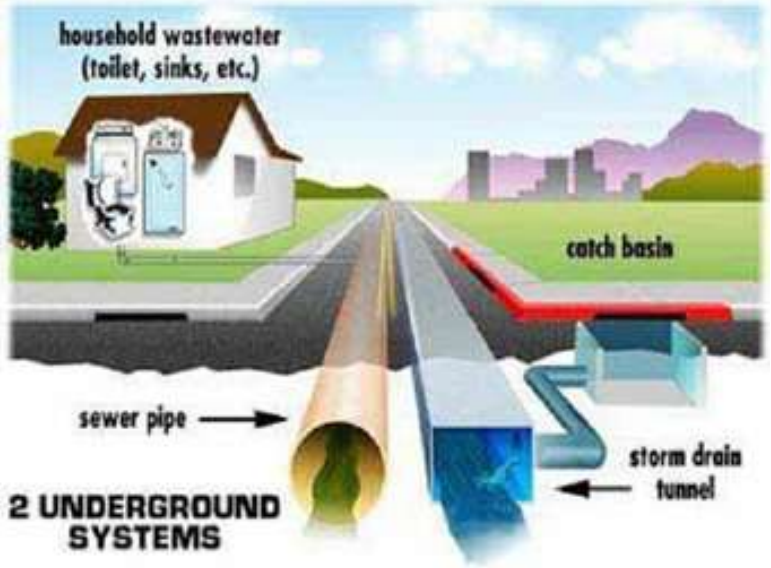
Sanitary Sewer Resiliency

Sanitary Sewer



Local & Sub-Regional System

- Wastewater/Sanitary Sewer – what is it?
- CLWB collects flow from 7 surrounding municipalities: CLWB, Lantana, Atlantis, Manalapan, South Palm Beach, Seminole Manor, PBSC, Palm Springs
- 6 of these systems are collected at Master Pump Station (MPS)
- Most all municipalities also experienced peak flows



https://www.concordnc.gov/Departments/Stormwater-Services/Stormwater-Pollution/Where-Does-It-Go

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Sanitary Sewer

Issues & Mitigation Strategies

Issues:

- SANITARY OVERFLOW - Inflow & Infiltration (I&I) from stormwater into sanitary:
  - Stormwater flows into sanitary sewer system through manholes and cleanouts when storm drain is overwhelmed
  - High groundwater from king tides and heavy rains pushes excess water to sanitary system
  - System is overwhelmed and flow cannot be conveyed to pump stations quickly enough, so overflows at manholes.

Mitigation Strategies:

- Cured-In-Place Pipe lining of sanitary sewer mains to prevent I&I from stormwater
- Reevaluate storm & sanitary systems – check for blockages, televise lines.

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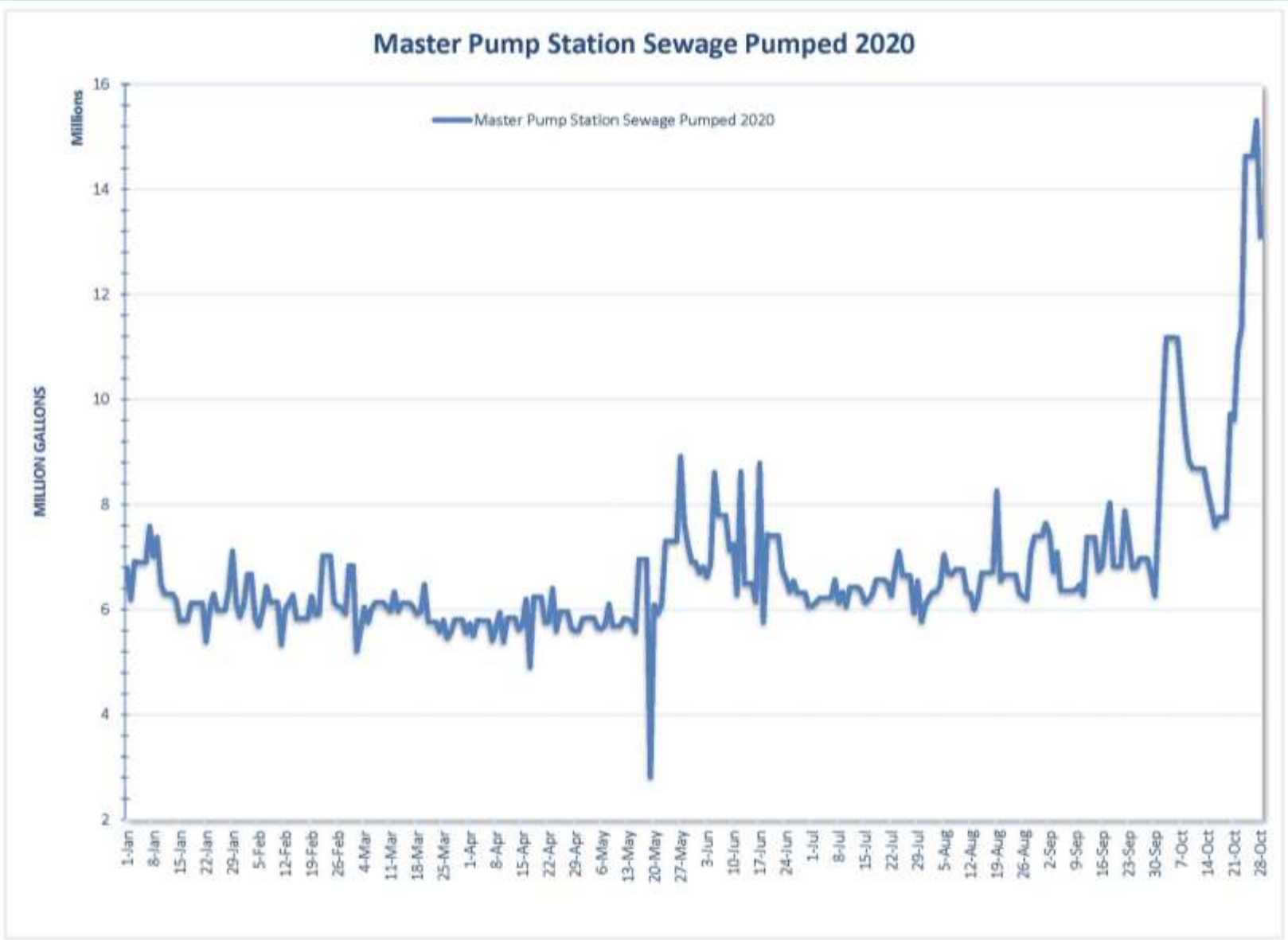
Sanitary Sewer



- Extreme flows seen at Sanitary Sewer Master Pump Station during hurricane Zeta
- MPS collects flow from CLWB, Lantana, Atlantis, Manalapan, South Palm Beach, Seminole Manor, PBSC
- Most all also experienced peak flows

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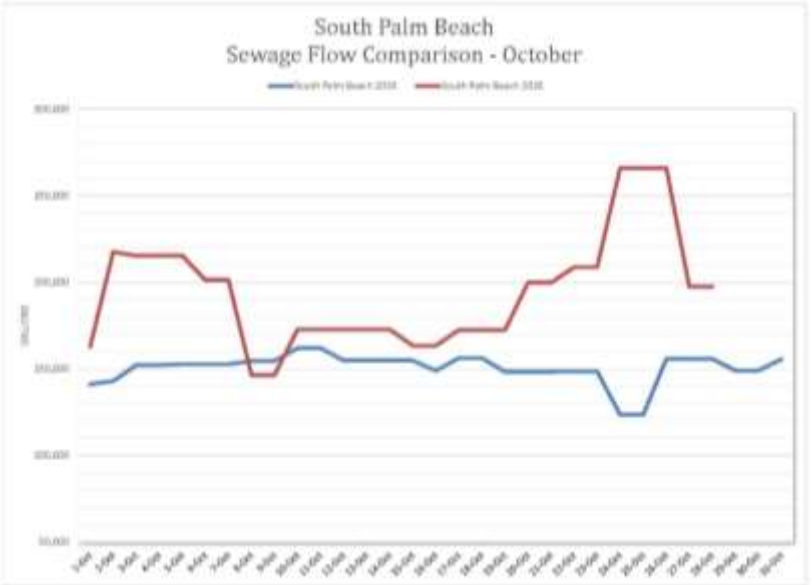
Sanitary Sewer



Sewer Flows:

- Month of October shown, red is 2020, blue is 2019

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Sanitary Sewer

Recent Projects:

- Cured-In-Place pipe lining of several collector trunk sanitary sewer mains
- Installation of ~3000 inflow inserts at manholes to prevent I&I
- Gravity Sanitary Sewer Condition Assessment of all mains up to 12”
- I&I Phase 2 Study of coastal sewer collection areas

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Sanitary Sewer

Future Projects:

- Infiltration & Inflow (I&I) mitigation - $200k per year as part of Annual I&I program for lining sanitary sewer pipe and manhole rehab to prevent excess stormwater and ground water in sewer system
  - Have asked sub-regional partners about I&I mitigation and acknowledged DEP oversees
  - I&I Phase 2 study completed and identified sewer lines to be rehabbed - results showed generally sewer lines within 1,500 ft of Intracoastal would be best to start with as worst offenders of I&I ($5 million)
- Inspection & repair/lining on S Lakeside Dr (15th Ave S to Bryant Park) sanitary sewer gravity main - FY 2021 and future years
- Inspection & repair/lining of 36” interceptor main in Bryant Park coming into Master Pump Station – FY 2021

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Sanitary Sewer

Capital Projects:

Project	Location	Capital Cost
1	Lining - LS 3, LS 1 (MPS), LS 4 basins	$ 5,000,000
2	Lift Station Rehab Annually	$ 350,000
3	I&I Projects (Lining) Annually	$ 200,000
4	Manhole Rehab Annually	$ 150,000
5	Sub-Regional - Lining S Lakeside Dr-15th Ave S to Bryant Park	$ 360,000
6	Sub-Regional - Lining 36" interceptor Bryant Park into MPS	$ 250,000
	TOTAL:	**$ 6,310,000**

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Questions?

Julie Parham, P.E.

Assistant Water Utilities Director

EXECUTIVE BRIEF
WORK SESSION

AGENDA DATE: November 5, 2020 **DEPARTMENT:** Public Works

TITLE:

Presentation regarding Pinecrest Cemetery's remaining vacant land for burials.

SUMMARY:

Pinecrest Cemetery is currently in the final stages of filling up. Before selling plots in the remaining vacant portion, an alternative option to expand the number of burial plots with a mausoleum should be considered.

BACKGROUND AND JUSTIFICATION:

Pinecrest Cemetery, located on the NW corner of 12th Ave South and South A Street, has been our main family cemetery opening in 1923. To date, over 10,200 residents and non-residents have been laid to rest in our cemetery, and the City has reached a point where additional space solutions need to be explored. There are 95 burial plots remaining in a vacant portion of the Cemetery and before these are sold, the Public Works Department is bringing forth possible options to increase the number of burial plots to provide an important service for our residents and their families.

ATTACHMENT(S):

Fiscal Impact Analysis N/A
Mausoleum Presentation

LAKE WORTH BEACH

Public Works℠

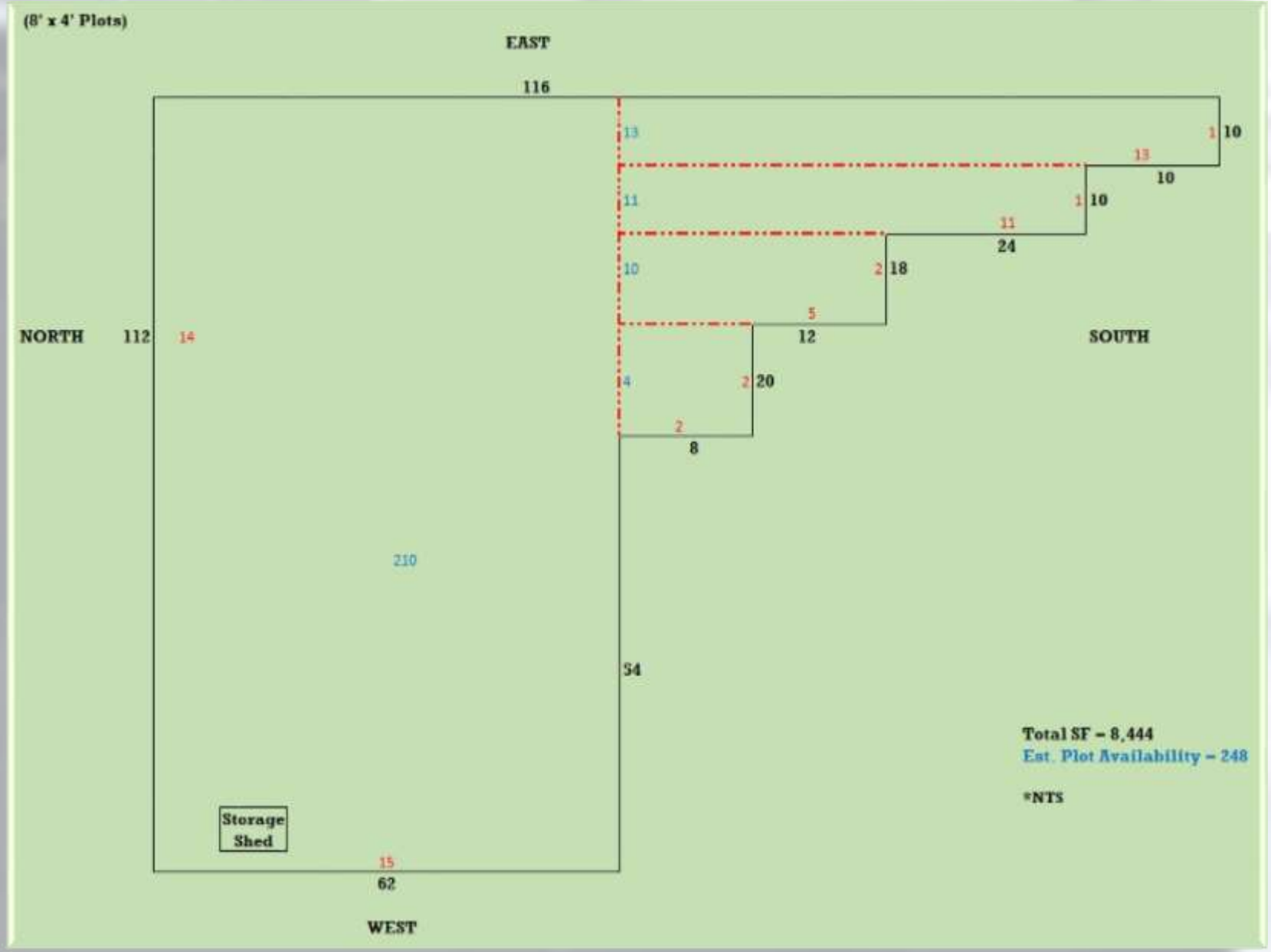
Lake Worth Beach - Pinecrest Cemetery

Lake Worth Beach - Pinecrest Cemetery

Lake Worth Beach - Pinecrest Cemetery

Pinecrest Cemetery Mausoleum – Option 1

Pinecrest Cemetery Option 1 - Plotting

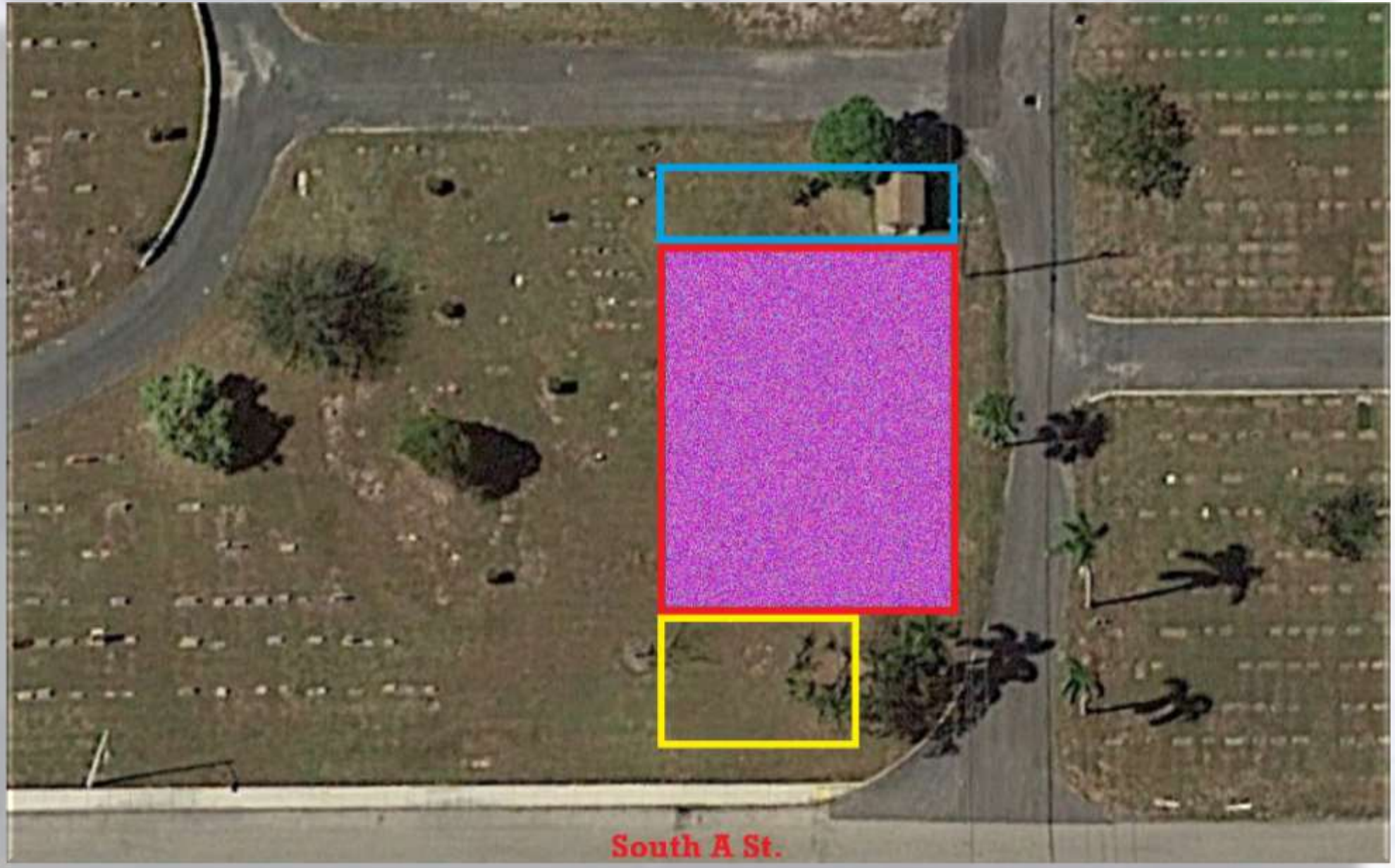


Pinecrest Cemetery Option 1 - Plotting

- Option would provide an est. addl. 248 plots in Pinecrest
- At City rates of $750 for residents / $1,200 for non-residents & utilizing the $750 open/close fees the following is estimated:
  - If all 248 plots were purchased by residents: $372k in revenue
  - If all 248 plots were purchased by non-residents: $484k in revenue
- Revenue Range when all plots sold: est. $372k - $484k

*Once all plots are sold, revenue will cease, but the annual operational cost will remain

Pinecrest Cemetery Option 2 - Mausoleum

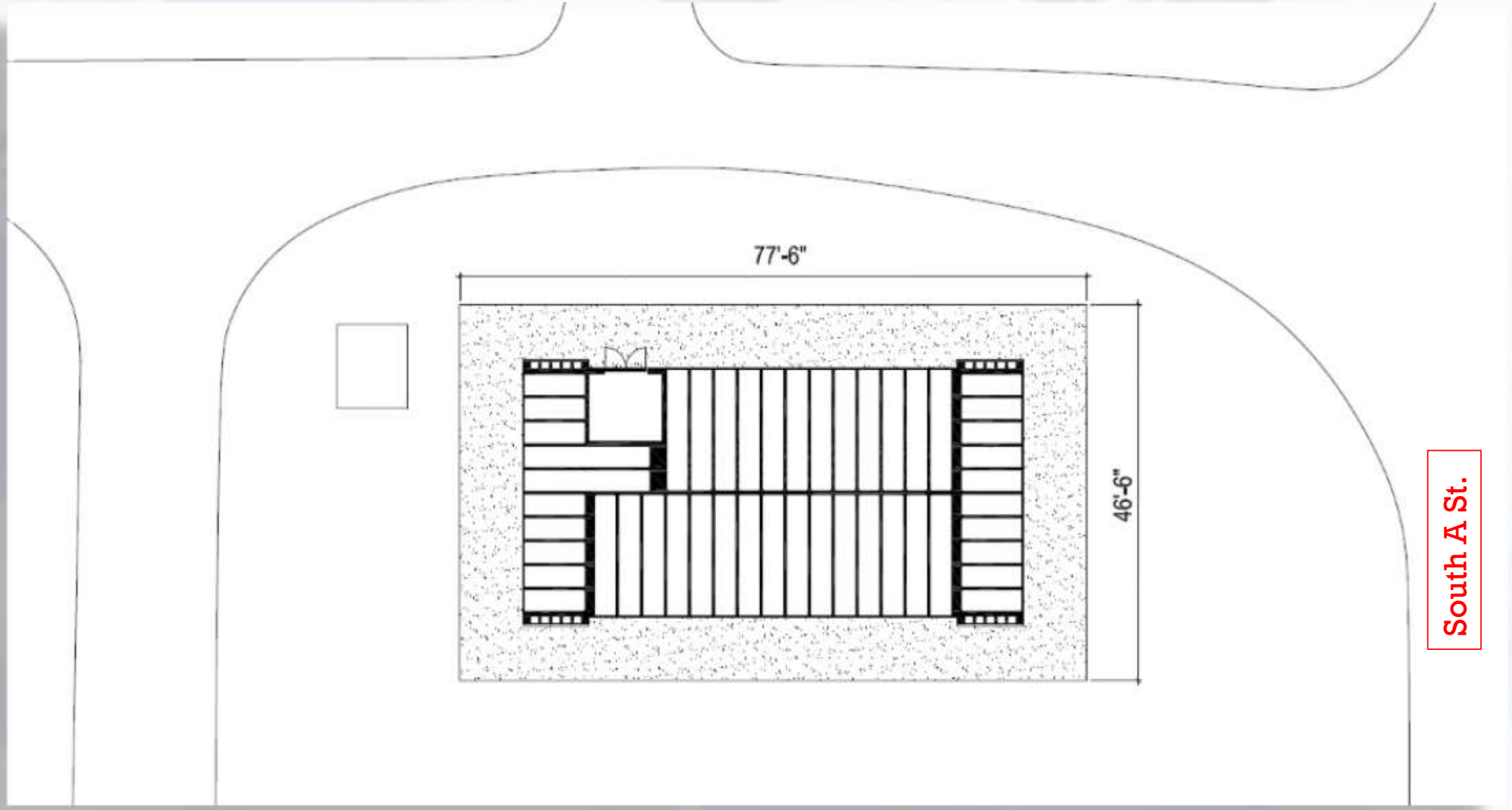


Pinecrest Cemetery Option 2 - Mausoleum

- Option consists of a footprint measuring 77'6 East/West by 46'6 North/South
- Based on a 7 level height, this configuration allows for 542 casket spaces / 240 niches
- Estimated cost of $544k (roughly $1k/casket space), which includes both single & companion casket spaces

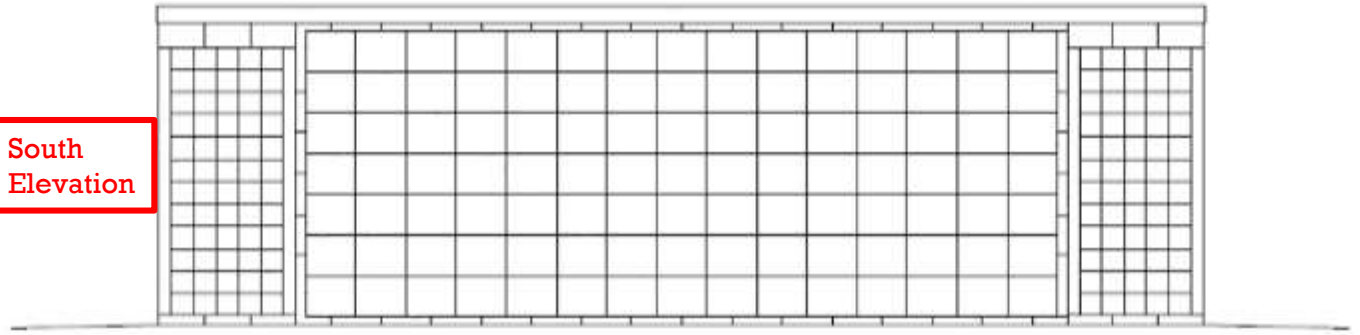
* Excluded from estimate are the necessary site work, crypt/niche plates, electric, and permits

Pinecrest Cemetery Option 2 - Mausoleum

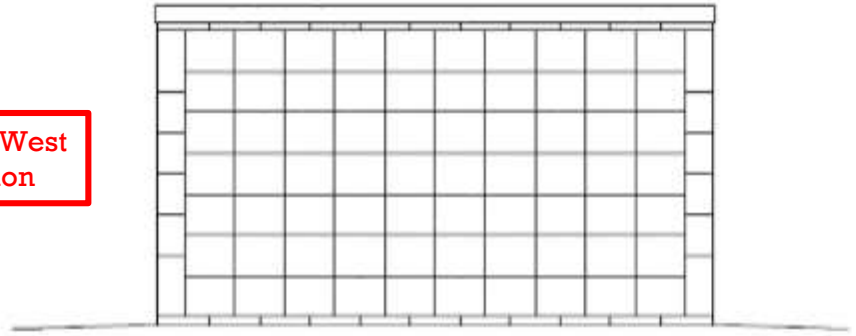


Pinecrest Cemetery Option 2 - Mausoleum

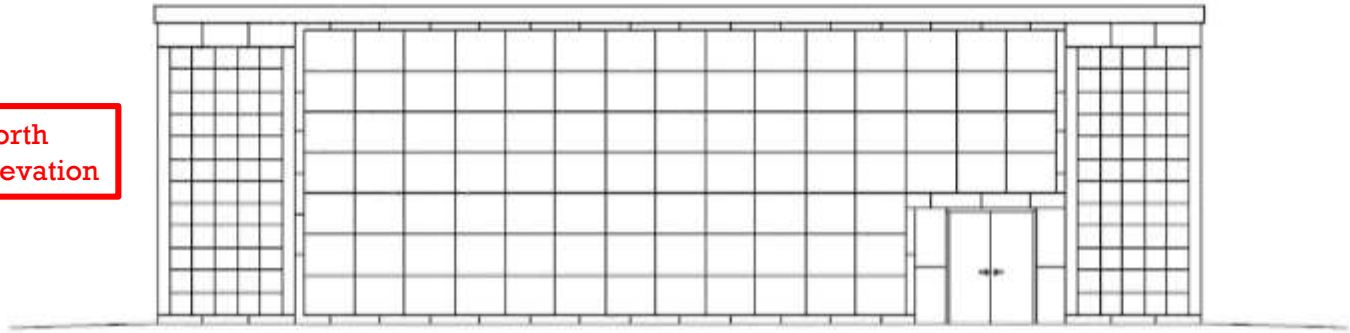
South Elevation



East & West Elevation



North Elevation



Pinecrest Cemetery Option 2 - Mausoleum

Level 1 (Ground Level): $4k/space X 74 spaces = $296k
Level 2: $5.5k/space X 74 spaces = $407k
Level 3: $5k/space X 74 spaces = $370k
Level 4: $4k/space X 80 spaces = $320k
Level 5: $3.5k/space X 80 spaces = $280k
Level 6: $3k/space X 80 spaces = $240k
Level 7 (Top Level): $2.5k/space X 80 spaces = $200k

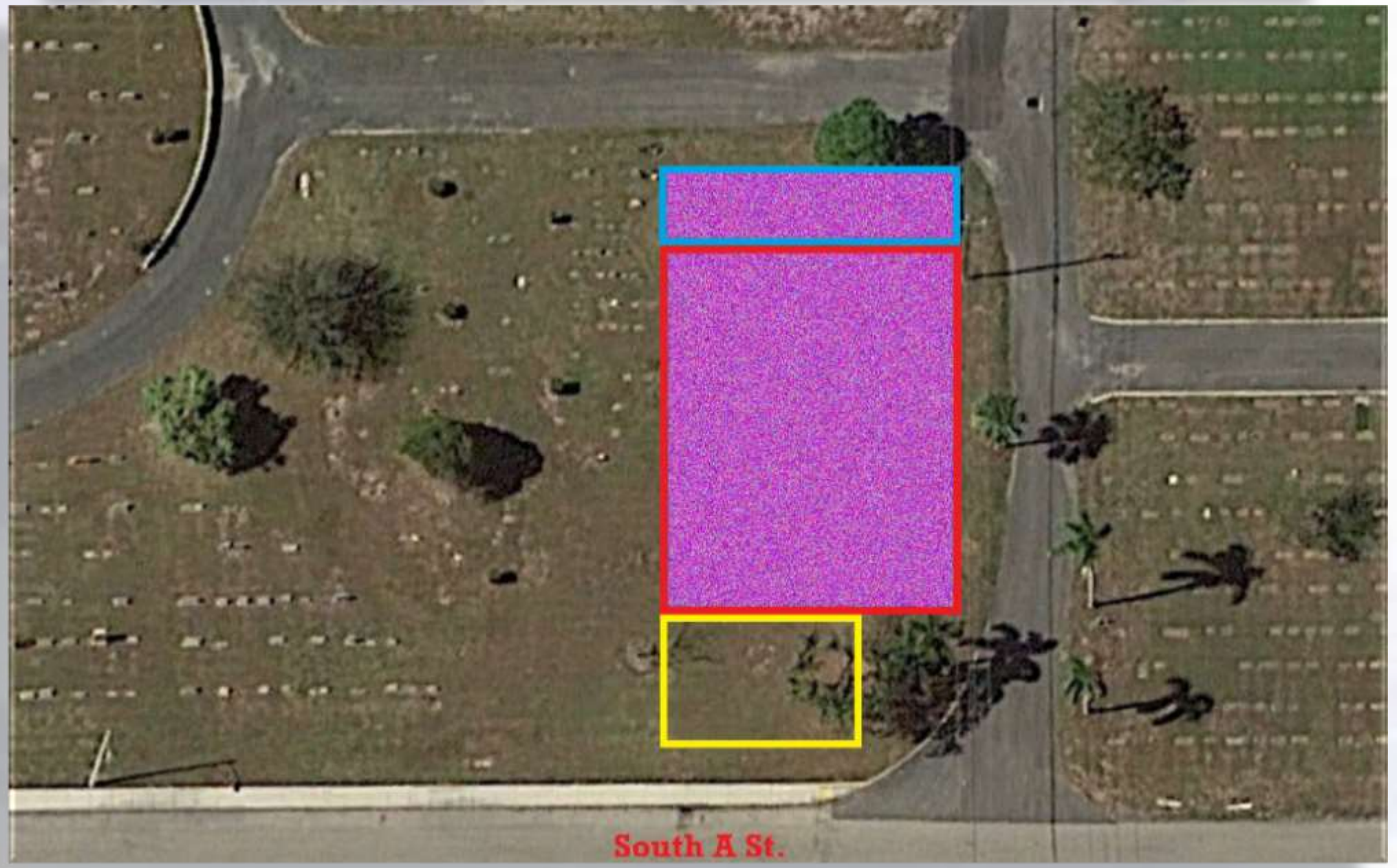
TOTAL CASKET REVENUE: $2,113,000

Niche Spaces for cremains Level 1 (Ground Level): $2.3k x 20 columns = $46k
Niche Spaces for cremains Level 2: $2.3k x 20 columns = $46k
Niche Spaces for cremains Level 3: $2.5k x 20 columns = $50k
Niche Spaces for cremains Level 4: $2.5k x 20 columns = $50k
Niche Spaces for cremains Level 5: $3k x 20 columns = $60k
Niche Spaces for cremains Level 6: $3k x 20 columns = $60k
Niche Spaces for cremains Level 7: $2.5k x 20 columns = $50k
Niche Spaces for cremains Level 8: $2.5k x 20 columns = $50k
Niche Spaces for cremains Level 9: $2.3k x 20 columns = $46k
Niche Spaces for cremains Level 10: $2.3k x 20 columns = $46k
Niche Spaces for cremains Level 11: $2.1k x 20 columns = $42k
Niche Spaces for cremains Level 12: $2.1k x 20 columns = $42k

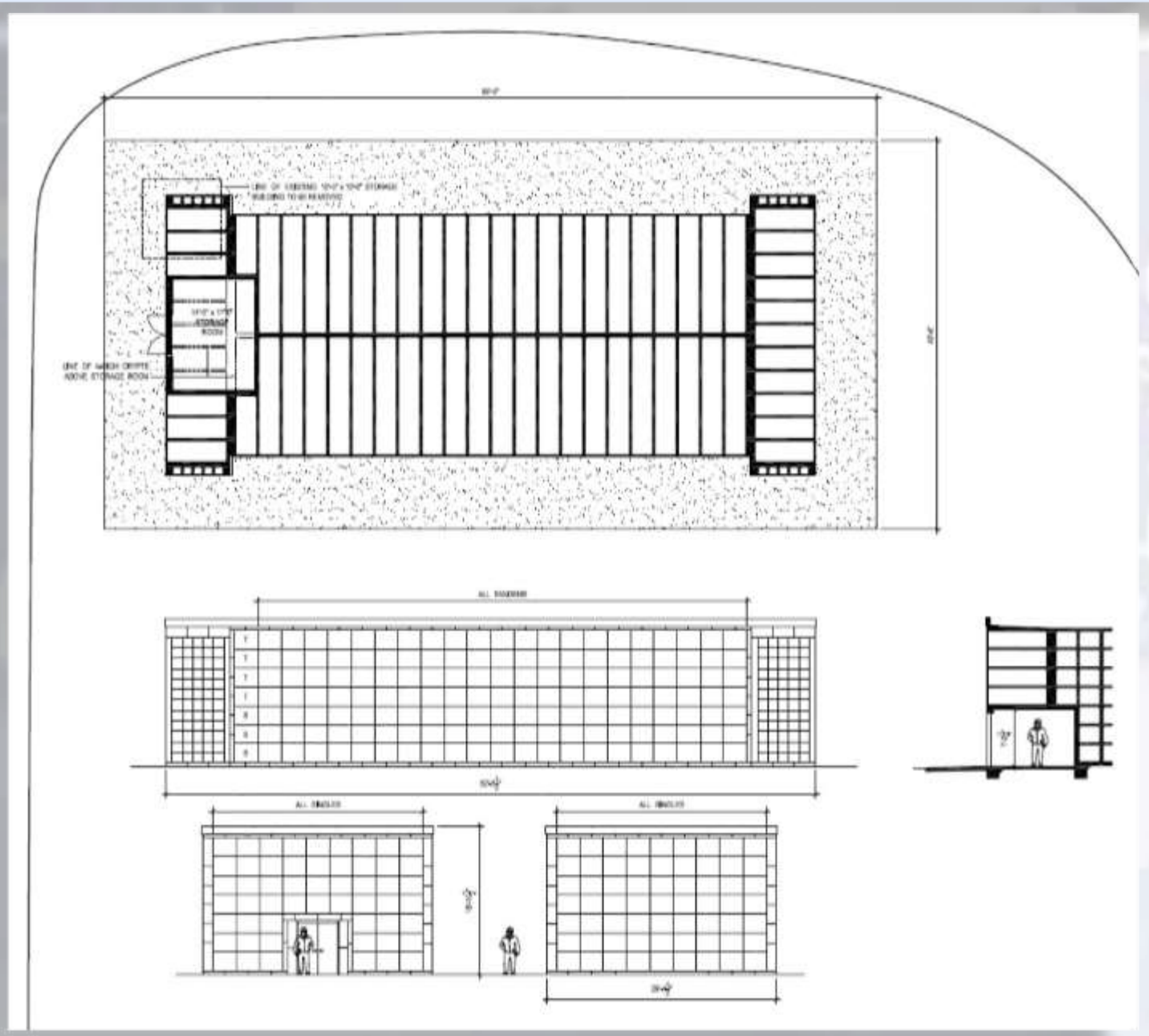
TOTAL NICHE SPACE REVENUE: $588,000

- Est. **$2,701,000** in potential revenue when all available spaces have been purchased

Pinecrest Cemetery Option 3 - Mausoleum



Pinecrest Cemetery Option 3 - Mausoleum



Pinecrest Cemetery Option 3 - Mausoleum

Level 1 (Ground Level): $4k/space X 101 spaces = $404k
Level 2: $5.5k/space X 101 spaces = $555.5k
Level 3: $5k/space X 101 spaces = $505k
Level 4: $4k/space X 106 spaces = $424k
Level 5: $3.5k/space X 106 spaces = $371k
Level 6: $3k/space X 106 spaces = $318k
Level 7 (Top Level): $2.5k/space X 106 spaces = $265k

TOTAL CASKET REVENUE: $2,842,500

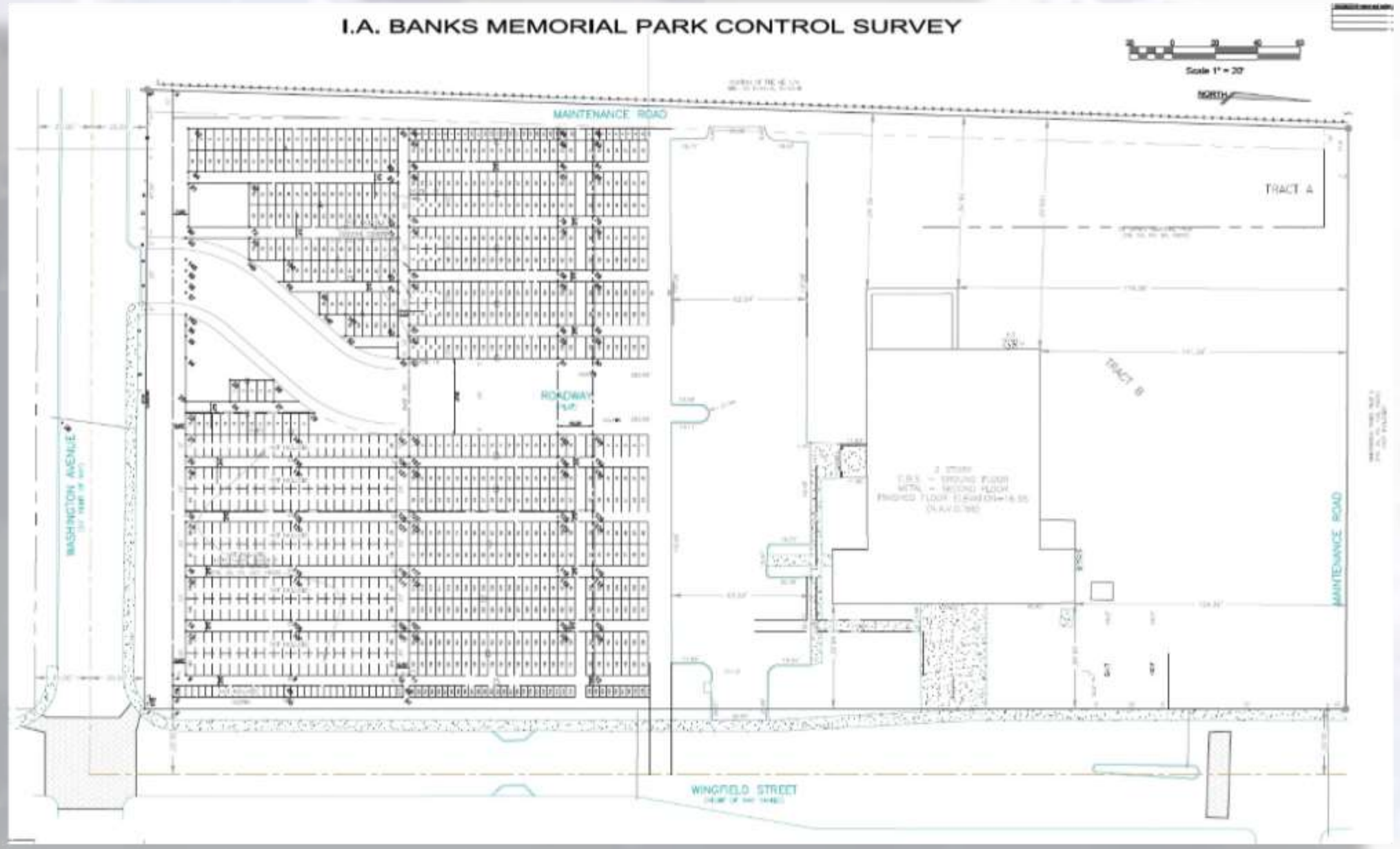
Niche Spaces for cremains Level 1 (Ground Level): $2.3k x 20 columns = $46k
Niche Spaces for cremains Level 2: $2.3k x 20 columns = $46k
Niche Spaces for cremains Level 3: $2.5k x 20 columns = $50k
Niche Spaces for cremains Level 4: $2.5k x 20 columns = $50k
Niche Spaces for cremains Level 5: $3k x 20 columns = $60k
Niche Spaces for cremains Level 6: $3k x 20 columns = $60k
Niche Spaces for cremains Level 7: $2.5k x 20 columns = $50k
Niche Spaces for cremains Level 8: $2.5k x 20 columns = $50k
Niche Spaces for cremains Level 9: $2.3k x 20 columns = $46k
Niche Spaces for cremains Level 10: $2.3k x 20 columns = $46k
Niche Spaces for cremains Level 11: $2.1k x 20 columns = $42k
Niche Spaces for cremains Level 12: $2.1k x 20 columns = $42k

TOTAL NICHE SPACE REVENUE: $588,000

- Est. **$3,430,500** in potential revenue when all available spaces have been purchased

Mausoleum Lift

I.A Banks Cemetery



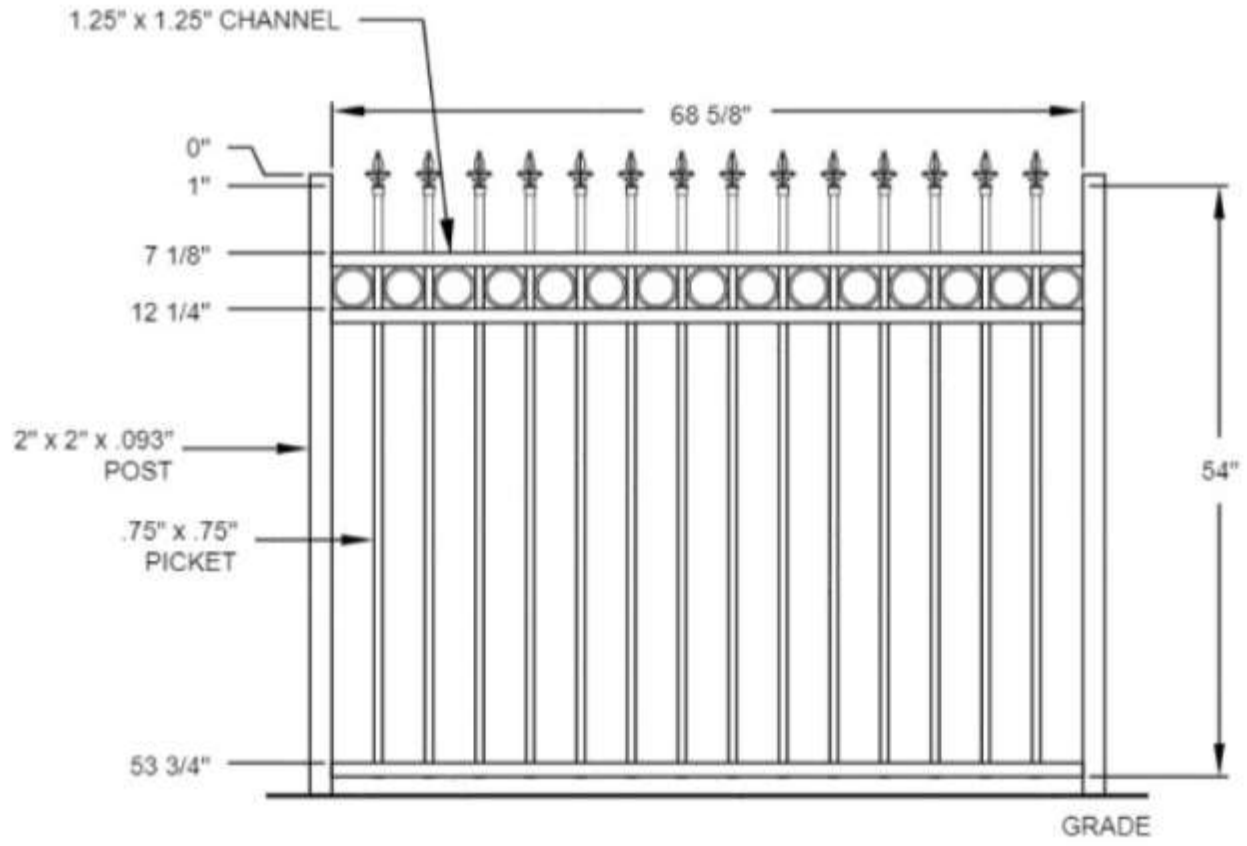
I.A Banks Cemetery

Example Cemetery Fence Detail

68.625" PANEL VICTORIA - FLEUR-DE-LIS

3 CH 54" COMMERCIAL FLUSH BTM W/ RINGS

ALUMI-GUARD	DATE: 11/02/2020
PO/JOB NAME:	ITEM: PANEL
QUOTE NO:	HINGE TYPE:
COLOR: BLACK	DAYLIGHT OPENING:
APPROVAL SIGNATURE (REQUIRED):	



Questions?