2023

North Beach Drainage Study

North Beach Drainage Study

Prepared For:

Prepared by:

OSIRIS 9 CONSULTING

10199 Southside Blvd, Ste 104

Jacksonville, FL 32256

Christian J. Gyle, PE, CFM

Florida PE No. 69159

January 2024

Summary of Findings

The purpose of this study was to determine solutions to combat flooding within the North Beach area of the St. Johns County. The study used a variety of sources as well as eyewitness testimony to develop multiple computer models that simulate rising water levels as witnessed on an annual frequency up to an infrequent event similar to Hurricane Matthew from rainfall and seawater inflow from the Intracoastal Waterway. Solutions that required purchasing homes and high-cost additions, like a $10 million pump station, were not considered for this study.

Three alternatives were developed under this study designated by the following: Full-Length Bulkhead (FLB); Raise Myrtle, Laurel, and Wahoo (RMLW); and Raise Road Ends (RRE).

The FLB alternative investigated constructing a bulkhead along the entire Intracoastal shoreline. This bulkhead would protect the study area from seawater inflow via low points on the shoreline. This alternative replaced all low-lying inflow points north, south, and west resulting in the lowest water levels, but it required the highest construction cost and private owner cooperation.

Advantages

- Erosion protection during wave action.
- A constant wall elevation that protects low-lying properties throughout most of the neighborhood.

Disadvantages

- Extremely high construction costs.
- Requires donation of property and cooperation between all property owners along the western shoreline.
- Aesthetic loss of sandy shoreline and natural buffers.
- Requires extensive environmental permitting.
- Limits access to shoreline and provides a visual obstruction for each property owner.

The RMLW alternative investigated raising the elevation of the major North-South roads: Myrtle Street, Laural Street, and Wahoo Drive. Properties east of these streets would see reduced water levels from rising Intracoastal levels while properties west of these streets would continue with their current amount of protection. This alternative requires the second largest construction cost and dozens of easements from property owners for the new construction.

Advantages

- Major Construction limits are within the County right-of-way (with exception of driveways and temporary easements).
- Minimized environmental and aesthetic impact of the Intracoastal shoreline.

Disadvantages

- Extremely high construction costs
- Requires significant infrastructure improvements to existing drainage system
- Requires easements from adjacent property owners.
- May require permitting and water quality treatment.
- Does not provide any protection for properties west of Myrtle, Laurel, and Wahoo.
- Does not prevent erosion from wave action.

The RRE alternative investigated raising the elevations at street ends adjacent to the Intracoastal. The RRE alternative would prevent seawater inflow from low-lying streets ends. However, seawater may enter the study area from low points within private property. This alternative requires the lowest construction cost and the least private property cooperation but provides the least flooding reduction.

Advantages

- Does not require cooperation from all private property owners along the Intracoastal.
- In smaller storm events, will improve protection for the study area from water encroachment via low street ends.
- Allows the existing shoreline and vegetation to remain along private properties.

Disadvantages

- Potential for water to encroach via low-lying private property along the shoreline.
- New infrastructure with additional backflow devices.
- Limited flood reduction in larger storm events.

Peak Water Level Summary

Simulation	Hurricane Matthew Equivalent Event
	feet above sea level, NAVD
Existing Condition	6.70
Proposed FLB	4.88
Proposed RMLW	4.95
Proposed RRE	6.70

Summary of Estimated Construction Costs

Solution	Cost (Millions)
Proposed FLB	$ 7.3
Proposed RMLW	$ 7.2
Proposed RRE	$ 2.6

PROFESSIONAL ENGINEER CERTIFICATION

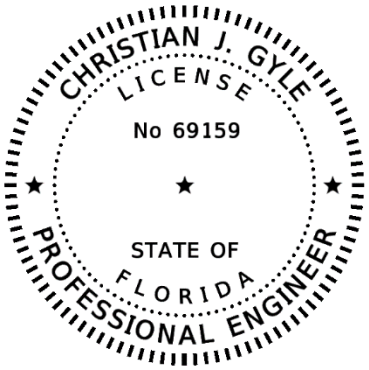
I hereby certify that I am a registered professional engineer in the State of Florida practicing engineering for Osiris 9 Consulting, LLC and that I have supervised the preparation of and approve the analysis, findings, opinions, conclusions, and technical advice hereby reported for:

PROJECT: North Beach Drainage Study
St. Johns County, Florida

The engineering work represented by this document was performed through the following duly authorized engineering business:

Osiris 9 Consulting, LLC
10199 Southside Blvd., Suite 104
Jacksonville, FL 32256

This report and its attachments provide details and calculations for the North Beach Drainage Study. Any engineering analyses, documents, conclusions, or recommendations relied upon from other professional sources or provided by others are referenced accordingly in the following report.



This item has been digitally signed and sealed by

on the date adjacent to the seal.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Table of Contents

Summary of Findings i
Executive Summary 1
Existing Conditions 2
Purpose and History 2
Existing Topography and Conveyance 2
Data Source List 3
Coordination 4
Homeowner Input Survey 4
Model Development 5
Boundary Conditions 5
Design Decisions and Assumptions 5
Existing Conditions Model 5
Proposed Conditions Model 7
Potential Solutions 8
Solution 1: Full-Length Bulkhead (FLB) 9
Solution 2: Raise Myrtle, Laurel, and Wahoo (RMLW) 10
Solution 3: Raise Road Ends (RRE) 11
Cost Estimates 12
Conclusions 12

List of Appendices

Appendix A: Figures

Figure 1: Study Location Map

Figure 2: USGS Quad Map

Figure 3: HSG Soils Map

Figure 4: FEMA Flood Zone Map

Figure 5: Land Use Map

Figure 6: Proposed FLB Schematic

Figure 7: Proposed RMLW Schematic

Figure 8: Proposed RRE Schematic

Appendix B: Calculations and ICPR4 Modelling

Calculations

ICPR4 Node Diagram

ICPR4 Input Report

ICPR4 Node Maximums

Appendix C: Data Collection

Pertinent Source Data

Plans Excerpts

Appendix D: Coordination

Homeowner Input Survey

Appendix E: Cost Estimates

Executive Summary

The North Beach area is a subsection of the greater Vilano Beach area of St. Johns County (SJC), Florida. This neighborhood lies west of SR A1A and comprises primarily single-family homes along with undeveloped wooded lots. Due to its proximity to the Intracoastal Waterway (also called the Tolomato River) and the Atlantic Ocean, the North Beach area has experienced many flooding events. More than 4 significant storm events have occurred in the last 8 years.

Flooding heights were investigated using the modeling software ICPR4. ICPR4 does not model ocean waves or winds, but the software can model the rise and fall of water levels as rain and other sources enter an area. The Existing Conditions Model (ECM) utilized the best available data to model flooding during Hurricane Matthew. The ECM model incorporated elevations from streets and existing bulkheads as well as hydraulic information from outfalls such as tidal flap gates. A Homeowner Input Survey was conducted to obtain eye-witness information regarding flood heights and locations.

The FDOT was contacted about planned trail and drainage improvements along SR A1A. It was determined these improvements would not have a significant impact on flooding or drainage flow within the study area.

Once the ECM was created and verified with known flood elevations, it was replicated to create proposed conditions models for three flooding improvement alternatives: Full-Length Bulkhead (FLB); Raise Myrtle, Laurel, and Wahoo (RMLW); and Raise Road Ends (RRE). These improvements varied from creating bulkheads to raising street elevations. In all cases, the proposed model used the same storm events as the ECM to compare what improvements were made to flooding. The alternatives were evaluated for overall cost and reduction in flooding. The results are summarized in the tables below. Solutions that required purchasing homes and high-cost additions, like a $10 million pump station, were not considered for this study.

Peak Stage Reduction Summary (Mean Annual and Hurricane Matthew Equivalent Events)

Simulation	Peak flood heights (feet above sea level, NAVD)			
	Mean Annual		Hurricane Matthew	
	Basin 1	Basin 2	Basin 1	Basin 2
ECM	3.53	3.21	6.70	6.70
Proposed FLB	3.53	3.21	4.88	4.87
Proposed RMLW	3.53	3.21	4.95	6.70
Proposed RRE	3.53	3.21	6.70	6.70

Summary of Estimated Construction Costs

Solution	Cost (Millions)
Proposed FLB	$ 7.3
Proposed RMLW	$ 7.2
Proposed RRE	$ 2.6

Existing Conditions

Purpose and History

The North Beach area is a subsection of the greater Vilano Beach area of St. Johns County (SJC), Florida. This neighborhood lies west of SR A1A and comprises primarily single family lots interspaced with undeveloped wooded areas. Over the past 50 years, gradual residential development has occurred in this area along with intermittent drainage improvements. Due to its proximity to the Intracoastal Waterway (also called the Tolomato River) and the Atlantic Ocean, the North Beach area has experienced many flooding events. More than 4 significant storm events have occurred in the last 8 years. Since the early 2000s, significant capital improvements were made to convey runoff to the Intracoastal Waterway.

The North Beach Drainage Study was conducted by Osiris 9 Consulting, LLC on behalf of St. Johns County Public Works following damaging storm events that flooded this community. The study sought to determine root causes of flooding experienced specifically since 2016, model the flood reduction of various improvements, and provide St. Johns County with estimates of probable cost for each. See **Appendix A, Figure 1: Study Location Map**.

The neighborhood has experienced the following construction since the 1980s:

- Berms built to separate specific roads from the Intracoastal, 1980s
- Driveway culverts and cross drains to promote drainage to the Intracoastal, 1990s
- Usina Boat Ramp Improvements, 2007
- Connelly & Wicker designed ditches that were partially constructed based on homeowner rejection, 1997.
- Four flap-gate tide control structures at street ends along the Intracoastal, 2005
- North Beach Utilities Wastewater treatment plant expansion, 2005
- Ditch and flap-gate structure connected to 23rd Street, Wahoo Drive, and the Villages of Vilano outfall, 2007.
- Boating Club Road boat ramp raised, 2023.

Existing Topography and Conveyance

The study area extended from Euclid Avenue south to 23rd Street and from the Atlantic Ocean east to the Intracoastal. Existing elevations in the study area range from 3.0 to 21.0 North American Vertical Datum (NAVD) 88. All elevations in this study are given in this datum. The eastern 30% of the study area slopes rapidly to the west while the remaining 70% has a gradual slope towards the Intracoastal with intermittent depressional areas. See **Figure 2: USGS Quad Map** and the diagram printed in **Appendix B** with the ICPR4 model output. Homeowners within the study area experience localized ponding during regular rain events and widespread inundation during larger storm events such as hurricanes and tropical storms. The soil within the study area is Satellite fine sand, 0 to 2 percent slopes, Narcoossee fine sand, shelly substratum, and Fripp-Satellite complex – see **Figure 3: HSG Soils Map**. Under the Hydrologic Soil Group designation, these soils are classified as "*A*" soils. Type "*A*" soils have high infiltration rates and allow runoff to quickly seep into the ground. Existing conveyance consists of swale and closed collection systems. The east-west streets primarily drain from SR A1A to the Intracoastal via

swales and driveway culverts. Within a few hundred feet of the Intracoastal, storm sewer pipe systems convey discharge through flap-gate outfall structures. These structures were installed to prevent high water stages in the Intracoastal, both tidal and storm related, from flowing into the low-lying areas of this neighborhood. See **Pertinent Source Data** in **Appendix C** for existing outfall structure details. **Figure 4: FEMA Flood Zone Map** shows 87% of the study area is estimated to be impacted by the 100-year storm event.

Including the Villages of Vilano (VOV) outfall, there are five outfalls for the study area. Below is a summary of the contributing drainage basins.

Table 3: Drainage Basin Summary

Basin	Location	Area (ac)	CN	High Elevation	Low Elevation	Outfall Invert
1	10th Street	45.98	61	20.50	3.20	1.56
2	17th Street	55.00	61	19.90	2.70	1.56
3	19th Street	26.14	61	17.30	2.30	1.56
4	21st Street	38.72	61	16.50	2.30	1.2
5	VOV	59.00	61	12.00	3.00	1.8

Data Source List

The following is a list of data sources used for gathering necessary information for the ICPR4 model setup, calibration, and interpretation. Pertinent excerpts from these sources can be found in **Appendix C**.

- Florida Department of Environmental Protection Statewide Land Use Cover (FLUCCS)
- USDA Web Soil Survey
- NRCS SCS CN Method
- FEMA National Flood Hazard Layer
- FEMA Flood Insurance Study 12109CV001D Volume 1 – 5
- 2018-2020 USGS Lidar: Florida Peninsular FDEM
- National Hurricane Center's Tropical Cyclone Report: Hurricane Matthew (AL142016)
- NOAA Atlas 14 Point Precipitation Frequency Estimate (100 yr 24 hr)
- NOAA/NOS/CO-OP Tide gauge data at 8720554
- USGS Storm Guage data FLST03118 Hurricane Matthew
- USGS Storm Guage data FLSTJ03118 Hurricane Irma
- North Beach Community Alliance: Flooding Mitigation and Prevention Resident Survey, March 2023
- City of St Augustine Data Hub, High Water Marks: Hurricane Irma
- St Johns County, High Water Marks: Hurricane Matthew and Hurricane Irma
- USGS Flood Event Viewer, High Water Marks: Hurricane Matthew and Hurricane Irma
- Connelly & Wicker North Vilano beach Drainage Improvement Contract Plans
    - 10th & 11th Street Outfall
    - 14th Street Outfall
    - 17th Street Outfall
    - 21st Street Outfall
    - 23rd Street Outfall

- SJC Public Works – Surveying and Mapping/GIS Division
    - Wahoo Drive Topographic Survey
    - 23rd Street Topographic Survey
    - Usina Boat Ramp Topographic Survey
- St. Johns River Water Management District (SJRWMD) – Environmental Resource Permit
    - ERP #48323-1
    - ERP #48323-2
    - ERP #48323-3
    - ERP #48369-5

Coordination

The direction from SJC staff, was to evaluate a major storm equivalent to Hurricane Matthew and a Mean Annual storm event. North Beach Park was not made available for potential added rainfall storage, based on recent homeowner preference to make no alterations to the park. Data collection was to include coordination with the FDOT project along SR A1A (FPID 429931-1-52-01).

FDOT staff were contacted concerning the project along SR A1A. The project comprises study and design of an 8' sidewalk which has a northern terminus at North Beach Park. The project includes a French drain collection/treatment system that continues further north from North Beach Park to Serenata Beach Club. The French drain system will divert more runoff from SR A1A into the ground relative to the existing condition. The runoff from SR A1A within the study area is estimated to contribute <1% of the runoff into the study area. Since the peak stages are controlled by rising water levels in the Intracoastal rather than from rainfall, the proposed changes from the FDOT project are not considered in the modeling.

Homeowner Input Survey

In order to identify drainage patterns and verify stages from previous storm events, a Homeowner Input Survey was distributed to residents at a public meeting hosted by North Beach Community Alliance at the Guana Tolomato Matanzas National Estuarine Research Reserve on August 16, 2023. Twenty-four (24) responses to the survey were submitted online and in person. The results documented flooding experienced in both large and smaller rain events as well as providing photographic documentation of specific storm events such as Tropical Storm Nicole and Hurricane Ian. See **Appendix D** for a summary of the survey responses.

Model Development

Boundary Conditions

Boundary time-stage conditions from past storm events were a critical component for calibrating the existing conditions model. The United States Geological Survey (USGS) installs temporary water level sensors in coastal waterways ahead of major storm events. One gauge on the Intracoastal, FLSTJ03118, was installed for Hurricane Matthew within the study area and was used to create the boundary stage set for the Tolomato River. The nearest water level gauge for the Atlantic Ocean was located near Fort Matanzas, FLSTJ03126. The stages from this gauge were used to establish the boundary stage set for the Atlantic Ocean for Hurricane Matthew. These boundary conditions allow the model to accurately predict when inundation will occur at various locations, and how long the stages remain elevated. An ICPR4 node diagram and input data are provided in **Appendix B**: **Calculations and ICPR4 Modeling**. For storm events analyzed other than a Matthew Equivalent event, the mean higher high water (MHHW) values were used for the Intracoastal and the Atlantic.

Design Decisions and Assumptions

Due to the limited information available regarding existing drainage improvements, the model focused on incorporating drainage structures that cross basin boundaries. Modeling was not considered for scenarios where flap gates fail and are stuck open. For this phase of the study, conveyance swales were omitted from the model because all low areas in each basin are hydraulically connected beneath the peak stage of the simulated storms.

Due to limited survey data within the study area, stage-storage information for each basin was generated using the Digital Elevation Model (DEM) surface in ICPR4 – see **Appendix B** for example. This stage-area table was truncated at elevation 9.0 to reduce computational time. The highest elevation found from the FEMA FIS study was 7.0. A 2-foot buffer was added to allow for variations in the stage.

Existing Conditions Model

To accurately model rainfall runoff within the study area, hydrologic soil group (HSG) data was correlated with the existing land use based on the SCS CN method – see **Figure 5: Land Use Map.** Two basins, Basin 1 and Basin 2, were created to better understand the overall hydrology of the study area. The ICPR4 Node Diagram in **Appendix B** shows the basins and respective links in the ECM. Basin 1 encompasses the majority of land east of Myrtle Street, Laurel Street, and Wahoo Drive. These streets serve as the drainage boundary between Basin 1 and Basin 2 due to relatively consistent elevations and limited points for water to cross. Basin 2 encompasses the western portion of the study area from the above-mentioned streets towards the Intracoastal. Under existing conditions, runoff from Basin 1 will flow west into Basin 2 before outfalling to the Intracoastal.

Once runoff and drainage basin data were established, a weir was modeled on all sides of each basin. The profiles of bordering streets (23rd, Wahoo, 21st, Laurel, 16th, Myrtle, Euclid, and SR A1A) were used to develop the shape of the weirs between basins. During a storm simulation, water must stage up to the lowest point on these streets before flowing into the basins unless it flows first through a culvert that is below the street. This helped identify low spots in the study area that may influence regional flooding. An additional weir was modeled for Basin 2 along the western shoreline. This weir initially followed a constant lidar high point that was found along the Intracoastal shoreline. After collecting

additional data from residents, it was observed that many properties had bulkheads with elevation profiles that conflicted with the lidar data. Using this additional information, "XW-BULKHEAD" was modified to better represent the elevation at existing bulkheads and manmade berms along the shoreline. During a storm simulation, water must stage up to the lowest point on the shoreline before flowing into Basin 2. This assumption aligns with data collected from residents who have observed water encroaching from the west via low spots along the Intracoastal.

In addition to overtopping earthen or roadway weirs, water may also enter the study area through various pipe connections that cross under many of the streets mentioned above. There are five flap gate structures that hold back rising waters in the Intracoastal from the low-lying areas in the neighborhood but allow rain runoff to flow into the Intracoastal when river levels are lower than the water levels in the study area. Under large storm events, these flap gates may alter the behavior of flood staging within the study area. Five flap gates, located at 10th Street, 17th Street, 19th Street, 21st Street, and Villages of Vilano, were modeled. Existing pipe culverts that cross basin divide weirs were added to the model using survey data from SJC Surveying or from permitted construction plans.

To model a tidal flap gate in ICPR4, a three-step methodology was used. Two stage-area nodes were placed upstream and downstream of the flap gate location. Next, a pipe link was added between the upstream and downstream nodes. Construction details from the sources listed above were used to input the pipe size, upstream invert, and downstream invert. The flow direction was set to positive only, allowing stormwater only to flow towards the Intracoastal node. The final step added a pipe link from Basin 2 into the upstream node and a pipe link from the downstream node to the Intracoastal. By using this three-step approach, the flap gates can be further modified if new information is collected. Since most of the flap gates are sumped, the exit loss coefficient was added to address the reduction in velocity.

A single storm simulation was used for calibrating the ECM. The Hurricane Matthew Equivalent event was used because SJC had obtained more than 10 high water marks after the event, and the USGS gathered accurate time-stage data from the Intracoastal and the Atlantic. Tailwater conditions were added to the boundary nodes at the Intracoastal and the Atlantic based on this storm event. USGS Gauge information obtained from Hurricane Matthew was used for the boundary stage node. The rainfall amount was set to 8.81" for Hurricane Matthew based on the recorded precipitation around the study area.

The unit hydrograph UH323 was used for all storm simulations because this unit hydrograph mimics developed residential land use without steep slopes.

The peak stage of the ECM for the Hurricane Matthew Equivalent storm simulation is 6.70 in both Basins 1 and Basin 2. The Mean Annual storm simulation produced peak stages of 3.53 for Basin 1 and 3.21 for Basin 2. The following table shows surveyed high-water points collected by SJC after the actual Hurricane Matthew event. The model effectively matches the data considering that the surveyed points were taken from rough lines left behind by floating debris that stuck to fences and other structures.

Table 4: Calibration Points from Hurricane Matthew

Basin	Location	High Water Mark
1	4090 Myrtle St, St. Augustine, FL 32084	6.54
1	302 Eleventh St, St. Augustine, FL 32084	6.65
1	213 12th St, St. Augustine, FL 32080	6.50
2	4001 Myrtle St, St. Augustine, FL 32084	6.64
1	302 Seventeenth St, St. Augustine, FL 32084	6.67
2	608 Boating Club Rd, St. Augustine, FL 32084	6.76
1	515 Boating Club Rd, St. Augustine, FL 32084	6.64
2	601 Nineteenth St, St. Augustine, FL 32084	6.92
2	600 Twentieth St, St. Augustine, FL 32084	6.74
2	603 Twentieth St, St. Augustine, FL 32084	6.78
1	216 Nineteenth St, St. Augustine, FL 32084	6.82
1	515 Twenty Third St, St. Augustine, FL 32084	6.95
1	3741 Palm St, St. Augustine, FL 32084	6.94

Sources: SJC, City of St. Augustine, USGS

Proposed Conditions Model

The proposed conditions model is a modification of the verified ECM. Three proposed conditions models (PCMs) were created to investigate improvements made by the three solutions mentioned in the next section.

To create the PCMs, the ECM was duplicated and renamed to each of the three solutions: Proposed FLB, Proposed RMLW, and Proposed RRE.

Proposed FLB consists of a modification to XW-BULKHEAD and XW-EUCLID cross sections. XW-BULKHEAD was modeled to simulate a full-length bulkhead along the ICW. An elevation of 6.8 was set along all of XW-BULKHEAD based on the maximum recorded stage from Hurricane Matthew by USGS. The western 800 feet of Euclid Ave. is below the 6.8 bulkhead elevation and would allow seawater to pass around the FLB in a storm event. To counter this, XW-EUCLID was modified for the western 800 feet to match the 6.8 bulkhead elevation.

Proposed RMLW consists of a modification to XW-MYRTLE_LAUREL and XW-EUCLID cross sections. XW-MYRTLE_LAUREL was modeled to simulate a raised roadway profile. An elevation of 6.8 was set along all of XW-MYRTLE_LAUREL based on the same criteria mentioned above. Likewise, the western 800 feet of XW-EUCLID was raised to match the 6.8 roadway elevation.

Proposed RRE consists of a modification to XW-BULKHEAD and XW-EUCLID cross sections. XW-BULKHEAD was modeled to simulate manmade berms where county streets terminate at the Intracoastal. A berm elevation of 6.8 was used based on the same criteria mentioned above. XW-BULKHEAD was raised to 6.8 at the following locations: Euclid/10th, 11th, 12th, 13th, 14th, 15th, 18th, 20th, and Wahoo. Based on field and lidar observations, these road ends were determined to be below 6.8 and were raised. The remaining areas of XW-BULKHEAD were left identical to the ECM as these areas

would not be altered in the RRE solution. As discussed in the previous two solutions, the western 800 feet of XW-EUCLID was raised to match the 6.8 berm elevation.

The Mean Annual storm event and the Hurricane Matthew Equivalent storm event were applied to the ECM and the three PCMs.

Potential Solutions

Areas of limited protection from rising water levels in the Intracoastal were observed during the research and ECM development of this study. Items are listed below; this list is not exhaustive nor did the scope of this study include survey to verify elevations.

Protection Limitations Along the Intracoastal

- Low points in private properties that allow rising water to convey to streets removed from the Intracoastal.
- Low points in Villages of Vilano development that allow rising water to convey to the natural area south of 23rd Street.
    - Subsequently, low profile elevation of 23rd Street that allows rising water to convey north into private property.
- Low profile elevations along Euclid that allow water to convey through North Beach Campground into private property south of Euclid.
- Low elevations at street-ends that allow rising water to enter roadside swales and connect to depressional areas otherwise removed from the Intracoastal.

Inland Limitations Contributing to Flooding

- Natural sandy soils replaced with sod and topsoil with lower infiltration rates.
- Existing trees that previously contributed to drawing down standing water levels now replaced with homes.
- Added fill beneath new homes has reduced flood storage area around low-lying homes.
- Natural sand dune topography that consists of sand ridges with intermittent valleys, which collect water, have been developed, reducing flood storage areas.

This study focused on three potential solutions that avoid impacts to homes. Other solutions that require purchasing private property and/or homes were not studied. During a storm like Hurricane Matthew and even the 100-year FEMA flood elevation, rising water of the Atlantic was not a contributing factor in flooding within the North Beach neighborhood. Evaluated solutions sought to provide protection from rising water in the Intracoastal through berms and pipe systems with backflow prevention. Like other low-lying, flood-prone areas in the U.S., pumps could be installed to draw water from lower areas in the drainage basin to reduce the height of the rising water. In cases where pumps would be utilized, a flood barrier (berm, bulkhead, etc.) would be constructed. Therefore, the cost of a pump would need to be added to the estimated cost of the solutions studied herein. Upon considering the Jacksonville Electric Authority (JEA) recently spent approximately $10 million for a pump system in downtown Jacksonville, this type of solution was expected to be outside of St. Johns County's budget and therefore excluded from the study.

All Proposed Conditions Models were run with identical storm events to compare what improvements were made to existing flood staging. Sketches of the proposed solutions can be found in **Appendix A: Figures**. The following table is a summary of the modeling results.

Table 1: Peak Stage Reduction Summary (Mean Annual and Hurricane Matthew Equivalent Events)

Simulation	Peak flood heights (feet above sea level, NAVD)			
	Mean Annual		Hurricane Matthew	
	Basin 1	Basin 2	Basin 1	Basin 2
ECM	3.53	3.21	6.70	6.70
Proposed FLB	3.53	3.21	4.88	4.87
Proposed RMLW	3.53	3.21	4.95	6.70
Proposed RRE	3.53	3.21	6.70	6.70

Solution 1: Full-Length Bulkhead (FLB)

In the existing condition, the shoreline properties along the Intracoastal vary in elevation and composition. There are existing bulkheads along certain properties; however, there are gaps, particularly at street ends. This solution aims to create a continuous bulkhead along the entire western shoreline of the North Beach neighborhood.

The proposed bulkhead was modeled at elevation 6.8 to exceed the maximum stage of Hurricane Matthew as recorded by USGS. The constructed bulkhead should consider the FEMA 100-year stillwater elevation 6.5 and the wave crest elevation up to 9.0. The cost estimate was based on a wall elevation of 7.0.

In addition to a complete bulkhead along the Intracoastal, to reduce flood stages, a short berm would have to be constructed between the end of Wahoo Drive and 23rd Street. This would be an earthen berm that would require an easement from two properties: 3780 Wahoo Drive and 610 23rd Street.

Also, 1600’ of 23rd Street would need to be raised to elevation 6.8 because of the limited protection provided by the Villages of Vilano development. This road construction would require collection system improvements along 23rd Street and well as Temporary Construction Easements (TCE) for rebuilding driveway transitions to the new road elevation. The collection system improvements may require permanent drainage easements along 23rd Street.

Similarly, 800’ of Euclid Avenue would need to be raised to elevation 6.8 because of limited protection from the North Beach Campground. Road construction would require collection system improvements and some TCEs for driveway rebuilding.

Advantages

- Erosion protection during wave action.
- A constant wall elevation that will protect low-lying areas behind the bulkhead.
- Low-lying areas immediately behind the bulkhead can be protected from nuisance tidal flooding.

Disadvantages

- Requires cooperation between all property owners along the western shoreline of the study area.
- Aesthetic loss of sandy shoreline and natural buffers.
- Limited access to shoreline for each property owner.
- Requires environmental permitting.
- Potential impacts to aquatic species who may use the gradual shoreline.

This solution produced peak stages in Basins 1 and 2 of 3.53 and 3.21, respectively for the Mean Annual storm and 4.88 and 4.87, respectively for the Hurricane Matthew Equivalent storm. There was no reduction for the Mean Annual storm event, but there was a 1'-10" reduction for the Hurricane Matthew Equivalent storm event. This solution will require permits from SJRWMD and US Army Corps of Engineers for roadway improvements and impacts to the Intracoastal. It is estimated that this alternative will require a 0.7-acre pond to treat the roadway improvements.

Solution 2: Raise Myrtle, Laurel, and Wahoo (RMLW)

Since a continuous bulkhead requires cooperation of all shoreline property owners, another alternative was considered that focuses the majority of improvements within existing County right-of-way. Potential Solution 2 raises road profiles of the north-south roads Myrtle Street, Laurel Street, and Wahoo Drive. Subsequently, connecting streets 16th and 21st would be raised as well. Raising the roads creates an inland berm to protect the low-lying properties east of the raised roads. Raising the roads would require complete reconstruction of the roads listed above as well as installing a closed collection system, as the existing ditches would need to be filled in.

The proposed road profiles were modeled at elevation 6.8 to exceed the maximum stage of Hurricane Matthew as recorded by USGS. The constructed road profiles should consider the FEMA 100-year stillwater elevation 6.5. The cost estimate was based on a road profile elevation of 7.0.

In addition to raising road profiles to reduce flood stages, a short berm would have to be constructed between the end of Wahoo Drive and 23rd Street. This would be an earthen berm that would require an easement from two properties: 3780 Wahoo Drive and 610 23rd Street. Alternately, Wahoo Drive can be excluded, and Laurel Street profile extended to 23rd Street if the private owners 3780 Wahoo Drive and 610 23rd Street decline an earthen berm on their property.

Also, 1600' of 23rd Street would need to be raised to elevation 6.8 because of the limited protection provided by the Villages of Vilano development. This road construction would require collection system improvements along 23rd Street and well as TCE for rebuilding driveway transitions to the new road elevation. The collection system improvements may require permanent drainage easements along 23rd Street.

Similarly, 800' of Euclid Avenue would need to be raised to elevation 6.8 because of limited protection from the North Beach Campground. Road construction would require collection system improvements and some TCEs for driveway rebuilding.

Collection systems would include backflow prevention devices to prevent west-to-east flow beneath the north-south roads due to rising water in the Intracoastal.

Advantages

- Within County right-of-way (with exception of driveways and TCEs).
- Minimized environmental and aesthetic impact of the Intracoastal shoreline.
- Allows closed collection of runoff as opposed to open ditches.

Disadvantages

- May require permitting and water quality treatment.
- Does not provide any protection for properties west of Myrtle, Laurel, and Wahoo.
- Does not prevent erosion from wave action.

This solution produced peak stages in Basins 1 and 2 of 3.53 and 3.21, respectively for the Mean Annual storm and 4.95 and 6.70, respectively for the Hurricane Matthew Equivalent storm. There was no reduction for the Mean Annual storm event, but there was a 1'-9" reduction for the Hurricane Matthew Equivalent storm event for the neighborhood east of the raised roadway. This solution will require a permit from SJRWMD. It is estimated that this alternative will require a 1.8-acre pond to treat the roadway improvements.

Solution 3: Raise Road Ends (RRE)

Based on eyewitness testimony and field observations, many street ends on the western shoreline of the study area vary in elevation compared to the surrounding area. Many street ends served as private boat ramps in the 1980s. These boat ramps were gradually built-up and blocked to reduce usage. However, the top elevations of the fill were inconsistent and lower than surrounding properties and, as a result, water may overtop certain street ends during a storm event. This solution will raise all street ends along the Intracoastal to a constant elevation using berms or complete reconstruction of the street ends.

The following street ends were modeled with a berm at elevation 6.8 to exceed the maximum stage of Hurricane Matthew: Euclid Avenue/10th Street, 11th Street, 12th Street, 13th Street, 14th Street, 15th Street, 18th Street (Boating Club Road), 20th Street, and Wahoo Drive. The constructed berms should consider the FEMA 100-year stillwater elevation, 6.5. The cost estimate was based on a berm elevation of 7.0.

In some cases, the current road ends provide conveyance of rainfall runoff towards the Intracoastal. The following locations would require new piped collection systems with backflow prevention devices to allow rainfall to continue to discharge to the Intracoastal during minor rainfall events or after major rainfall events: 11th Street, 12th Street, 13th Street, 14th Street, 15th Street, and 20th Street. Alternately, the collection systems could be installed to reroute runoff to an existing outfall that already has constructed backflow prevention. For cost estimation, new backflow preventers were considered in lieu of rerouting runoff to existing flap gates.

To take advantage of improved protection from raised road ends, 1600' of 23rd Street would also need to be raised to elevation 6.8 because of the limited protection provided by the Villages of Vilano development. This road construction would require collection system improvements along 23rd Street and well as TCE for rebuilding driveway transitions to the new road elevation. The collection system improvements may require permanent drainage easements along 23rd Street.

Similarly, 800' of Euclid Avenue would need to be raised to elevation 6.8 because of limited protection from the North Beach Campground. Road construction would require collection system improvements and some TCEs for driveway rebuilding.

Advantages

- Does not require cooperation from all private property owners along the Intracoastal.
- Will improve protection for the study area from water encroachment via low street ends.
- Allows the existing shoreline and vegetation to remain along private properties.

Disadvantages

- Potential for water to encroach via low-lying private property along the shoreline.
- New infrastructure with additional backflow devices.
- Does not prevent erosion from wave action.

This solution produced peak stages in Basins 1 and 2 of 3.53 and 3.21, respectively for the Mean Annual storm and 6.70 for both basins in the Hurricane Matthew Equivalent storm. There was no reduction for the Mean Annual storm event or the Hurricane Matthew Equivalent storm event. This solution will require a permit from SJRWMD. It is estimated that this alternative will require a 0.7-acre pond to treat the roadway improvements. The improvements did not reduce peak stages in the larger storm event because even though the road ends were raised low spots along private properties still exist that allow inflow of rising water from the Intracoastal. Property owners would have to individually raise these low areas on their property to match the proposed berm elevation to better protect their property and the low-lying areas within the neighborhood.

Cost Estimates

Cost estimates were developed using preliminary sketches of solutions to estimate quantities of major items, applying FDOT construction average costs, and deriving property appraiser right-of-way values as needed. Schematics of the proposed solutions are provided in **Figures 6-8**. Cost estimate details are provided in **Appendix E**. The following table is a summary of the total cost of each alternative.

Table 2: Summary of Estimated Construction Costs

Solution	Cost (Millions)
Proposed FLB	$ 7.3
Proposed RMLW	$ 7.2
Proposed RRE	$ 2.6

Conclusions

Each of the alternatives produced varying levels of peak stage reduction. The Full-Length Bulkhead produced the greatest reductions, but comes at the highest cost, requires the most buy-in from property owners, is contrary to property owners' desire for a natural buffer along the shoreline, and requires the highest level of permitting. The Raise Myrtle, Laurel, and Wahoo alternative has the second highest cost, but requires less permitting than the FLB. The Raise Road Ends alternative did not reduce

peak stages in the larger storm event because even though the road ends were raised, low spots along private properties still exist that allow inflow of rising water from the Intracoastal. Property owners would have to individually raise these low areas on their property to match the proposed berm elevation to better protect their property and the low-lying areas within the neighborhood.

Appendix A: Figures

Figure 1: Study Location Map

Figure 2: USGS Quad Map

Figure 3: HSG Soils Map

Figure 4: FEMA Flood Zone Map

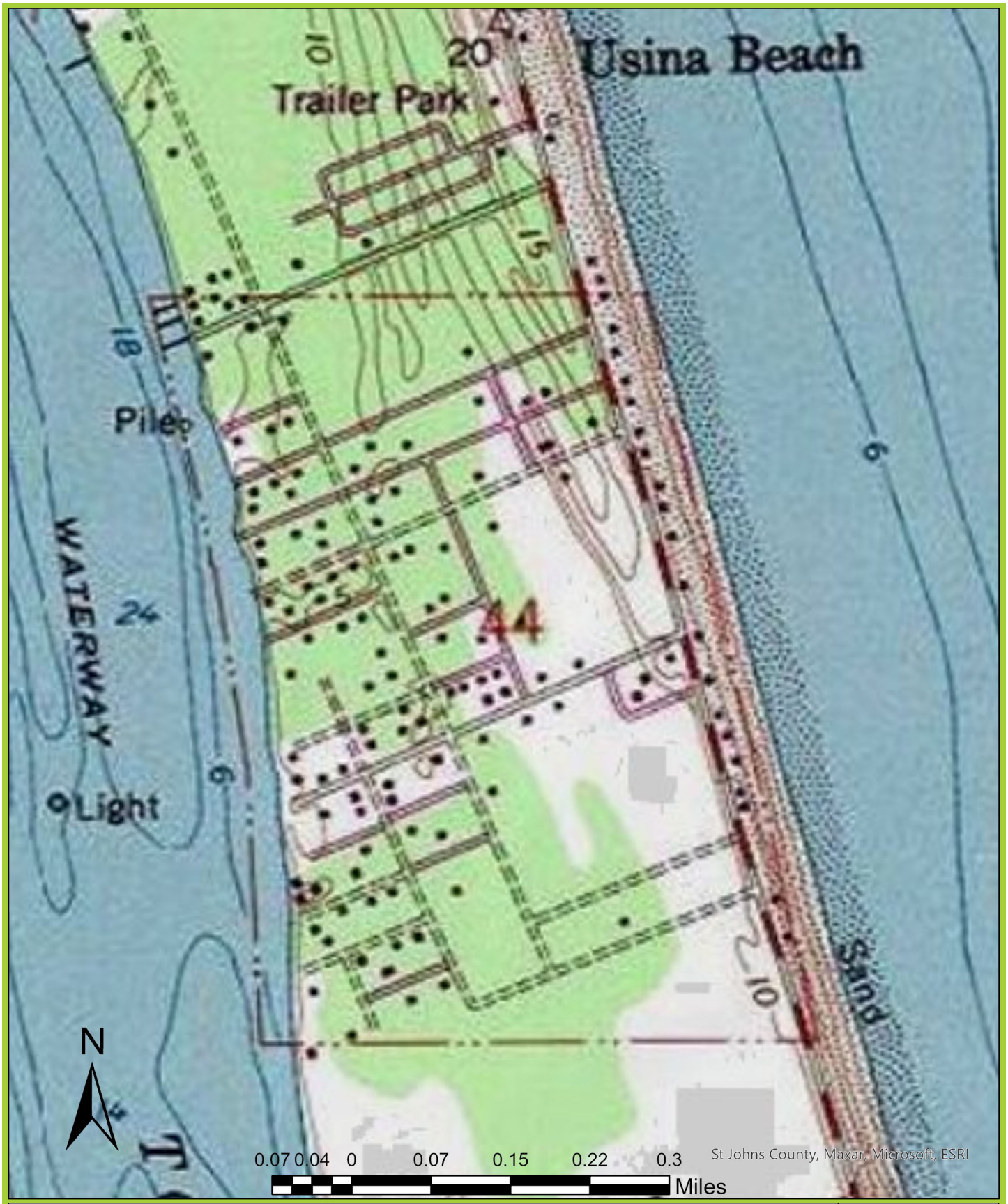
Figure 5: Land Use Map

Figure 6: Proposed FLB Schematic

Figure 7: Proposed RMLW Schematic

Figure 8: Proposed RRE Schematic

North Beach Drainage Study	**Figure 1: Project Location Map**	



North Beach Drainage Study	**Figure 2: USGS Quad Map**	

Map Scale: 1:11,300 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

Figure 3:
HSG Soils Map

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: St. Johns County, Florida
Survey Area Data: Version 21, Sep 2, 2022

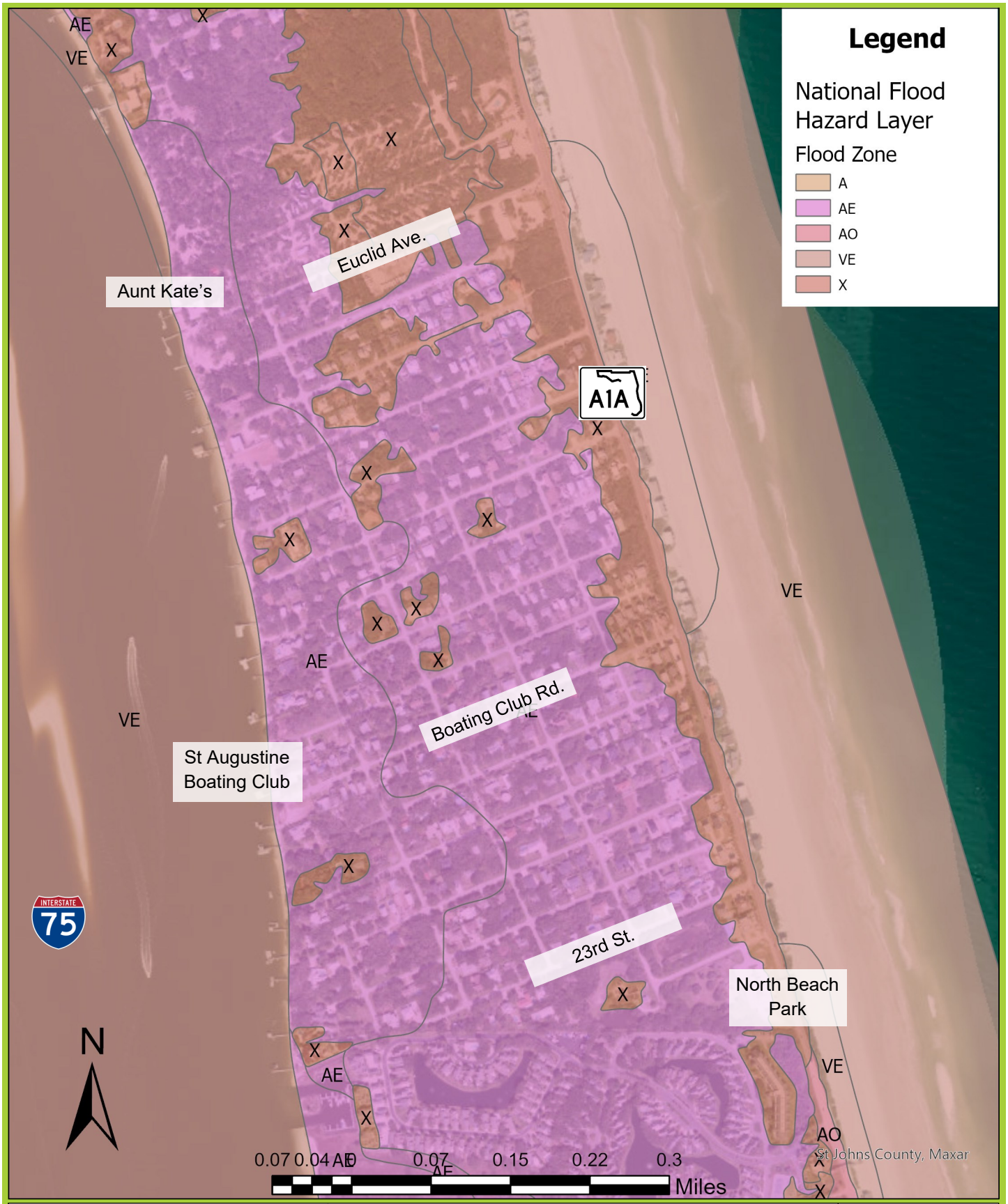
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 6, 2022—Feb 10, 2022

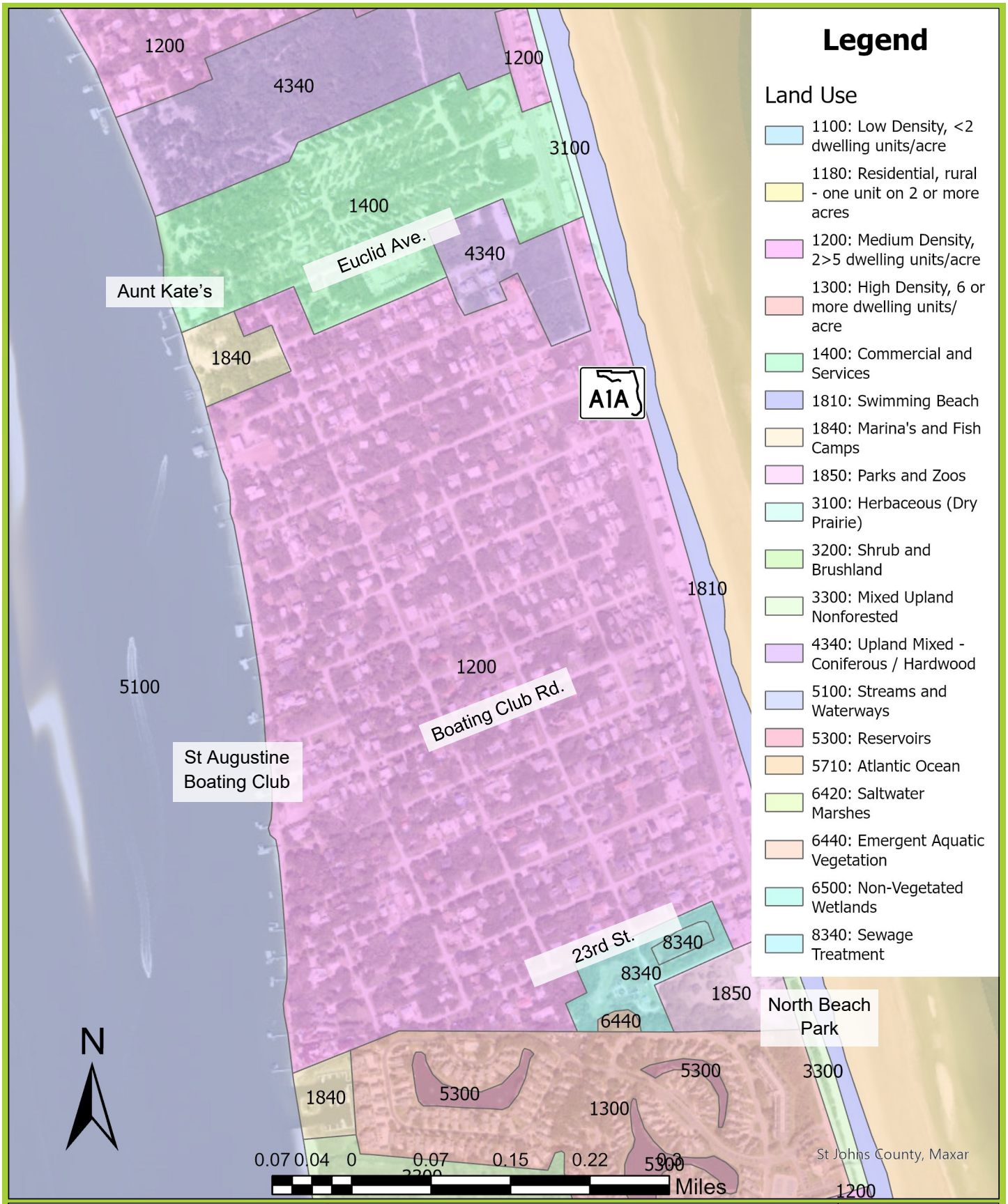
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

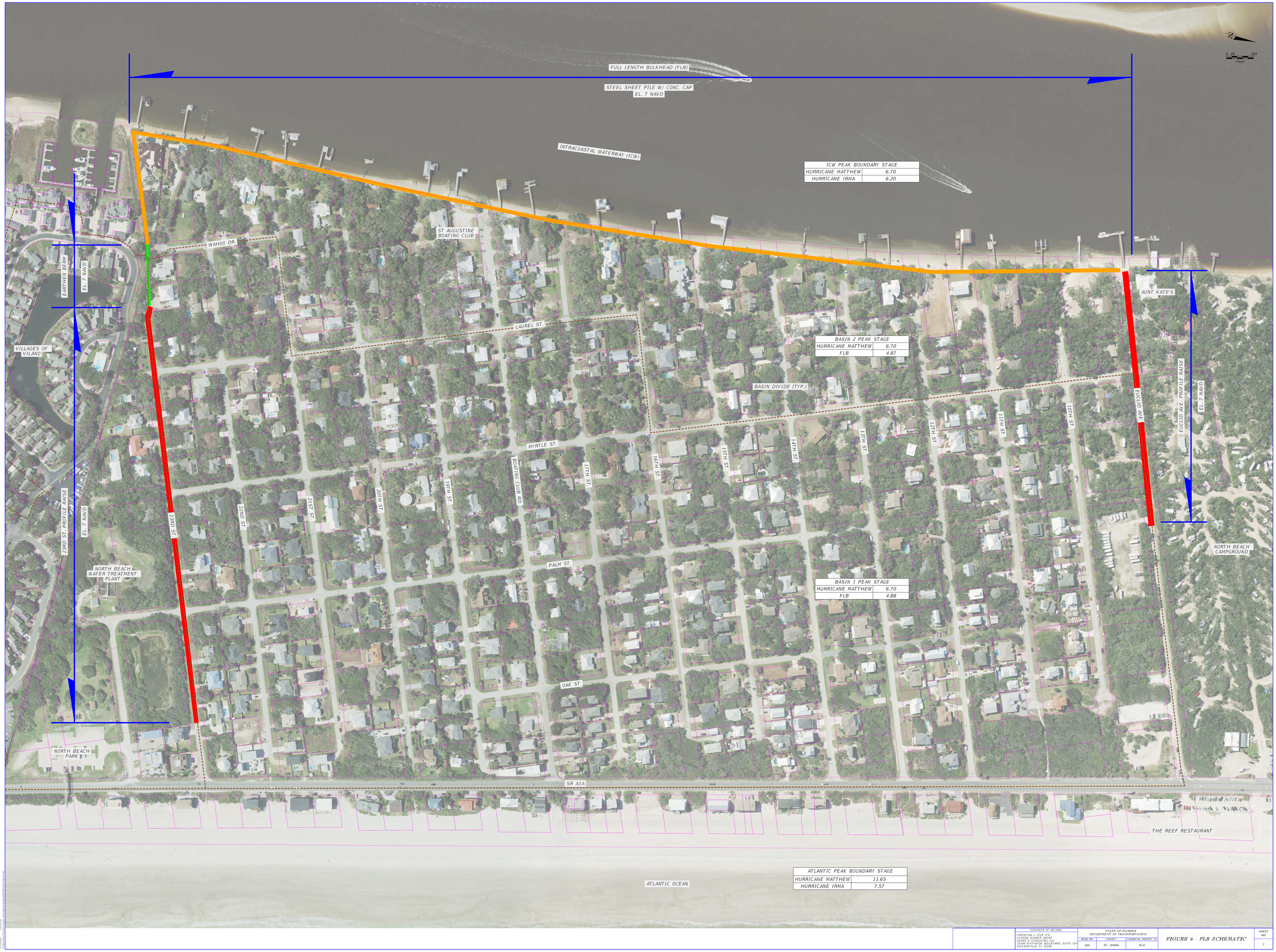
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
19	Pompano fine sand	18.6	2.9%
24	Pellicer silty clay loam, frequently flooded	0.2	0.0%
28	Beaches	38.4	6.0%
29	Satellite fine sand, 0 to 2 percent slopes	91.6	14.4%
31	Fripp-Satellite complex	44.7	7.0%
32	Palm Beach sand, 0 to 8 percent slopes	26.2	4.1%
50	Narcoossee fine sand, shelly substratum	135.9	21.4%
99	Water	158.4	24.9%
100	Waters of the Atlantic Ocean	122.3	19.2%
Totals for Area of Interest		**636.4**	**100.0%**



North Beach Drainage Study	**Figure 4: FEMA Flood Zone Map**	



North Beach Drainage Study	**Figure 5: Land Use Map**	



ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				SHEET NO.
CHRISTIAN J. GYLE, P.E. LICENSE NUMBER: 69159 OSIRIS 9 CONSULTING, LLC 10199 SOUTHSIDE BOULEVARD, SUITE 104 JACKSONVILLE, FL 32256	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	FIGURE 6 - FLB SCHEMATIC	1
	A1A	ST. JOHNS	N/A		

WAHOO DR, 21ST ST, LAUREL ST, 16TH ST, MYRTLE ST. PROFILE RAISE (RMLW)

FULL ROADWAY & DRIVEWAY RECONSTRUCTION
EL. 7 NAVD

INTRACOASTAL WATERWAY (ICW)

ICW PEAK BOUNDARY STAGE	
HURRICANE MATTHEW	6.70
HURRICANE IRMA	6.20

BASIN 2 PEAK STAGE	
HURRICANE MATTHEW	6.70
RMLW	6.70

BASIN 1 PEAK STAGE	
HURRICANE MATTHEW	6.70
RMLW	4.95

ATLANTIC PEAK BOUNDARY STAGE	
HURRICANE MATTHEW	11.65
HURRICANE IRMA	7.57

N

0 20 100
Feet

ST AUGUSTINE BOATING CLUB

AUNT KATE'S

VILLAGES OF VILANO

EARTHEN BERM

EL. 7 NAVD

WAHOO DR.

LAUREL ST.

BASIN DIVIDE (TYP.)

MYRTLE ST.

BOATING CLUB RD.

16TH ST.

15TH ST.

14TH ST.

13TH ST.

12TH ST.

11TH ST.

10TH ST.

EUCLID AVE

EUCLID AVE. PROFILE RAISE

EL. 7 NAVD

NORTH BEACH CAMPGROUND

23RD ST. PROFILE RAISE

EL. 7 NAVD

NORTH BEACH WATER TREATMENT PLANT

23RD ST.

22ND ST.

21ST ST.

20TH ST.

19TH ST.

17TH ST.

PALM ST.

OAK ST.

NORTH BEACH PARK

SR AIA

THE REEF RESTAURANT

ATLANTIC OCEAN

ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			FIGURE 7 - RMLW SCHEMATIC	SHEET NO.
CHRISTIAN J. GYLE, P.E. LICENSE NUMBER: 69139 OSIRIS 9 CONSULTING, LLC 10199 SOUTHSIDE BOULEVARD, SUITE 104 JACKSONVILLE, FL 32256	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		2
	A1A	ST. JOHNS	N/A		

ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			FIGURE 8 - RRE SCHEMATIC	SHEET NO.
CHRISTIAN J. GYLE, P.E. LICENSE NUMBER 58910	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
VOLKERT CONSULTING, LLC 10306 SOUTHSIDE BOULEVARD, SUITE 104 JACKSONVILLE, FL 32256	A1A	ST. JOHNS	N/A		3

Appendix B:
Calculations and ICPR4 Modelling

Calculations

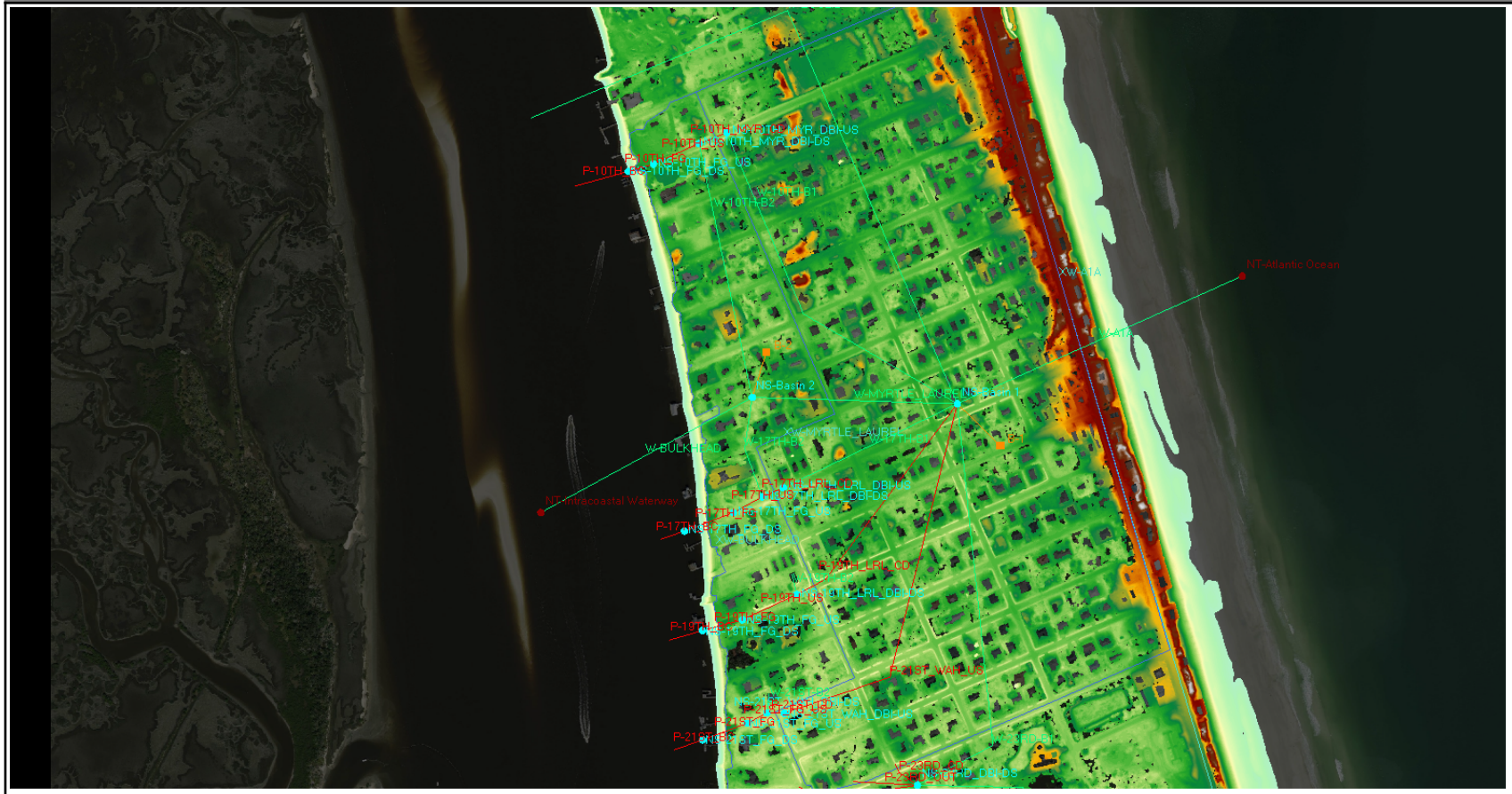
ICPR4 Node Diagram

ICPR4 Surface Elevation Map

ICPR4 Input Report

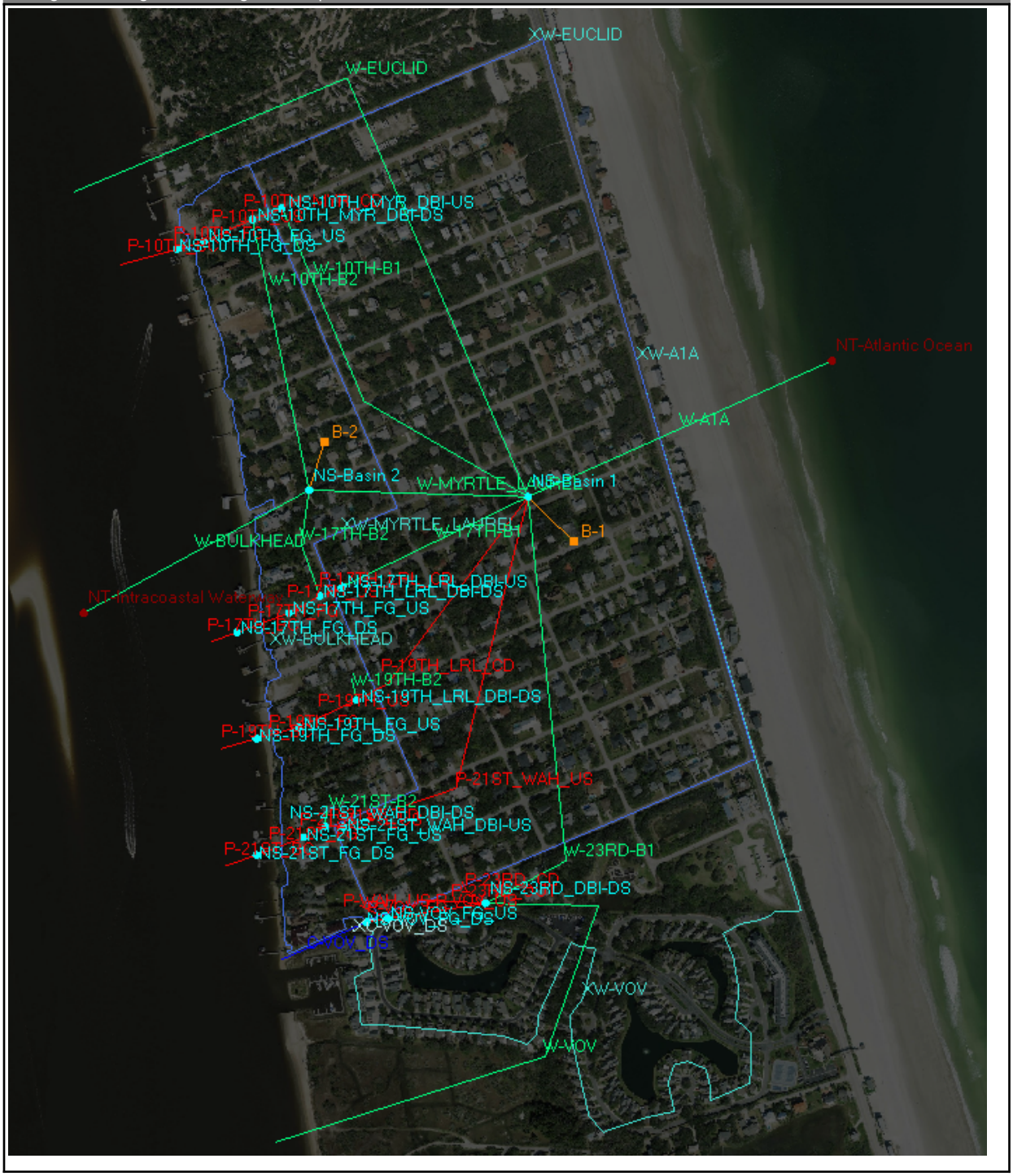
ICPR4 Node Maximums

Background Image: Surface Elevation Map

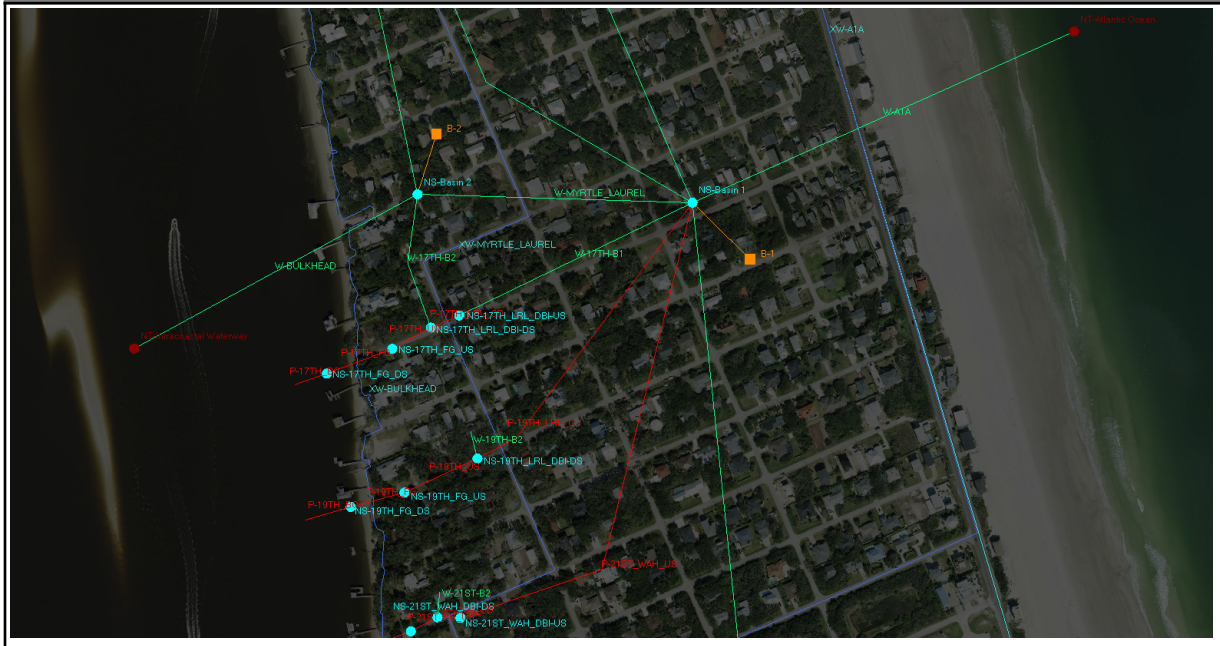


Raster Legend			
	1.54 - 1.77		19.16 - 19.39
	1.78 - 2.00		19.40 - 19.62
	2.01 - 2.24		19.63 - 19.86
	2.25 - 2.47		19.87 - 20.09
	2.48 - 2.71		20.10 - 20.33
	2.72 - 2.94		20.34 - 20.56
	2.95 - 3.18		20.57 - 20.80
	3.19 - 3.41		20.81 - 21.03
	3.42 - 3.65		21.04 - 21.27
	3.66 - 3.88		21.28 - 21.50
	3.89 - 4.12		21.51 - 21.74
	4.13 - 4.35		21.75 - 21.97
	4.36 - 4.59		21.98 - 22.21
	4.60 - 4.82		22.22 - 22.44
	4.83 - 5.06		22.45 - 22.68
	5.07 - 5.29		22.69 - 22.91
	5.30 - 5.53		22.92 - 23.15
	5.54 - 5.76		23.16 - 23.38
	5.77 - 6.00		23.39 - 23.62
	6.01 - 6.23		23.63 - 23.85
	6.24 - 6.47		23.86 - 24.09
	6.48 - 6.70		24.10 - 24.32
	6.71 - 6.94		24.33 - 24.56
	6.95 - 7.17		24.57 - 24.79
	7.18 - 7.41		24.80 - 25.03
	7.42 - 7.64		25.04 - 25.26
	7.65 - 7.88		25.27 - 25.50
	7.89 - 8.11		25.51 - 25.73
	8.12 - 8.35		25.74 - 25.97
	8.36 - 8.58		25.98 - 26.20
	8.59 - 8.82		26.21 - 26.44

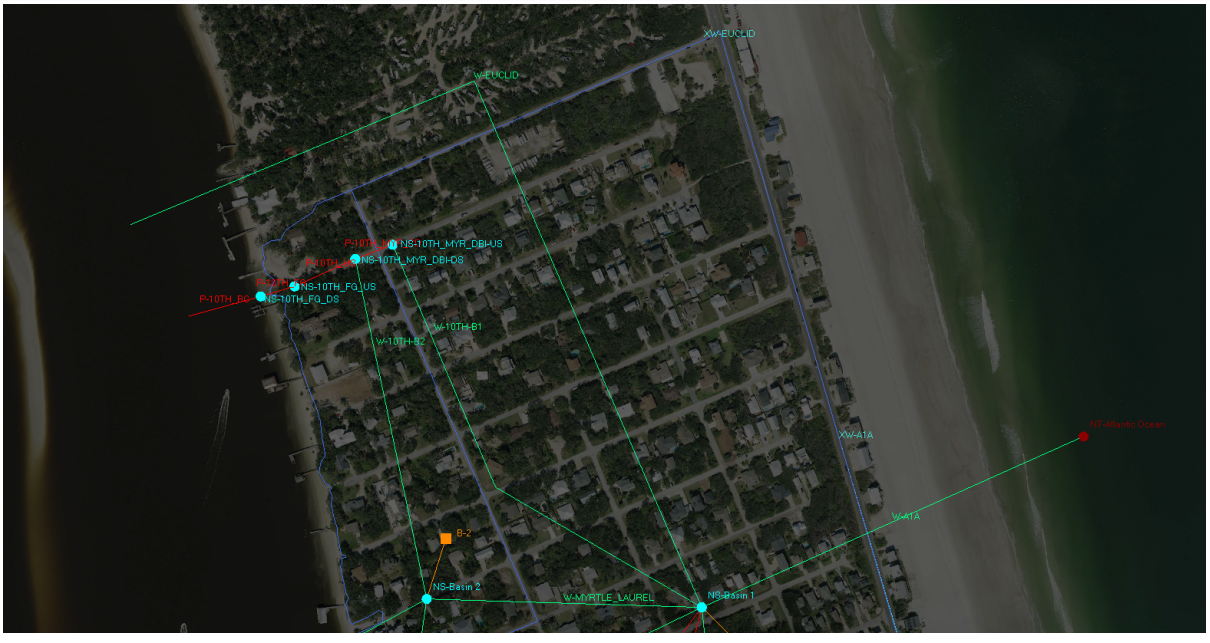
Background Image: Node Diagram Complete



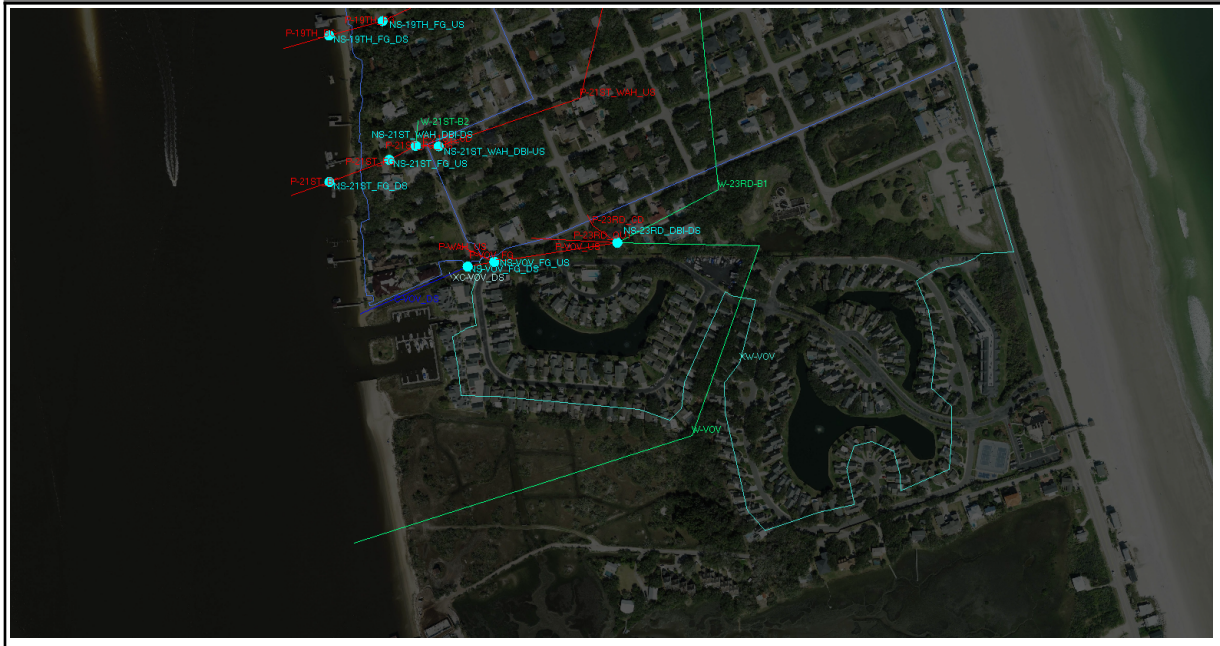
Background Image: Node Diagram Mid



Background Image: Node Diagram North



Background Image: Node Diagram South



Simulation: Matthew Storm

Scenario:	Existing Conditions
Run Date/Time:	12/15/2023 12:08:17 PM
Program Version:	ICPR4 4.07.08

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	2016	10	6	11.0000
End Time:	2016	10	9	17.0000

	Hydrology [sec]	Surface Hydraulics [sec]
Min Calculation Time:	60.0000	0.2500
Max Calculation Time:		5.0000

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:

Unit Hydrograph Folder: Icpr3

Lookup Tables

Boundary Stage Set: Matthew Storm
Extern Hydrograph Set:
Curve Number Set: NBD
Green-Ampt Set:
Vertical Layers Set:
Impervious Set: NBD

Tolerances & Options

Time Marching: FIREBALL
dZ Tolerance: 0.0010 ft
Max dZ: 1.0000 ft
Link Optimizer Tol: 0.0001 ft
Edge Length Option: Automatic

IA Recovery Time: 24.0000 hr
Smp/Man Basin Rain Opt: Global
Rainfall Name: ~FLMOD
Rainfall Amount: 8.81 in
Storm Duration: 24.0000 hr
Dflt Damping (1D): 0.0050 ft
Min Node Srf Area (1D): 44 ft2
Energy Switch (1D): Momentum

Comment:

Simulation: Mean Annual

Scenario: Existing Conditions
Run Date/Time: 12/15/2023 12:10:00 PM
Program Version: ICPR4 4.07.08

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000

End Time:	0	0	0	30.0000

	Hydrology [sec]	Surface Hydraulics [sec]
Min Calculation Time:	60.0000	0.2500
Max Calculation Time:		5.0000

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	5.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000
0	0	0	8.0000	5.0000
0	0	0	35.0000	15.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:

Unit Hydrograph Folder: Icpr3

Lookup Tables

Boundary Stage Set:

Extern Hydrograph Set:

Curve Number Set: NBD

Green-Ampt Set:

Vertical Layers Set:

Impervious Set: NBD

Tolerances & Options

Time Marching: FIREBALL

dZ Tolerance: 0.0010 ft

Max dZ: 1.0000 ft

Link Optimizer Tol: 0.0001 ft

Edge Length Option: Automatic

IA Recovery Time: 24.0000 hr

Smp/Man Basin Rain Opt: Global

Rainfall Name: ~FLMOD

Rainfall Amount: 3.92 in

Storm Duration: 24.0000 hr

Dflt Damping (1D): 0.0050 ft

Min Node Srf Area (1D): 44 ft2

Energy Switch (1D): Momentum

Comment:

Node: NS-Basin 1

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 1.54 ft
Warning Stage: 4.20 ft

Stage [ft]	Area [ac]	Area [ft2]
0.46	0.0001	4
1.00	0.0013	59
2.00	0.0148	644
3.00	0.3186	13880
4.00	6.1923	269737
5.00	39.2310	1708904
6.00	72.9607	3178170
7.00	91.5680	3988703
8.00	101.5028	4421464
9.00	106.8398	4653941
10.00	109.5483	4771924
11.00	111.1319	4840904
12.00	112.5414	4902305
13.00	113.9262	4962625
14.00	115.4459	5028822
15.00	116.9075	5092492
16.00	118.2208	5149696
17.00	119.3202	5197588
18.00	120.3076	5240601
19.00	121.5787	5295969
20.00	122.5511	5338325
21.00	122.8698	5352208
22.00	122.9450	5355486
23.00	123.0045	5358078
24.00	123.0550	5360276
25.00	123.0815	5361430
26.00	123.0961	5362065
27.00	123.1033	5362380
28.00	135.0604	5883232
29.00	135.0604	5883232

Comment:

Node Max Conditions [Existing Conditions]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NS-Basin 1	Matthew Storm	4.20	6.70	0.0010	2711.36	620.98	3745517
NS-Basin 1	Mean Annual	4.20	3.53	0.0010	71.94	44.27	151012

Node: NS-Basin 2

Scenario: Existing Conditions
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 1.94 ft
Warning Stage: 4.20 ft

Stage [ft]	Area [ac]	Area [ft2]
1.94	0.0001	2
2.00	0.0001	4
3.00	0.1160	5053
4.00	3.2831	143012
5.00	15.5340	676663
6.00	26.8061	1167673
7.00	32.2445	1404569
8.00	34.7845	1515211
9.00	35.7953	1559243

Comment:

Node Max Conditions [Existing Conditions]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NS-Basin 2	Matthew Storm	4.20	6.70	-0.0677	2884.58	1987.39	1333535
NS-Basin 2	Mean Annual	4.20	3.21	-0.0677	45.92	38.34	33628

Node: NT-Atlantic Ocean

Scenario: Existing Conditions
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 2.00 ft
Warning Stage: 4.20 ft

Boundary Stage: Atlantic

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	2.00
0	0	0	999.0000	2.00

Comment:

Node Max Conditions [Existing Conditions]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NT-Atlantic Ocean	Matthew Storm	4.20	11.65	-0.5493	0.00	0.00	0
NT-Atlantic Ocean	Mean Annual	4.20	2.00	0.0000	0.00	0.00	0

Node: NT-Intracoastal Waterway

Scenario: Existing Conditions
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 1.86 ft
Warning Stage: 4.20 ft
Boundary Stage: Tolomato

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	1.86
0	0	0	999.0000	1.86

Comment: 1.86 is NOAA MHHW elevation NAVD88

Node Max Conditions [Existing Conditions]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NT-Intracoastal Waterway	Matthew Storm	4.20	6.70	0.0010	846.05	3663.71	0
NT-Intracoastal Waterway	Mean Annual	4.20	1.86	0.0000	78.40	19.22	0

Node: NS-Basin 1

Scenario: Proposed FLB
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 1.54 ft
Warning Stage: 4.20 ft

Stage [ft]	Area [ac]	Area [ft2]
0.46	0.0001	4
1.00	0.0013	59
2.00	0.0148	644
3.00	0.3186	13880
4.00	6.1923	269737
5.00	39.2310	1708904
6.00	72.9607	3178170
7.00	91.5680	3988703
8.00	101.5028	4421464
9.00	106.8398	4653941
10.00	109.5483	4771924
11.00	111.1319	4840904
12.00	112.5414	4902305
13.00	113.9262	4962625
14.00	115.4459	5028822
15.00	116.9075	5092492
16.00	118.2208	5149696
17.00	119.3202	5197588
18.00	120.3076	5240601
19.00	121.5787	5295969
20.00	122.5511	5338325
21.00	122.8698	5352208
22.00	122.9450	5355486
23.00	123.0045	5358078
24.00	123.0550	5360276
25.00	123.0815	5361430
26.00	123.0961	5362065
27.00	123.1033	5362380
28.00	135.0604	5883232
29.00	135.0604	5883232

Comment:

Node Max Conditions [Proposed FLB]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NS-Basin 1	Matthew Storm	4.20	4.88	0.0010	423.46	213.27	1529456

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NS-Basin 1	Mean Annual	4.20	3.53	0.0010	71.94	44.27	151012

Node: NS-Basin 2

Scenario: Proposed FLB
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 1.94 ft
Warning Stage: 4.20 ft

Stage [ft]	Area [ac]	Area [ft2]
1.94	0.0001	2
2.00	0.0001	4
3.00	0.1160	5053
4.00	3.2831	143012
5.00	15.5340	676663
6.00	26.8061	1167673
7.00	32.2445	1404569
8.00	34.7845	1515211
9.00	35.7953	1559243

Comment:

Node Max Conditions [Proposed FLB]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NS-Basin 2	Matthew Storm	4.20	4.87	-0.0677	279.05	103.06	609780
NS-Basin 2	Mean Annual	4.20	3.21	-0.0677	45.92	38.34	33628

Node: NT-Atlantic Ocean

Scenario: Proposed FLB
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 2.00 ft
Warning Stage: 4.20 ft
Boundary Stage: Atlantic

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	2.00
0	0	0	999.0000	2.00

Comment:

Node Max Conditions [Proposed FLB]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NT-Atlantic Ocean	Matthew Storm	4.20	11.52	-0.5493	0.00	0.00	0
NT-Atlantic Ocean	Mean Annual	4.20	2.00	0.0000	0.00	0.00	0

Node: NT-Intracoastal Waterway

Scenario: Proposed FLB
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 1.86 ft
Warning Stage: 4.20 ft
Boundary Stage: Tolomato

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	1.86
0	0	0	999.0000	1.86

Comment: 1.86 is NOAA MHHW elevation NAVD88

Node Max Conditions [Proposed FLB]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NT-Intracoastal Waterway	Matthew Storm	4.20	6.70	0.0010	214.34	559.23	0
NT-Intracoastal Waterway	Mean Annual	4.20	1.86	0.0000	78.40	19.22	0

Node: NS-Basin 1

Scenario: Proposed RMLW

Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 1.54 ft
Warning Stage: 4.20 ft

Stage [ft]	Area [ac]	Area [ft2]
0.46	0.0001	4
1.00	0.0013	59
2.00	0.0148	644
3.00	0.3186	13880
4.00	6.1923	269737
5.00	39.2310	1708904
6.00	72.9607	3178170
7.00	91.5680	3988703
8.00	101.5028	4421464
9.00	106.8398	4653941
10.00	109.5483	4771924
11.00	111.1319	4840904
12.00	112.5414	4902305
13.00	113.9262	4962625
14.00	115.4459	5028822
15.00	116.9075	5092492
16.00	118.2208	5149696
17.00	119.3202	5197588
18.00	120.3076	5240601
19.00	121.5787	5295969
20.00	122.5511	5338325
21.00	122.8698	5352208
22.00	122.9450	5355486
23.00	123.0045	5358078
24.00	123.0550	5360276
25.00	123.0815	5361430
26.00	123.0961	5362065
27.00	123.1033	5362380
28.00	135.0604	5883232
29.00	135.0604	5883232

Comment:

Node Max Conditions [Proposed RMLW]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NS-Basin 1	Matthew Storm	4.20	4.95	-0.0010	423.46	97.13	1633290
NS-Basin 1	Mean Annual	4.20	3.53	0.0010	71.94	44.32	151041

Node: NS-Basin 2

Scenario: Proposed RMLW
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 1.94 ft
Warning Stage: 4.20 ft

Stage [ft]	Area [ac]	Area [ft2]
1.94	0.0001	2
2.00	0.0001	4
3.00	0.1160	5053
4.00	3.2831	143012
5.00	15.5340	676663
6.00	26.8061	1167673
7.00	32.2445	1404569
8.00	34.7845	1515211
9.00	35.7953	1559243

Comment:

Node Max Conditions [Proposed RMLW]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NS-Basin 2	Matthew Storm	4.20	6.70	-0.0677	639.04	213.19	1333592
NS-Basin 2	Mean Annual	4.20	3.21	-0.0677	46.57	38.59	34107

Node: NT-Atlantic Ocean

Scenario: Proposed RMLW
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 2.00 ft
Warning Stage: 4.20 ft
Boundary Stage: Atlantic

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	2.00
0	0	0	999.0000	2.00

Comment:

Node Max Conditions [Proposed RMLW]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NT-Atlantic Ocean	Matthew Storm	4.20	11.52	-0.5493	0.00	0.00	0
NT-Atlantic Ocean	Mean Annual	4.20	2.00	0.0000	0.00	0.00	0

Node: NT-Intracoastal Waterway

Scenario: Proposed RMLW
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 1.86 ft
Warning Stage: 4.20 ft
Boundary Stage: Tolomato

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	1.86
0	0	0	999.0000	1.86

Comment: 1.86 is NOAA MHHW elevation NAVD88

Node Max Conditions [Proposed RMLW]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NT-Intracoastal Waterway	Matthew Storm	4.20	6.70	0.0010	222.05	778.11	0
NT-Intracoastal Waterway	Mean Annual	4.20	1.86	0.0000	79.15	19.22	0

Node: NS-Basin 1

Scenario: Proposed RRE
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 1.54 ft
Warning Stage: 4.20 ft

Stage [ft]	Area [ac]	Area [ft2]
0.46	0.0001	4
1.00	0.0013	59

Stage [ft]	Area [ac]	Area [ft2]
2.00	0.0148	644
3.00	0.3186	13880
4.00	6.1923	269737
5.00	39.2310	1708904
6.00	72.9607	3178170
7.00	91.5680	3988703
8.00	101.5028	4421464
9.00	106.8398	4653941
10.00	109.5483	4771924
11.00	111.1319	4840904
12.00	112.5414	4902305
13.00	113.9262	4962625
14.00	115.4459	5028822
15.00	116.9075	5092492
16.00	118.2208	5149696
17.00	119.3202	5197588
18.00	120.3076	5240601
19.00	121.5787	5295969
20.00	122.5511	5338325
21.00	122.8698	5352208
22.00	122.9450	5355486
23.00	123.0045	5358078
24.00	123.0550	5360276
25.00	123.0815	5361430
26.00	123.0961	5362065
27.00	123.1033	5362380
28.00	135.0604	5883232
29.00	135.0604	5883232

Comment:

Node Max Conditions [Proposed RRE]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NS-Basin 1	Matthew Storm	4.20	6.70	0.0010	2296.30	588.50	3744439
NS-Basin 1	Mean Annual	4.20	3.53	0.0010	71.94	44.27	151012

Node: NS-Basin 2

Scenario: Proposed RRE
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 1.94 ft

Warning Stage: 4.20 ft

Stage [ft]	Area [ac]	Area [ft2]
1.94	0.0001	2
2.00	0.0001	4
3.00	0.1160	5053
4.00	3.2831	143012
5.00	15.5340	676663
6.00	26.8061	1167673
7.00	32.2445	1404569
8.00	34.7845	1515211
9.00	35.7953	1559243

Comment:

Node Max Conditions [Proposed RRE]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NS-Basin 2	Matthew Storm	4.20	6.70	-0.0677	1767.22	946.14	1333295
NS-Basin 2	Mean Annual	4.20	3.21	-0.0677	45.92	38.34	33628

Node: NT-Atlantic Ocean

Scenario: Proposed RRE
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 2.00 ft
Warning Stage: 4.20 ft
Boundary Stage: Atlantic

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	2.00
0	0	0	999.0000	2.00

Comment:

Node Max Conditions [Proposed RRE]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NT-Atlantic	Matthew	4.20	11.65	0.5488	0.00	0.00	0

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
Ocean	Storm						
NT-Atlantic Ocean	Mean Annual	4.20	2.00	0.0000	0.00	0.00	0

Node: NT-Intracoastal Waterway

Scenario: Proposed RRE
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 1.86 ft
Warning Stage: 4.20 ft
Boundary Stage: Tolomato

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	1.86
0	0	0	999.0000	1.86

Comment: 1.86 is NOAA MHHW elevation NAVD88

Node Max Conditions [Proposed RRE]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NT-Intracoastal Waterway	Matthew Storm	4.20	6.70	0.0010	863.30	3154.72	0
NT-Intracoastal Waterway	Mean Annual	4.20	1.86	0.0000	78.40	19.22	0

Channel Link: C-VOV_DS

Scenario: Existing Conditions
From Node: NS-VOV_FG_DS
To Node: NT-Intracoastal Waterway
Link Count: 1
Flow Direction: Both
Damping: 0.0000 ft
Length: 457.32 ft
Contraction Coef: 0.00
Expansion Coef: 0.00
Entr Loss Coef: 0.00

Upstream		Downstream	
Invert:	1.80 ft	Invert:	0.00 ft
Manning's N:	0.0000	Manning's N:	0.0000
Geometry:	Irregular	Geometry:	Irregular
Cross Section:	XC-VOV_DS	Cross Section:	XC-VOV_DS

Exit Loss Coef:	0.00
Bend Loss Coef:	0.00
Bend Location:	0.00 dec
Energy Switch:	Energy

Comment:

Pipe Link: P-10TH_BC		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	1.66 ft	Invert:	1.56 ft
From Node:	NS-10TH_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal	Geometry: Rectangular		Geometry: Rectangular	
	Waterway	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	10.00 ft	Max Width:	10.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	25.00 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-10TH_FG		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-2.69 ft	Invert:	-2.69 ft
From Node:	NS-10TH_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-10TH_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.50 ft	Max Depth:	3.50 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-10TH_MYR_CD		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	2.10 ft	Invert:	-1.11 ft
From Node:	NS-10TH_MYR_DBI -US	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-10TH_MYR_DBI -DS	Max Depth:	1.58 ft	Max Depth:	1.58 ft
		Bottom Clip			
Link Count:	1	Default:	0.00 ft	Default:	0.00 ft
Flow Direction:	Both	Op Table:		Op Table:	
Damping:	0.0000 ft	Ref Node:		Ref Node:	
Length:	120.25 ft	Manning's N:	0.0000	Manning's N:	0.0000
FHWA Code:	0	Top Clip			
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	
Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 dec	Manning's N:	0.0000	Manning's N:	0.0000
Energy Switch:	Energy				
Comment:					

Pipe Link: P-10TH_US		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-1.11 ft	Invert:	-2.69 ft
From Node:	NS-10TH_MYR_DBI -DS	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-10TH_FG_US	Max Depth:	3.50 ft	Max Depth:	3.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	145.00 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-17TH_BC		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	1.66 ft	Invert:	1.56 ft
From Node:	NS-17TH_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal Waterway	Geometry: Rectangular		Geometry: Rectangular	
		Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	10.00 ft	Max Width:	10.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	39.10 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	

Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-17TH_FG		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.95 ft	Invert:	-3.95 ft
From Node:	NS-17TH_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-17TH_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-17TH_LRL_CD		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.81 ft	Invert:	-3.83 ft
From Node:	NS-17TH_LRL_DBI-US	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-17TH_LRL_DBI-DS	Max Depth:	4.50 ft	Max Depth:	4.50 ft
		Bottom Clip			
Link Count:	1	Default:	0.00 ft	Default:	0.00 ft
Flow Direction:	Both	Op Table:		Op Table:	
Damping:	0.0000 ft	Ref Node:		Ref Node:	
Length:	63.81 ft	Manning's N:	0.0000	Manning's N:	0.0000
FHWA Code:	0	Top Clip			
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	
Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 dec	Manning's N:	0.0000	Manning's N:	0.0000
Energy Switch:	Energy				

Comment:

Pipe Link: P-17TH_US		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-3.83 ft	Invert:	-3.95 ft
From Node:	NS-17TH_LRL_DBI-DS	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-17TH_FG_US	Max Depth:	4.50 ft	Max Depth:	4.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	109.67 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-19TH_BC		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	1.61 ft	Invert:	1.56 ft
From Node:	NS-19TH_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal Waterway	Geometry: Rectangular		Geometry: Rectangular	
		Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	10.00 ft	Max Width:	10.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	59.50 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-19TH_FG		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.29 ft	Invert:	-3.76 ft
From Node:	NS-19TH_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-19TH_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	

Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-19TH_LRL_CD		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	1.54 ft	Invert:	1.44 ft
From Node:	NS-Basin 1	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-19TH_LRL_DBI-DS	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
		Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	103.31 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-19TH_US		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-4.17 ft	Invert:	-4.29 ft
From Node:	NS-19TH_LRL_DBI-DS	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-19TH_FG_US	Max Depth:	4.50 ft	Max Depth:	4.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	129.70 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-21ST_BC		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	1.38 ft	Invert:	1.20 ft
From Node:	NS-21ST_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal Waterway	Geometry: Rectangular		Geometry: Rectangular	
		Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	9.00 ft	Max Width:	9.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	52.00 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-21ST_CD		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	0.73 ft	Invert:	0.72 ft
From Node:	NS-21ST_WAH_DB I-US	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
To Node:	NS-21ST_WAH_DB I-DS	Max Depth:	1.66 ft	Max Depth:	1.66 ft
		Bottom Clip			
Link Count:	1	Default:	0.00 ft	Default:	0.00 ft
Flow Direction:	Both	Op Table:		Op Table:	
Damping:	0.0000 ft	Ref Node:		Ref Node:	
Length:	59.43 ft	Manning's N:	0.0000	Manning's N:	0.0000
FHWA Code:	0	Top Clip			
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	
Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 dec	Manning's N:	0.0000	Manning's N:	0.0000
Energy Switch:	Energy				
Comment:					

Pipe Link: P-21ST_FG		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	-1.28 ft	Invert:	-4.28 ft
From Node:	NS-21ST_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-21ST_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	

FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: -4.28 AS INVERT BASED ON 1.28+36" SINCE US PIPE WAS JUST BELOW INVERT OF FLAP GATE
PIPE IS SET TO POSITIVE FLOW ONLY TO MIMIC A FLAP GATE STRUCTURE

Pipe Link: P-21ST_FG_US		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	0.72 ft	Invert:	-1.28 ft
From Node:	NS-21ST_WAH_DB	Manning's N:	0.0120	Manning's N:	0.0120
	I-DS	Geometry: Circular		Geometry: Circular	
To Node:	NS-21ST_FG_US	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	200.00 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-21ST_WAH_US		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	2.65 ft	Invert:	0.73 ft
From Node:	NS-Basin 1	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	NS-21ST_WAH_DB	Geometry: Circular		Geometry: Circular	
	I-US	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	380.00 ft	Ref Node:		Ref Node:	
FHWA Code:	6	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-23RD_CD		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	3.39 ft	Invert:	1.89 ft
From Node:	NS-Basin 1	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-23RD_DBI-DS	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
Link Count:	1	Max Depth:	1.08 ft	Max Depth:	1.08 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	30.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-23RD_OUT		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	1.90 ft	Invert:	1.89 ft
From Node:	NS-Basin 1	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-23RD_DBI-DS	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
Link Count:	1	Max Depth:	1.58 ft	Max Depth:	1.58 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	50.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-VOV_FG		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	1.80 ft	Invert:	1.80 ft
From Node:	NS-VOV_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-VOV_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			

Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-VOV_US		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	1.89 ft	Invert:	1.89 ft
From Node:	NS-23RD_DBI-DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-VOV_FG_US	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	20.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-WAH_US		Upstream		Downstream	
Scenario:	Existing Conditions	Invert:	3.68 ft	Invert:	1.81 ft
From Node:	NS-Basin 2	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-VOV_FG_US	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
Link Count:	1	Max Depth:	1.58 ft	Max Depth:	1.58 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	185.17 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Weir Link: W-10TH-B1		
Scenario:	Existing Conditions	Bottom Clip

From Node:	NS-Basin 1		
To Node:	NS-10TH_MYR_DBI-US	Default:	0.00 ft
Link Count:	1	Op Table:	
Flow Direction:	Both	Ref Node:	
Damping:	0.0000 ft	Top Clip	
Weir Type:	Sharp Crested Vertical	Default:	0.00 ft
Geometry Type:	Rectangular	Op Table:	
Invert:	3.26 ft	Ref Node:	
Control Elevation:	3.26 ft	Discharge Coefficients	
Max Depth:	1.00 ft	Weir Default:	2.800
Max Width:	2.00 ft	Weir Table:	
Fillet:	0.00 ft	Orifice Default:	0.600
		Orifice Table:	

Comment: slot 4.26 - 1 foot

Weir Link: W-10TH-B2

Scenario:	Existing Conditions	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-10TH_MYR_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	3.26 ft	Discharge Coefficients	
Control Elevation:	3.26 ft	Weir Default:	2.800
Max Depth:	1.00 ft	Weir Table:	
Max Width:	2.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment: slot 4.26 - 1 foot

Weir Link: W-17TH-B1

Scenario:	Existing Conditions	Bottom Clip	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-17TH_LRL_DBI-US	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	2.38 ft	Discharge Coefficients	
Control Elevation:	2.38 ft	Weir Default:	2.800
Max Depth:	1.00 ft	Weir Table:	
Max Width:	2.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment: slot in CW 17-74

Weir Link: W-17TH-B2			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-17TH_LRL_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	2.26 ft	Discharge Coefficients	
Control Elevation:	2.26 ft	Weir Default:	2.800
Max Depth:	1.00 ft	Weir Table:	
Max Width:	2.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment: slot in CW 17-75

Weir Link: W-19TH-B2			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-19TH_LRL_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Trapezoidal	Ref Node:	
Invert:	1.44 ft	Discharge Coefficients	
Control Elevation:	1.44 ft	Weir Default:	2.800
Max Depth:	1.50 ft	Weir Table:	
Extrapolation Method:	Normal Projection	Orifice Default:	0.600
Bottom Width:	2.00 ft	Orifice Table:	
Left Slope:	3.000 (h:v)		
Right Slope:	3.000 (h:v)		

Comment: The weir is the incoming ditch cross section

Weir Link: W-21ST-B2			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-21ST_WAH_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	

Damping:	0.0000 ft		
Weir Type:	Sharp Crested Vertical	Default:	0.00 ft
Geometry Type:	Rectangular	Op Table:	
Invert:	3.90 ft	Ref Node:	
Control Elevation:	3.90 ft	Discharge Coefficients	
Max Depth:	99.00 ft	Weir Default:	2.800
Max Width:	10.00 ft	Weir Table:	
Fillet:	0.00 ft	Orifice Default:	0.600
		Orifice Table:	

Comment: C-inlet grate as a weir

Weir Link: W-23RD-B1

Scenario:	Existing Conditions	Bottom Clip	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-23RD_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	4.30 ft	Discharge Coefficients	
Control Elevation:	4.30 ft	Weir Default:	2.800
Max Depth:	99.00 ft	Weir Table:	
Max Width:	600.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment: update from 23rd profile

Weir Link: W-A1A

Scenario:	Existing Conditions	Bottom Clip	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NT-Atlantic Ocean	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	11.80 ft	Discharge Coefficients	
Control Elevation:	11.80 ft	Weir Default:	2.800
Cross Section:	XW-A1A	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment: see irregular weir comment

Weir Link: W-BULKHEAD

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NT-Intracoastal Waterway	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	4.50 ft	**Discharge Coefficients**	
Control Elevation:	4.50 ft	Weir Default:	2.800
Cross Section:	XW-BULKHEAD	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Weir Link: W-EUCLID

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NT-Intracoastal Waterway	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	5.27 ft	**Discharge Coefficients**	
Control Elevation:	5.27 ft	Weir Default:	2.800
Cross Section:	XW-EUCLID	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Weir Link: W-MYRTLE_LAUREL

Scenario:	Existing Conditions	**Bottom Clip**	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-Basin 2	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	3.71 ft	**Discharge Coefficients**	
Control Elevation:	3.71 ft	Weir Default:	2.800
Cross Section:	XW-MYRTLE_LAUREL	Weir Table:	
		Orifice Default:	0.600

	Orifice Table:

Comment:

Weir Link: W-VOV			
Scenario:	Existing Conditions	Bottom Clip	
From Node:	NS-23RD_DBI-DS	Default:	0.00 ft
To Node:	NT-Intracoastal Waterway	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	6.00 ft	Discharge Coefficients	
Control Elevation:	6.00 ft	Weir Default:	2.800
Cross Section:	XW-VOV	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Channel Link: C-VOV_DS		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	1.80 ft	Invert:	0.00 ft
From Node:	NS-VOV_FG_DS	Manning's N:	0.0000	Manning's N:	0.0000
To Node:	NT-Intracoastal Waterway	Geometry: Irregular		Geometry: Irregular	
		Cross Section:	XC-VOV_DS	Cross Section:	XC-VOV_DS
Link Count:	1				
Flow Direction:	Both				
Damping:	0.0000 ft				
Length:	457.32 ft				
Contraction Coef:	0.00				
Expansion Coef:	0.00				
Entr Loss Coef:	0.00				
Exit Loss Coef:	0.00				
Bend Loss Coef:	0.00				
Bend Location:	0.00 dec				
Energy Switch:	Energy				

Comment:

Pipe Link: P-10TH_BC		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	1.66 ft	Invert:	1.56 ft
From Node:	NS-10TH_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal	Geometry: Rectangular		Geometry: Rectangular	

	Waterway	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	10.00 ft	Max Width:	10.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	25.00 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-10TH_FG		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	-2.69 ft	Invert:	-2.69 ft
From Node:	NS-10TH_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-10TH_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.50 ft	Max Depth:	3.50 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-10TH_MYR_CD		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	2.10 ft	Invert:	-1.11 ft
From Node:	NS-10TH_MYR_DBI-US	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-10TH_MYR_DBI-DS	Max Depth:	1.58 ft	Max Depth:	1.58 ft
		Bottom Clip			
Link Count:	1	Default:	0.00 ft	Default:	0.00 ft
Flow Direction:	Both	Op Table:		Op Table:	
Damping:	0.0000 ft	Ref Node:		Ref Node:	
Length:	120.25 ft	Manning's N:	0.0000	Manning's N:	0.0000
FHWA Code:	0	Top Clip			
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	

Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 dec	Manning's N:	0.0000	Manning's N:	0.0000
Energy Switch:	Energy				
Comment:					

Pipe Link: P-10TH_US		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	-1.11 ft	Invert:	-2.69 ft
From Node:	NS-10TH_MYR_DBI	Manning's N:	0.0120	Manning's N:	0.0120
	-DS	Geometry: Circular		Geometry: Circular	
To Node:	NS-10TH_FG_US	Max Depth:	3.50 ft	Max Depth:	3.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	145.00 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-17TH_BC		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	1.66 ft	Invert:	1.56 ft
From Node:	NS-17TH_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal	Geometry: Rectangular		Geometry: Rectangular	
	Waterway	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	10.00 ft	Max Width:	10.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	39.10 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-17TH_FG	Upstream	Downstream

Scenario:	Proposed FLB	Invert:	-3.95 ft	Invert:	-3.95 ft
From Node:	NS-17TH_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-17TH_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-17TH_LRL_CD		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	-3.81 ft	Invert:	-3.83 ft
From Node:	NS-17TH_LRL_DBI-US	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-17TH_LRL_DBI-DS	Max Depth:	4.50 ft	Max Depth:	4.50 ft
		Bottom Clip			
Link Count:	1	Default:	0.00 ft	Default:	0.00 ft
Flow Direction:	Both	Op Table:		Op Table:	
Damping:	0.0000 ft	Ref Node:		Ref Node:	
Length:	63.81 ft	Manning's N:	0.0000	Manning's N:	0.0000
FHWA Code:	0	Top Clip			
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	
Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 dec	Manning's N:	0.0000	Manning's N:	0.0000
Energy Switch:	Energy				

Comment:

Pipe Link: P-17TH_US		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	-3.83 ft	Invert:	-3.95 ft
From Node:	NS-17TH_LRL_DBI-DS	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-17TH_FG_US	Max Depth:	4.50 ft	Max Depth:	4.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	109.67 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			

Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-19TH_BC		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	1.61 ft	Invert:	1.56 ft
From Node:	NS-19TH_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal	Geometry: Rectangular		Geometry: Rectangular	
	Waterway	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	10.00 ft	Max Width:	10.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	59.50 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-19TH_FG		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	-4.29 ft	Invert:	-3.76 ft
From Node:	NS-19TH_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-19TH_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-19TH_LRL_CD		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	1.54 ft	Invert:	1.44 ft
From Node:	NS-Basin 1	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-19TH_LRL_DBI-DS	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
		Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	103.31 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-19TH_US		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	-4.17 ft	Invert:	-4.29 ft
From Node:	NS-19TH_LRL_DBI-DS	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-19TH_FG_US	Max Depth:	4.50 ft	Max Depth:	4.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	129.70 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-21ST_BC		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	1.38 ft	Invert:	1.20 ft
From Node:	NS-21ST_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal Waterway	Geometry: Rectangular		Geometry: Rectangular	
		Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	9.00 ft	Max Width:	9.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	52.00 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	

Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-21ST_CD		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	0.73 ft	Invert:	0.72 ft
From Node:	NS-21ST_WAH_DB I-US	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
To Node:	NS-21ST_WAH_DB I-DS	Max Depth:	1.66 ft	Max Depth:	1.66 ft
		Bottom Clip			
Link Count:	1	Default:	0.00 ft	Default:	0.00 ft
Flow Direction:	Both	Op Table:		Op Table:	
Damping:	0.0000 ft	Ref Node:		Ref Node:	
Length:	59.43 ft	Manning's N:	0.0000	Manning's N:	0.0000
FHWA Code:	0	Top Clip			
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	
Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 dec	Manning's N:	0.0000	Manning's N:	0.0000
Energy Switch:	Energy				

Comment:

Pipe Link: P-21ST_FG		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	-1.28 ft	Invert:	-4.28 ft
From Node:	NS-21ST_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-21ST_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: -4.28 AS INVERT BASED ON 1.28+36" SINCE US PIPE WAS JUST BELOW INVERT OF FLAP GATE
PIPE IS SET TO POSITIVE FLOW ONLY TO MIMIC A FLAP GATE STRUCTURE

Pipe Link: P-21ST_FG_US		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	0.72 ft	Invert:	-1.28 ft
From Node:	NS-21ST_WAH_DB	Manning's N:	0.0120	Manning's N:	0.0120
	I-DS	Geometry: Circular		Geometry: Circular	
To Node:	NS-21ST_FG_US	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	200.00 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-21ST_WAH_US		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	2.65 ft	Invert:	0.73 ft
From Node:	NS-Basin 1	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	NS-21ST_WAH_DB	Geometry: Circular		Geometry: Circular	
	I-US	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	380.00 ft	Ref Node:		Ref Node:	
FHWA Code:	6	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-23RD_CD		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	3.39 ft	Invert:	1.89 ft
From Node:	NS-Basin 1	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-23RD_DBI-DS	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
Link Count:	1	Max Depth:	1.08 ft	Max Depth:	1.08 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	30.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			

Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-23RD_OUT		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	1.90 ft	Invert:	1.89 ft
From Node:	NS-Basin 1	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-23RD_DBI-DS	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
Link Count:	1	Max Depth:	1.58 ft	Max Depth:	1.58 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	50.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-VOV_FG		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	1.80 ft	Invert:	1.80 ft
From Node:	NS-VOV_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-VOV_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-VOV_US		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	1.89 ft	Invert:	1.89 ft

From Node:	NS-23RD_DBI-DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-VOV_FG_US	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	20.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-WAH_US		Upstream		Downstream	
Scenario:	Proposed FLB	Invert:	3.68 ft	Invert:	1.81 ft
From Node:	NS-Basin 2	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-VOV_FG_US	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
Link Count:	1	Max Depth:	1.58 ft	Max Depth:	1.58 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	185.17 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Weir Link: W-10TH-B1			
Scenario:	Proposed FLB	Bottom Clip	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-10TH_MYR_DBI-US	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	3.26 ft	Discharge Coefficients	
Control Elevation:	3.26 ft	Weir Default:	2.800
Max Depth:	1.00 ft	Weir Table:	
Max Width:	2.00 ft	Orifice Default:	0.600

Fillet:	0.00 ft		
		Orifice Table:	

Comment: slot 4.26 - 1 foot

Weir Link: W-10TH-B2

Scenario:	Proposed FLB	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-10TH_MYR_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	3.26 ft	Discharge Coefficients	
Control Elevation:	3.26 ft	Weir Default:	2.800
Max Depth:	1.00 ft	Weir Table:	
Max Width:	2.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment: slot 4.26 - 1 foot

Weir Link: W-17TH-B1

Scenario:	Proposed FLB	Bottom Clip	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-17TH_LRL_DBI-US	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	2.38 ft	Discharge Coefficients	
Control Elevation:	2.38 ft	Weir Default:	2.800
Max Depth:	1.00 ft	Weir Table:	
Max Width:	2.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment: slot in CW 17-74

Weir Link: W-17TH-B2

Scenario:	Proposed FLB	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-17TH_LRL_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	

Damping:	0.0000 ft		
Weir Type:	Sharp Crested Vertical	Default:	0.00 ft
Geometry Type:	Rectangular	Op Table:	
Invert:	2.26 ft	Ref Node:	
Control Elevation:	2.26 ft	Discharge Coefficients	
Max Depth:	1.00 ft	Weir Default:	2.800
Max Width:	2.00 ft	Weir Table:	
Fillet:	0.00 ft	Orifice Default:	0.600
		Orifice Table:	

Comment: slot in CW 17-75

Weir Link: W-19TH-B2

Scenario:	Proposed FLB	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-19TH_LRL_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Trapezoidal	Ref Node:	
Invert:	1.44 ft	Discharge Coefficients	
Control Elevation:	1.44 ft	Weir Default:	2.800
Max Depth:	1.50 ft	Weir Table:	
Extrapolation Method:	Normal Projection	Orifice Default:	0.600
Bottom Width:	2.00 ft	Orifice Table:	
Left Slope:	3.000 (h:v)		
Right Slope:	3.000 (h:v)		

Comment: The weir is the incoming ditch cross section

Weir Link: W-21ST-B2

Scenario:	Proposed FLB	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-21ST_WAH_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	3.90 ft	Discharge Coefficients	
Control Elevation:	3.90 ft	Weir Default:	2.800
Max Depth:	99.00 ft	Weir Table:	
Max Width:	10.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment: C-inlet grate as a weir

Weir Link: W-23RD-B1			
Scenario:	Proposed FLB	Bottom Clip	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-23RD_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	6.80 ft	Discharge Coefficients	
Control Elevation:	6.80 ft	Weir Default:	2.800
Max Depth:	99.00 ft	Weir Table:	
Max Width:	600.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	
Comment: update from 23rd profile			

Weir Link: W-A1A			
Scenario:	Proposed FLB	Bottom Clip	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NT-Atlantic Ocean	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	11.80 ft	Discharge Coefficients	
Control Elevation:	11.80 ft	Weir Default:	2.800
Cross Section:	XW-A1A	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	
Comment: see irregular weir comment			

Weir Link: W-BULKHEAD			
Scenario:	Proposed FLB	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NT-Intracoastal Waterway	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	6.80 ft	Discharge Coefficients	
Control Elevation:	6.80 ft	Weir Default:	2.800
Cross Section:	XW-BULKHEAD	Weir Table:	
		Orifice Default:	0.600

	Orifice Table:

Comment:

Weir Link: W-EUCLID

Scenario:	Proposed FLB	**Bottom Clip**	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NT-Intracoastal Waterway	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	6.80 ft	**Discharge Coefficients**	
Control Elevation:	6.80 ft	Weir Default:	2.800
Cross Section:	XW-EUCLID	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Weir Link: W-MYRTLE_LAUREL

Scenario:	Proposed FLB	**Bottom Clip**	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-Basin 2	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	3.71 ft	**Discharge Coefficients**	
Control Elevation:	3.71 ft	Weir Default:	2.800
Cross Section:	XW-MYRTLE_LAUREL	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Weir Link: W-VOV

Scenario:	Proposed FLB	**Bottom Clip**	
From Node:	NS-23RD_DBI-DS	Default:	0.00 ft
To Node:	NT-Intracoastal Waterway	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	

Damping:	0.0000 ft
Weir Type:	Broad Crested Vertical
Geometry Type:	Irregular
Invert:	5.00 ft
Control Elevation:	5.00 ft
Cross Section:	XW-VOV

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	2.800
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment:

Channel Link: C-VOV_DS

Scenario:	Proposed RMLW
From Node:	NS-VOV_FG_DS
To Node:	NT-Intracoastal Waterway
Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Length:	457.32 ft
Contraction Coef:	0.00
Expansion Coef:	0.00
Entr Loss Coef:	0.00
Exit Loss Coef:	0.00
Bend Loss Coef:	0.00
Bend Location:	0.00 dec
Energy Switch:	Energy

Upstream		Downstream	
Invert:	1.80 ft	Invert:	0.00 ft
Manning's N:	0.0000	Manning's N:	0.0000
Geometry:	Irregular	Geometry:	Irregular
Cross Section:	XC-VOV_DS	Cross Section:	XC-VOV_DS

Comment:

Pipe Link: P-10TH_BC

Scenario:	Proposed RMLW
From Node:	NS-10TH_FG_DS
To Node:	NT-Intracoastal Waterway
Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Length:	25.00 ft
FHWA Code:	0
Entr Loss Coef:	0.00
Exit Loss Coef:	0.00
Bend Loss Coef:	0.00
Bend Location:	0.00 dec
Energy Switch:	Energy

Upstream		Downstream	
Invert:	1.66 ft	Invert:	1.56 ft
Manning's N:	0.0120	Manning's N:	0.0120
Geometry:	Rectangular	Geometry:	Rectangular
Max Depth:	3.00 ft	Max Depth:	3.00 ft
Max Width:	10.00 ft	Max Width:	10.00 ft
Fillet:	0.00 ft	Fillet:	0.00 ft
Bottom Clip			
Default:	0.00 ft	Default:	0.00 ft
Op Table:		Op Table:	
Ref Node:		Ref Node:	
Manning's N:	0.0000	Manning's N:	0.0000
Top Clip			
Default:	0.00 ft	Default:	0.00 ft
Op Table:		Op Table:	
Ref Node:		Ref Node:	

		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-10TH_FG		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	-2.69 ft	Invert:	-2.69 ft
From Node:	NS-10TH_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-10TH_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.50 ft	Max Depth:	3.50 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-10TH_MYR_CD		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	2.10 ft	Invert:	-1.11 ft
From Node:	NS-10TH_MYR_DBI -US	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-10TH_MYR_DBI -DS	Max Depth:	1.58 ft	Max Depth:	1.58 ft
		Bottom Clip			
Link Count:	1	Default:	0.00 ft	Default:	0.00 ft
Flow Direction:	Positive	Op Table:		Op Table:	
Damping:	0.0000 ft	Ref Node:		Ref Node:	
Length:	120.25 ft	Manning's N:	0.0000	Manning's N:	0.0000
FHWA Code:	0	Top Clip			
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	
Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 dec	Manning's N:	0.0000	Manning's N:	0.0000
Energy Switch:	Energy				

Comment:

Pipe Link: P-10TH_US		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	-1.11 ft	Invert:	-2.69 ft
From Node:	NS-10TH_MYR_DBI -DS	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	

To Node:	NS-10TH_FG_US	Max Depth:	3.50 ft	Max Depth:	3.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	145.00 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-17TH_BC		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	1.66 ft	Invert:	1.56 ft
From Node:	NS-17TH_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal	Geometry: Rectangular		Geometry: Rectangular	
	Waterway	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	10.00 ft	Max Width:	10.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	39.10 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-17TH_FG		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	-3.95 ft	Invert:	-3.95 ft
From Node:	NS-17TH_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-17TH_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	

Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-17TH_LRL_CD		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	-3.81 ft	Invert:	-3.83 ft
From Node:	NS-17TH_LRL_DBI-US	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-17TH_LRL_DBI-DS	Max Depth:	4.50 ft	Max Depth:	4.50 ft
		Bottom Clip			
Link Count:	1	Default:	0.00 ft	Default:	0.00 ft
Flow Direction:	Positive	Op Table:		Op Table:	
Damping:	0.0000 ft	Ref Node:		Ref Node:	
Length:	63.81 ft	Manning's N:	0.0000	Manning's N:	0.0000
FHWA Code:	0	Top Clip			
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	
Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 dec	Manning's N:	0.0000	Manning's N:	0.0000
Energy Switch:	Energy				

Comment:

Pipe Link: P-17TH_US		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	-3.83 ft	Invert:	-3.95 ft
From Node:	NS-17TH_LRL_DBI-DS	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-17TH_FG_US	Max Depth:	4.50 ft	Max Depth:	4.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	109.67 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-19TH_BC		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	1.61 ft	Invert:	1.56 ft
From Node:	NS-19TH_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120

		Geometry: Rectangular		Geometry: Rectangular	
To Node:	NT-Intracoastal Waterway	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	10.00 ft	Max Width:	10.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	59.50 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-19TH_FG		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	-4.29 ft	Invert:	-3.76 ft
From Node:	NS-19TH_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-19TH_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-19TH_LRL_CD		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	1.54 ft	Invert:	1.44 ft
From Node:	NS-Basin 1	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-19TH_LRL_DBI-DS	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
		Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Positive	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	103.31 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft

Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-19TH_US		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	-4.17 ft	Invert:	-4.29 ft
From Node:	NS-19TH_LRL_DBI-DS	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-19TH_FG_US	Max Depth:	4.50 ft	Max Depth:	4.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	129.70 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-21ST_BC		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	1.38 ft	Invert:	1.20 ft
From Node:	NS-21ST_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal Waterway	Geometry: Rectangular		Geometry: Rectangular	
		Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	9.00 ft	Max Width:	9.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	52.00 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-21ST_CD	Upstream	Downstream

Scenario:	Proposed RMLW	Invert:	0.73 ft	Invert:	0.72 ft
From Node:	NS-21ST_WAH_DB	Manning's N:	0.0120	Manning's N:	0.0120
	I-US	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
To Node:	NS-21ST_WAH_DB	Max Depth:	1.66 ft	Max Depth:	1.66 ft
	I-DS	Bottom Clip			
Link Count:	1	Default:	0.00 ft	Default:	0.00 ft
Flow Direction:	Both	Op Table:		Op Table:	
Damping:	0.0000 ft	Ref Node:		Ref Node:	
Length:	59.43 ft	Manning's N:	0.0000	Manning's N:	0.0000
FHWA Code:	0	Top Clip			
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	
Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 dec	Manning's N:	0.0000	Manning's N:	0.0000
Energy Switch:	Energy				

Comment:

Pipe Link: P-21ST_FG		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	-1.28 ft	Invert:	-4.28 ft
From Node:	NS-21ST_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-21ST_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: -4.28 AS INVERT BASED ON 1.28+36" SINCE US PIPE WAS JUST BELOW INVERT OF FLAP GATE
PIPE IS SET TO POSITIVE FLOW ONLY TO MIMIC A FLAP GATE STRUCTURE

Pipe Link: P-21ST_FG_US		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	0.72 ft	Invert:	-1.28 ft
From Node:	NS-21ST_WAH_DB	Manning's N:	0.0120	Manning's N:	0.0120
	I-DS	Geometry: Circular		Geometry: Circular	
To Node:	NS-21ST_FG_US	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	200.00 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000

Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-21ST_WAH_US		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	2.65 ft	Invert:	0.73 ft
From Node:	NS-Basin 1	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	NS-21ST_WAH_DB I-US	Geometry: Circular		Geometry: Circular	
		Max Depth:	2.00 ft	Max Depth:	2.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Positive	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	380.00 ft	Ref Node:		Ref Node:	
FHWA Code:	6	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-23RD_CD		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	3.39 ft	Invert:	1.89 ft
From Node:	NS-Basin 1	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-23RD_DBI-DS	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
Link Count:	1	Max Depth:	1.08 ft	Max Depth:	1.08 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	30.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-23RD_OUT	Upstream	Downstream

Scenario:	Proposed RMLW	Invert:	1.90 ft	Invert:	1.89 ft
From Node:	NS-Basin 1	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-23RD_DBI-DS	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
Link Count:	1	Max Depth:	1.58 ft	Max Depth:	1.58 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	50.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-VOV_FG		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	1.80 ft	Invert:	1.80 ft
From Node:	NS-VOV_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-VOV_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-VOV_US		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	1.89 ft	Invert:	1.89 ft
From Node:	NS-23RD_DBI-DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-VOV_FG_US	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	20.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft

Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-WAH_US		Upstream		Downstream	
Scenario:	Proposed RMLW	Invert:	3.68 ft	Invert:	1.81 ft
From Node:	NS-Basin 2	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-VOV_FG_US	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
Link Count:	1	Max Depth:	1.58 ft	Max Depth:	1.58 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	185.17 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Weir Link: W-10TH-B1			
Scenario:	Proposed RMLW	Bottom Clip	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-10TH_MYR_DBI-US	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	3.26 ft	Discharge Coefficients	
Control Elevation:	3.26 ft	Weir Default:	2.800
Max Depth:	1.00 ft	Weir Table:	
Max Width:	2.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment: slot 4.26 - 1 foot

Weir Link: W-10TH-B2			
Scenario:	Proposed RMLW	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-10TH_MYR_DBI-DS	Op Table:	

Link Count:	1		
Flow Direction:	Both	Ref Node:	
Damping:	0.0000 ft	Top Clip	
Weir Type:	Sharp Crested Vertical	Default:	0.00 ft
Geometry Type:	Rectangular	Op Table:	
Invert:	3.26 ft	Ref Node:	
Control Elevation:	3.26 ft	Discharge Coefficients	
Max Depth:	1.00 ft	Weir Default:	2.800
Max Width:	2.00 ft	Weir Table:	
Fillet:	0.00 ft	Orifice Default:	0.600
		Orifice Table:	

Comment: slot 4.26 - 1 foot

Weir Link: W-17TH-B1

Scenario:	Proposed RMLW	Bottom Clip	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-17TH_LRL_DBI-US	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	2.38 ft	Discharge Coefficients	
Control Elevation:	2.38 ft	Weir Default:	2.800
Max Depth:	1.00 ft	Weir Table:	
Max Width:	2.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment: slot in CW 17-74

Weir Link: W-17TH-B2

Scenario:	Proposed RMLW	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-17TH_LRL_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	2.26 ft	Discharge Coefficients	
Control Elevation:	2.26 ft	Weir Default:	2.800
Max Depth:	1.00 ft	Weir Table:	
Max Width:	2.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment: slot in CW 17-75

Weir Link: W-19TH-B2			
Scenario:	Proposed RMLW	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-19TH_LRL_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Trapezoidal	Ref Node:	
Invert:	1.44 ft	Discharge Coefficients	
Control Elevation:	1.44 ft	Weir Default:	2.800
Max Depth:	1.50 ft	Weir Table:	
Extrapolation Method:	Normal Projection	Orifice Default:	0.600
Bottom Width:	2.00 ft	Orifice Table:	
Left Slope:	3.000 (h:v)		
Right Slope:	3.000 (h:v)		
Comment: The weir is the incoming ditch cross section			

Weir Link: W-21ST-B2			
Scenario:	Proposed RMLW	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-21ST_WAH_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	3.90 ft	Discharge Coefficients	
Control Elevation:	3.90 ft	Weir Default:	2.800
Max Depth:	99.00 ft	Weir Table:	
Max Width:	10.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	
Comment: C-inlet grate as a weir			

Weir Link: W-23RD-B1			
Scenario:	Proposed RMLW	Bottom Clip	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-23RD_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	6.80 ft	Discharge Coefficients	
Control Elevation:	6.80 ft	Weir Default:	2.800

Max Depth:	99.00 ft		
Max Width:	600.00 ft	Weir Table:	
Fillet:	0.00 ft	Orifice Default:	0.600
		Orifice Table:	

Comment: update from 23rd profile

Weir Link: W-A1A

Scenario:	Proposed RMLW	**Bottom Clip**	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NT-Atlantic Ocean	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	11.80 ft	**Discharge Coefficients**	
Control Elevation:	11.80 ft	Weir Default:	2.800
Cross Section:	XW-A1A	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment: see irregular weir comment

Weir Link: W-BULKHEAD

Scenario:	Proposed RMLW	**Bottom Clip**	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NT-Intracoastal Waterway	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Broad Crested Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	4.00 ft	**Discharge Coefficients**	
Control Elevation:	4.00 ft	Weir Default:	2.800
Cross Section:	XW-BULKHEAD	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Comment:

Weir Link: W-EUCLID

Scenario:	Proposed RMLW	**Bottom Clip**	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NT-Intracoastal Waterway	Op Table:	

Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Broad Crested Vertical
Geometry Type:	Irregular
Invert:	6.80 ft
Control Elevation:	6.80 ft
Cross Section:	XW-EUCLID

Ref Node:	
Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Discharge Coefficients	
Weir Default:	2.800
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment:

Weir Link: W-MYRTLE_LAUREL

Scenario:	Proposed RMLW
From Node:	NS-Basin 1
To Node:	NS-Basin 2
Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Paved Road Vertical
Geometry Type:	Irregular
Invert:	6.80 ft
Control Elevation:	6.80 ft
Cross Section:	XW-MYRTLE_LAUREL

Bottom Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Discharge Coefficients	
Weir Default:	2.800
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment:

Weir Link: W-VOV

Scenario:	Proposed RMLW
From Node:	NS-23RD_DBI-DS
To Node:	NT-Intracoastal Waterway
Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Broad Crested Vertical
Geometry Type:	Irregular
Invert:	5.00 ft
Control Elevation:	5.00 ft
Cross Section:	XW-VOV

Bottom Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Discharge Coefficients	
Weir Default:	2.800
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment:

Channel Link: C-VOV_DS		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	1.80 ft	Invert:	0.00 ft
From Node:	NS-VOV_FG_DS	Manning's N:	0.0000	Manning's N:	0.0000
To Node:	NT-Intracoastal	Geometry:	Irregular	Geometry:	Irregular
	Waterway	Cross Section:	XC-VOV_DS	Cross Section:	XC-VOV_DS
Link Count:	1				
Flow Direction:	Both				
Damping:	0.0000 ft				
Length:	457.32 ft				
Contraction Coef:	0.00				
Expansion Coef:	0.00				
Entr Loss Coef:	0.00				
Exit Loss Coef:	0.00				
Bend Loss Coef:	0.00				
Bend Location:	0.00 dec				
Energy Switch:	Energy				
Comment:					

Pipe Link: P-10TH_BC		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	1.66 ft	Invert:	1.56 ft
From Node:	NS-10TH_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal	Geometry:	Rectangular	Geometry:	Rectangular
	Waterway	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	10.00 ft	Max Width:	10.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	25.00 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-10TH_FG		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	-2.69 ft	Invert:	-2.69 ft
From Node:	NS-10TH_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-10TH_FG_DS	Geometry:	Circular	Geometry:	Circular
Link Count:	1	Max Depth:	3.50 ft	Max Depth:	3.50 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	

FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-10TH_MYR_CD		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	2.10 ft	Invert:	-1.11 ft
From Node:	NS-10TH_MYR_DBI -US	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-10TH_MYR_DBI -DS	Max Depth:	1.58 ft	Max Depth:	1.58 ft
		Bottom Clip			
Link Count:	1	Default:	0.00 ft	Default:	0.00 ft
Flow Direction:	Both	Op Table:		Op Table:	
Damping:	0.0000 ft	Ref Node:		Ref Node:	
Length:	120.25 ft	Manning's N:	0.0000	Manning's N:	0.0000
FHWA Code:	0	Top Clip			
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	
Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 dec	Manning's N:	0.0000	Manning's N:	0.0000
Energy Switch:	Energy				

Comment:

Pipe Link: P-10TH_US		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	-1.11 ft	Invert:	-2.69 ft
From Node:	NS-10TH_MYR_DBI -DS	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-10TH_FG_US	Max Depth:	3.50 ft	Max Depth:	3.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	145.00 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-17TH_BC		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	1.66 ft	Invert:	1.56 ft
From Node:	NS-17TH_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal Waterway	Geometry: Rectangular		Geometry: Rectangular	
		Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	10.00 ft	Max Width:	10.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	39.10 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-17TH_FG		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	-3.95 ft	Invert:	-3.95 ft
From Node:	NS-17TH_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-17TH_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-17TH_LRL_CD		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	-3.81 ft	Invert:	-3.83 ft
From Node:	NS-17TH_LRL_DBI-US	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-17TH_LRL_DBI-DS	Max Depth:	4.50 ft	Max Depth:	4.50 ft
		Bottom Clip			
Link Count:	1	Default:	0.00 ft	Default:	0.00 ft
Flow Direction:	Both	Op Table:		Op Table:	
Damping:	0.0000 ft	Ref Node:		Ref Node:	

Length:	63.81 ft	Manning's N:	0.0000	Manning's N:	0.0000
FHWA Code:	0		Top Clip		
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	
Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 dec	Manning's N:	0.0000	Manning's N:	0.0000
Energy Switch:	Energy				
Comment:					

Pipe Link: P-17TH_US		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	-3.83 ft	Invert:	-3.95 ft
From Node:	NS-17TH_LRL_DBI-DS	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-17TH_FG_US	Max Depth:	4.50 ft	Max Depth:	4.50 ft
Link Count:	1		Bottom Clip		
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	109.67 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00		Top Clip		
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-19TH_BC		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	1.61 ft	Invert:	1.56 ft
From Node:	NS-19TH_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal Waterway	Geometry: Rectangular		Geometry: Rectangular	
		Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	10.00 ft	Max Width:	10.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft		Bottom Clip		
Length:	59.50 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00		Top Clip		
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-19TH_FG		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	-4.29 ft	Invert:	-3.76 ft
From Node:	NS-19TH_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-19TH_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-19TH_LRL_CD		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	1.54 ft	Invert:	1.44 ft
From Node:	NS-Basin 1	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-19TH_LRL_DBI-DS	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
		Max Depth:	1.50 ft	Max Depth:	1.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	103.31 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000
Comment:					

Pipe Link: P-19TH_US		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	-4.17 ft	Invert:	-4.29 ft
From Node:	NS-19TH_LRL_DBI-DS	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-19TH_FG_US	Max Depth:	4.50 ft	Max Depth:	4.50 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	129.70 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			

Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-21ST_BC		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	1.38 ft	Invert:	1.20 ft
From Node:	NS-21ST_FG_DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NT-Intracoastal	Geometry: Rectangular		Geometry: Rectangular	
	Waterway	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Link Count:	1	Max Width:	9.00 ft	Max Width:	9.00 ft
Flow Direction:	Both	Fillet:	0.00 ft	Fillet:	0.00 ft
Damping:	0.0000 ft	Bottom Clip			
Length:	52.00 ft	Default:	0.00 ft	Default:	0.00 ft
FHWA Code:	0	Op Table:		Op Table:	
Entr Loss Coef:	0.00	Ref Node:		Ref Node:	
Exit Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Loss Coef:	0.00	Top Clip			
Bend Location:	0.00 dec	Default:	0.00 ft	Default:	0.00 ft
Energy Switch:	Energy	Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-21ST_CD		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	0.73 ft	Invert:	0.72 ft
From Node:	NS-21ST_WAH_DB	Manning's N:	0.0120	Manning's N:	0.0120
	I-US	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
To Node:	NS-21ST_WAH_DB	Max Depth:	1.66 ft	Max Depth:	1.66 ft
	I-DS	Bottom Clip			
Link Count:	1	Default:	0.00 ft	Default:	0.00 ft
Flow Direction:	Both	Op Table:		Op Table:	
Damping:	0.0000 ft	Ref Node:		Ref Node:	
Length:	59.43 ft	Manning's N:	0.0000	Manning's N:	0.0000
FHWA Code:	0	Top Clip			
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	
Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 dec	Manning's N:	0.0000	Manning's N:	0.0000
Energy Switch:	Energy				

Comment:

Pipe Link: P-21ST_FG		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	-1.28 ft	Invert:	-4.28 ft
From Node:	NS-21ST_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-21ST_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment: -4.28 AS INVERT BASED ON 1.28+36" SINCE US PIPE WAS JUST BELOW INVERT OF FLAP GATE
PIPE IS SET TO POSITIVE FLOW ONLY TO MIMIC A FLAP GATE STRUCTURE

Pipe Link: P-21ST_FG_US		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	0.72 ft	Invert:	-1.28 ft
From Node:	NS-21ST_WAH_DB I-DS	Manning's N:	0.0120	Manning's N:	0.0120
		Geometry: Circular		Geometry: Circular	
To Node:	NS-21ST_FG_US	Max Depth:	6.00 ft	Max Depth:	6.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	200.00 ft	Ref Node:		Ref Node:	
FHWA Code:	0	Manning's N:	0.0000	Manning's N:	0.0000
Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-21ST_WAH_US		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	2.65 ft	Invert:	0.73 ft
From Node:	NS-Basin 1	Manning's N:	0.0240	Manning's N:	0.0240
To Node:	NS-21ST_WAH_DB I-US	Geometry: Circular		Geometry: Circular	
		Max Depth:	2.00 ft	Max Depth:	2.00 ft
Link Count:	1	Bottom Clip			
Flow Direction:	Both	Default:	0.00 ft	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:		Op Table:	
Length:	380.00 ft	Ref Node:		Ref Node:	
FHWA Code:	6	Manning's N:	0.0000	Manning's N:	0.0000

Entr Loss Coef:	0.00	Top Clip			
Exit Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:		Op Table:	
Bend Location:	0.00 dec	Ref Node:		Ref Node:	
Energy Switch:	Energy	Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-23RD_CD		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	3.39 ft	Invert:	1.89 ft
From Node:	NS-Basin 1	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-23RD_DBI-DS	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
Link Count:	1	Max Depth:	1.08 ft	Max Depth:	1.08 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	30.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-23RD_OUT		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	1.90 ft	Invert:	1.89 ft
From Node:	NS-Basin 1	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-23RD_DBI-DS	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
Link Count:	1	Max Depth:	1.58 ft	Max Depth:	1.58 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	50.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-VOV_FG	Upstream	Downstream

Scenario:	Proposed RRE	Invert:	1.80 ft	Invert:	1.80 ft
From Node:	NS-VOV_FG_US	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-VOV_FG_DS	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Positive	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	10.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-VOV_US		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	1.89 ft	Invert:	1.89 ft
From Node:	NS-23RD_DBI-DS	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-VOV_FG_US	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	20.00 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Pipe Link: P-WAH_US		Upstream		Downstream	
Scenario:	Proposed RRE	Invert:	3.68 ft	Invert:	1.81 ft
From Node:	NS-Basin 2	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NS-VOV_FG_US	Geometry: Horizontal Ellipse		Geometry: Horizontal Ellipse	
Link Count:	1	Max Depth:	1.58 ft	Max Depth:	1.58 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	185.17 ft	Op Table:		Op Table:	
FHWA Code:	0	Ref Node:		Ref Node:	
Entr Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Exit Loss Coef:	0.00	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft

Bend Location:	0.00 dec	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0000	Manning's N:	0.0000

Comment:

Weir Link: W-10TH-B1

Scenario:	Proposed RRE	**Bottom Clip**	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-10TH_MYR_DBI-US	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	3.26 ft	**Discharge Coefficients**	
Control Elevation:	3.26 ft	Weir Default:	2.800
Max Depth:	1.00 ft	Weir Table:	
Max Width:	2.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment: slot 4.26 - 1 foot

Weir Link: W-10TH-B2

Scenario:	Proposed RRE	**Bottom Clip**	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-10TH_MYR_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	**Top Clip**	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	3.26 ft	**Discharge Coefficients**	
Control Elevation:	3.26 ft	Weir Default:	2.800
Max Depth:	1.00 ft	Weir Table:	
Max Width:	2.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	

Comment: slot 4.26 - 1 foot

Weir Link: W-17TH-B1

Scenario:	Proposed RRE	**Bottom Clip**	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-17TH_LRL_DBI-US	Op Table:	
Link Count:	1	Ref Node:	

Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Rectangular
Invert:	2.38 ft
Control Elevation:	2.38 ft
Max Depth:	1.00 ft
Max Width:	2.00 ft
Fillet:	0.00 ft

Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients	
Weir Default:	2.800
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment: slot in CW 17-74

Weir Link: W-17TH-B2

Scenario:	Proposed RRE
From Node:	NS-Basin 2
To Node:	NS-17TH_LRL_DBI-DS
Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Rectangular
Invert:	2.26 ft
Control Elevation:	2.26 ft
Max Depth:	1.00 ft
Max Width:	2.00 ft
Fillet:	0.00 ft

Bottom Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients	
Weir Default:	2.800
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment: slot in CW 17-75

Weir Link: W-19TH-B2

Scenario:	Proposed RRE
From Node:	NS-Basin 2
To Node:	NS-19TH_LRL_DBI-DS
Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Trapezoidal
Invert:	1.44 ft
Control Elevation:	1.44 ft
Max Depth:	1.50 ft
Extrapolation Method:	Normal Projection
Bottom Width:	2.00 ft
Left Slope:	3.000 (h:v)
Right Slope:	3.000 (h:v)

Bottom Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients	
Weir Default:	2.800
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment: The weir is the incoming ditch cross section

Weir Link: W-21ST-B2			
Scenario:	Proposed RRE	Bottom Clip	
From Node:	NS-Basin 2	Default:	0.00 ft
To Node:	NS-21ST_WAH_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Sharp Crested Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	3.90 ft	Discharge Coefficients	
Control Elevation:	3.90 ft	Weir Default:	2.800
Max Depth:	99.00 ft	Weir Table:	
Max Width:	10.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	
Comment: C-inlet grate as a weir			

Weir Link: W-23RD-B1			
Scenario:	Proposed RRE	Bottom Clip	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NS-23RD_DBI-DS	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Rectangular	Ref Node:	
Invert:	6.80 ft	Discharge Coefficients	
Control Elevation:	6.80 ft	Weir Default:	2.800
Max Depth:	99.00 ft	Weir Table:	
Max Width:	600.00 ft	Orifice Default:	0.600
Fillet:	0.00 ft	Orifice Table:	
Comment: update from 23rd profile			

Weir Link: W-A1A			
Scenario:	Proposed RRE	Bottom Clip	
From Node:	NS-Basin 1	Default:	0.00 ft
To Node:	NT-Atlantic Ocean	Op Table:	
Link Count:	1	Ref Node:	
Flow Direction:	Both	Top Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Weir Type:	Paved Road Vertical	Op Table:	
Geometry Type:	Irregular	Ref Node:	
Invert:	11.80 ft	Discharge Coefficients	
Control Elevation:	11.80 ft	Weir Default:	2.800
Cross Section:	XW-A1A	Weir Table:	
		Orifice Default:	0.600

	Orifice Table:

Comment: see irregular weir comment

Weir Link: W-BULKHEAD

Scenario:	Proposed RRE
From Node:	NS-Basin 2
To Node:	NT-Intracoastal Waterway
Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Broad Crested Vertical
Geometry Type:	Irregular
Invert:	4.50 ft
Control Elevation:	4.50 ft
Cross Section:	XW-BULKHEAD

Bottom Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Discharge Coefficients	
Weir Default:	2.800
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment:

Weir Link: W-EUCLID

Scenario:	Proposed RRE
From Node:	NS-Basin 1
To Node:	NT-Intracoastal Waterway
Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Broad Crested Vertical
Geometry Type:	Irregular
Invert:	5.27 ft
Control Elevation:	5.27 ft
Cross Section:	XW-EUCLID

Bottom Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Discharge Coefficients	
Weir Default:	2.800
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment:

Weir Link: W-MYRTLE_LAUREL

Scenario:	Proposed RRE
From Node:	NS-Basin 1
To Node:	NS-Basin 2
Link Count:	1
Flow Direction:	Both

Bottom Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Top Clip	

Damping:	0.0000 ft
Weir Type:	Paved Road Vertical
Geometry Type:	Irregular
Invert:	3.71 ft
Control Elevation:	3.71 ft
Cross Section:	XW-MYRTLE_LAUREL

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	2.800
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment:

Weir Link: W-VOV

Scenario:	Proposed RRE
From Node:	NS-23RD_DBI-DS
To Node:	NT-Intracoastal Waterway
Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Broad Crested Vertical
Geometry Type:	Irregular
Invert:	6.00 ft
Control Elevation:	6.00 ft
Cross Section:	XW-VOV

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip

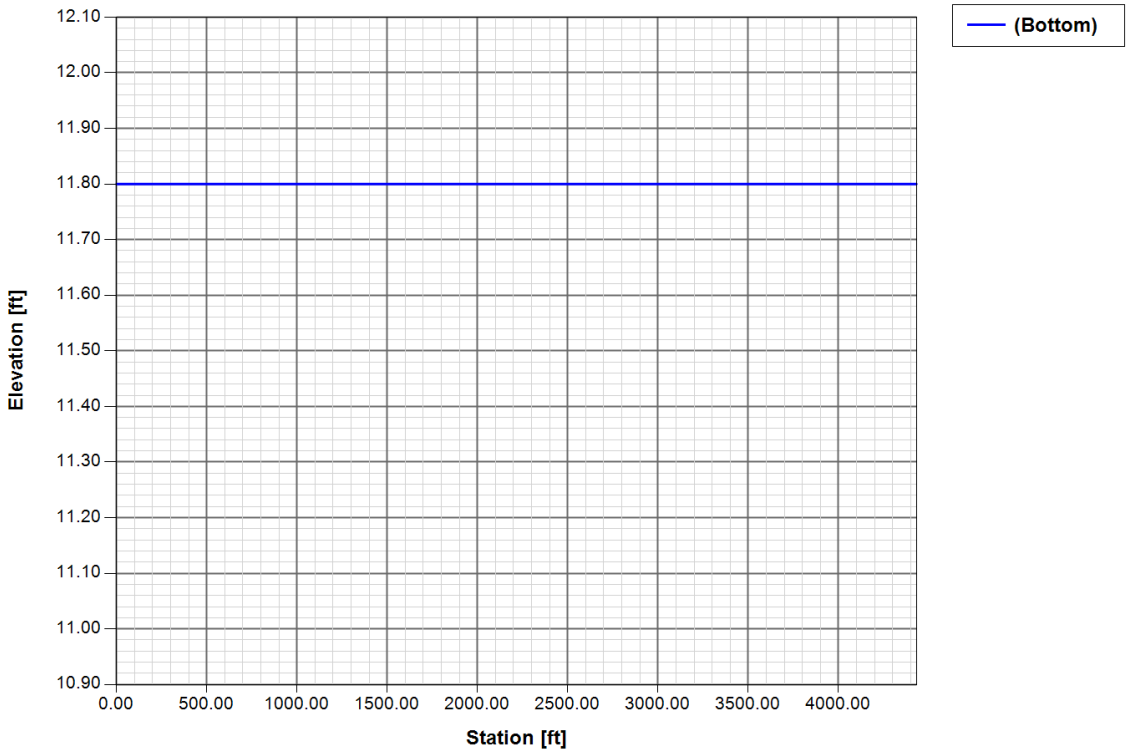
Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

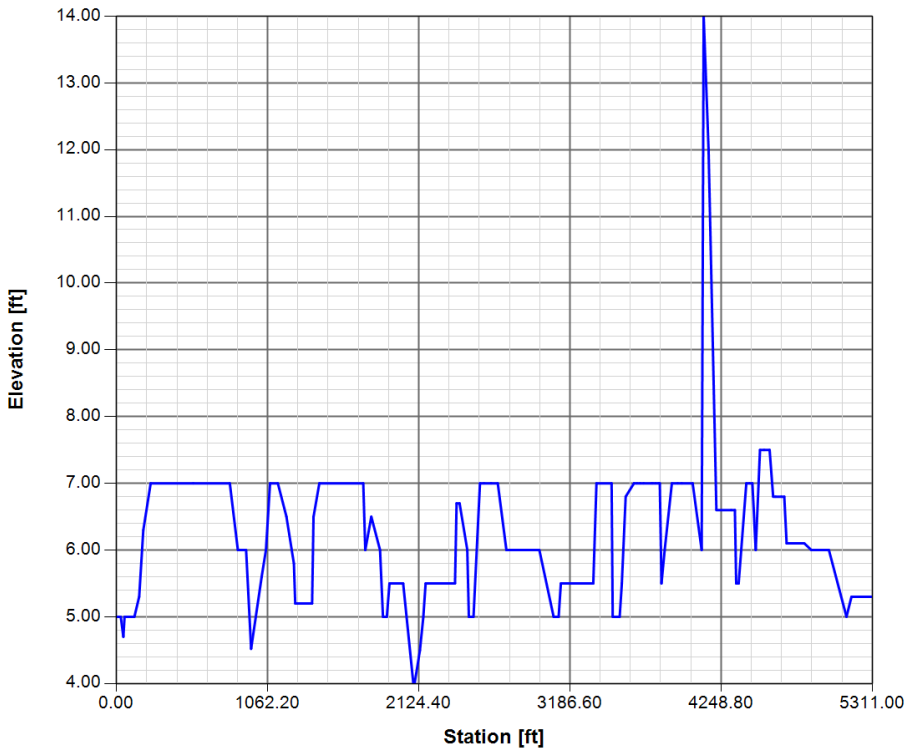
Weir Default:	2.800
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment:

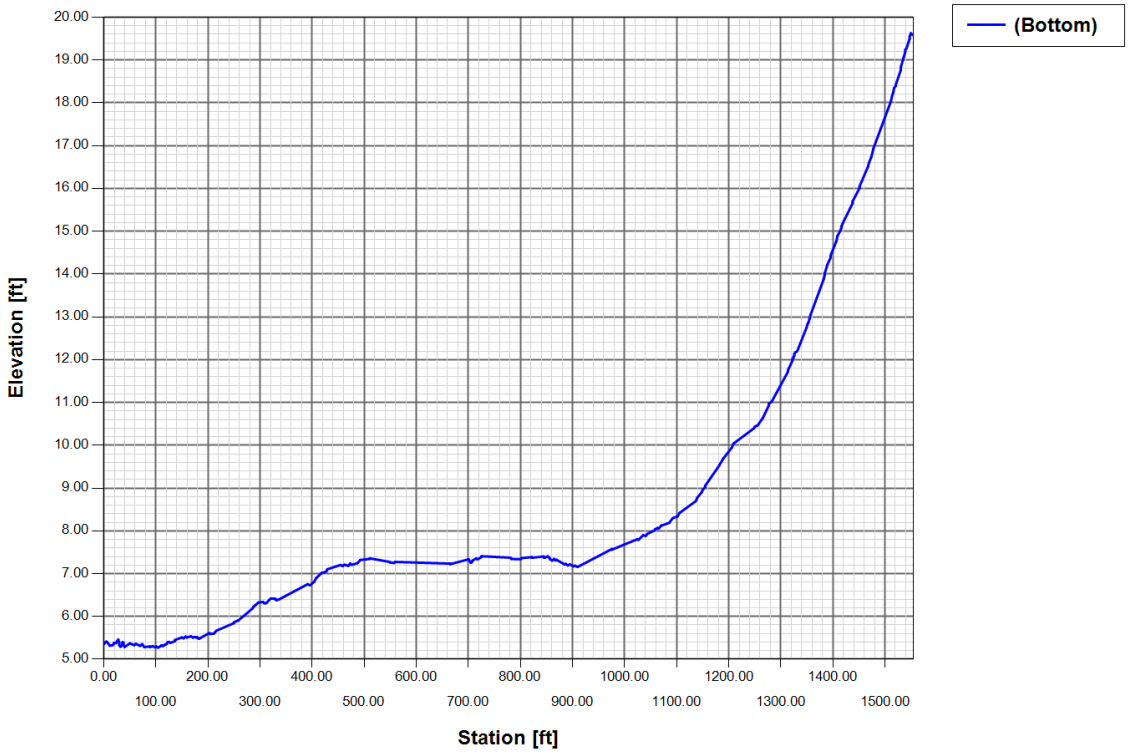
Weir Cross Section: XW-A1A Scenario: XW-A1A



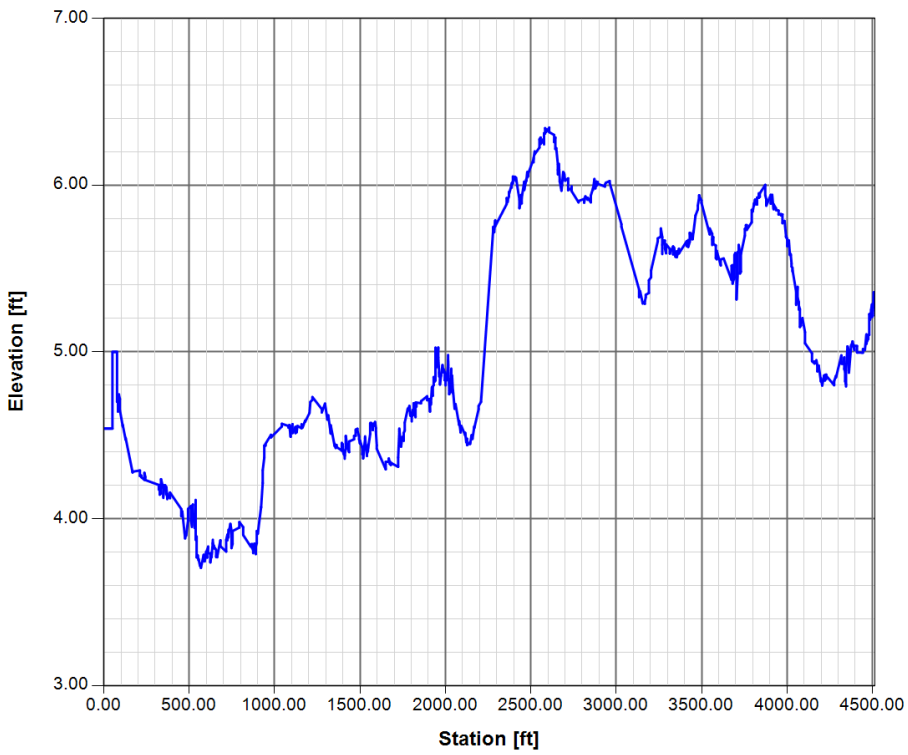
Weir Cross Section: XW-BULKHEAD Scenario: XW-BULKHEAD



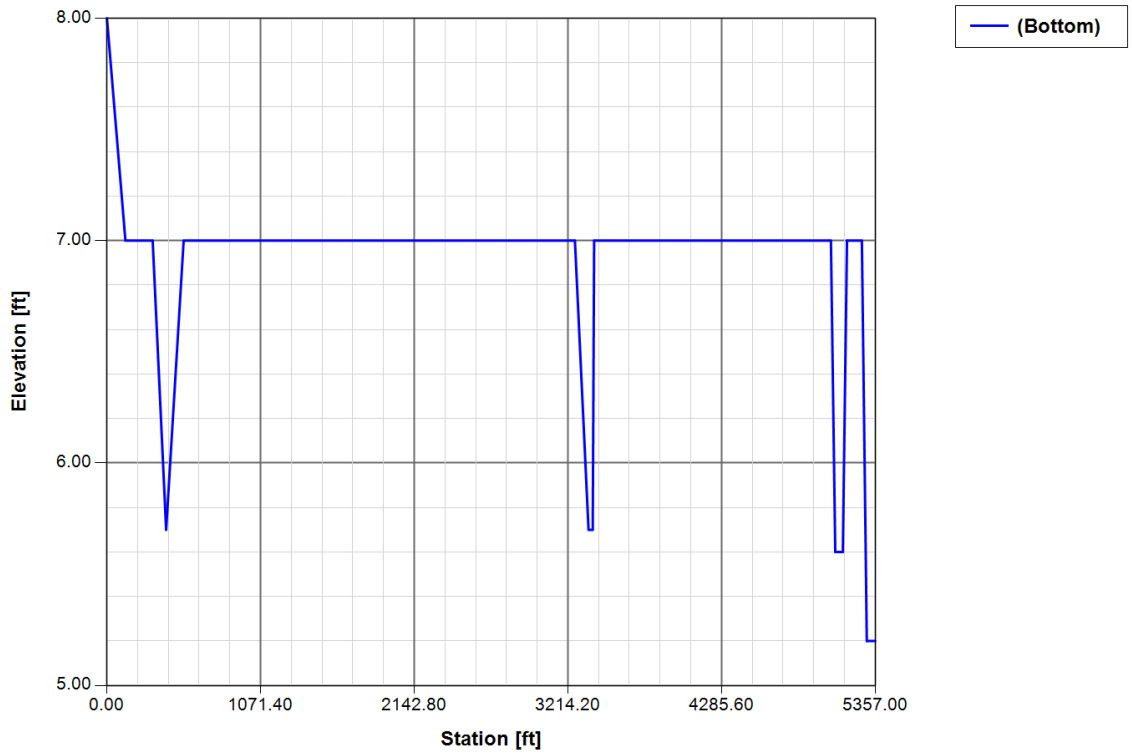
Weir Cross Section: XW-EUCLID Scenario: XW-EUCLID



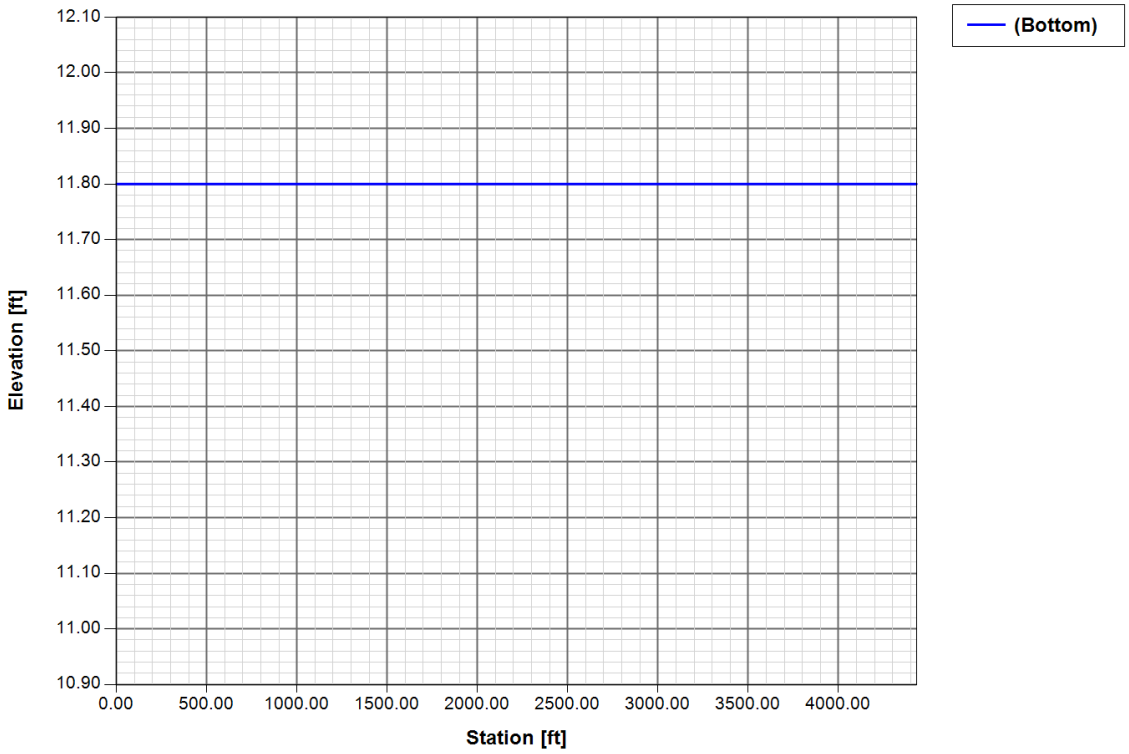
Weir Cross Section: XW-MYRTLE_LAUREL Scenario: XW-MYRTLE_LAUREL



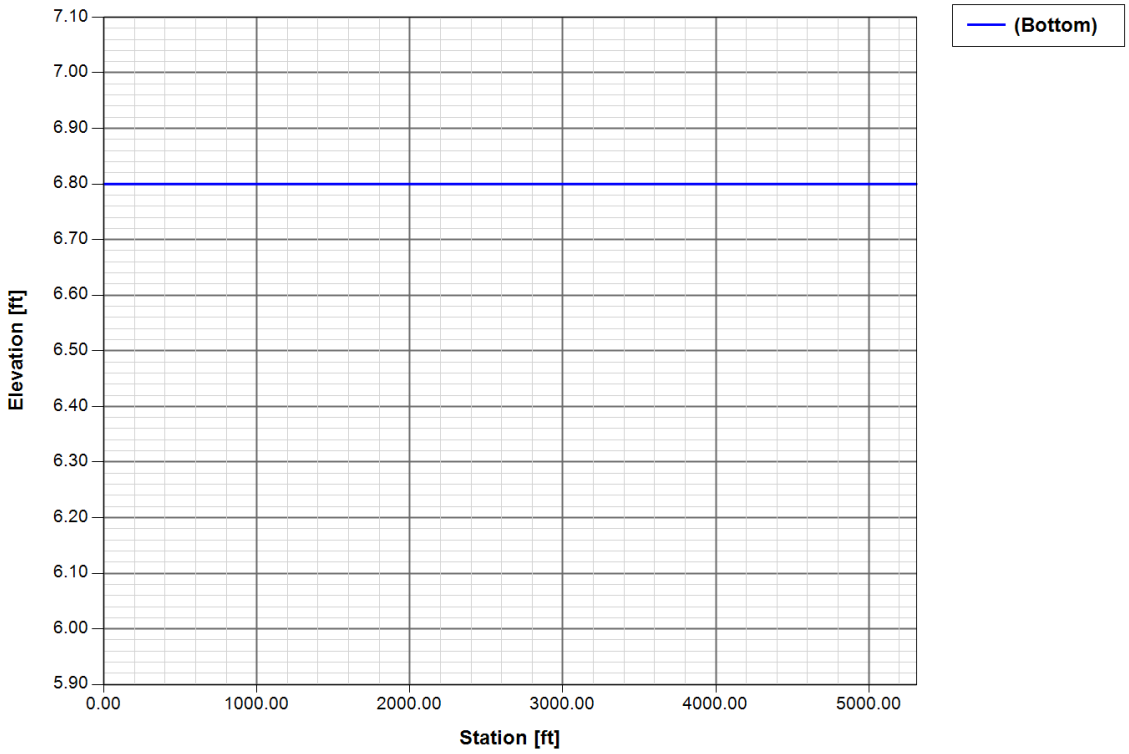
Weir Cross Section: XW-VOV Scenario: XW-VOV



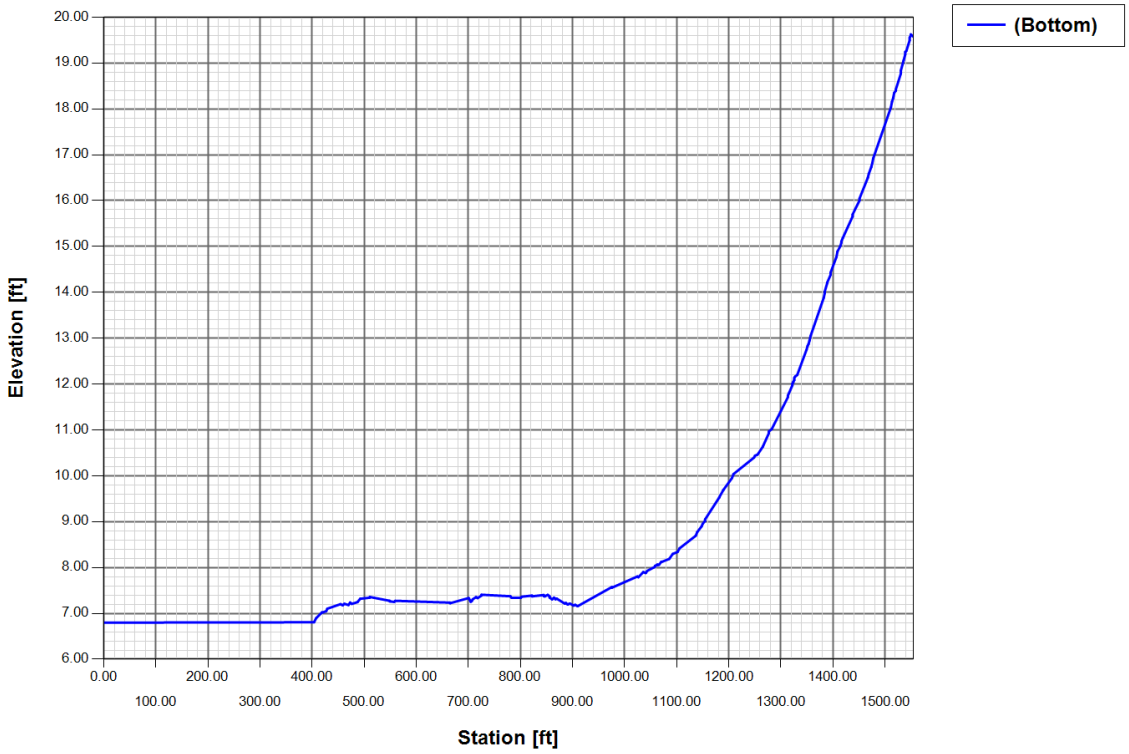
Weir Cross Section: XW-A1A Scenario: XW-A1A



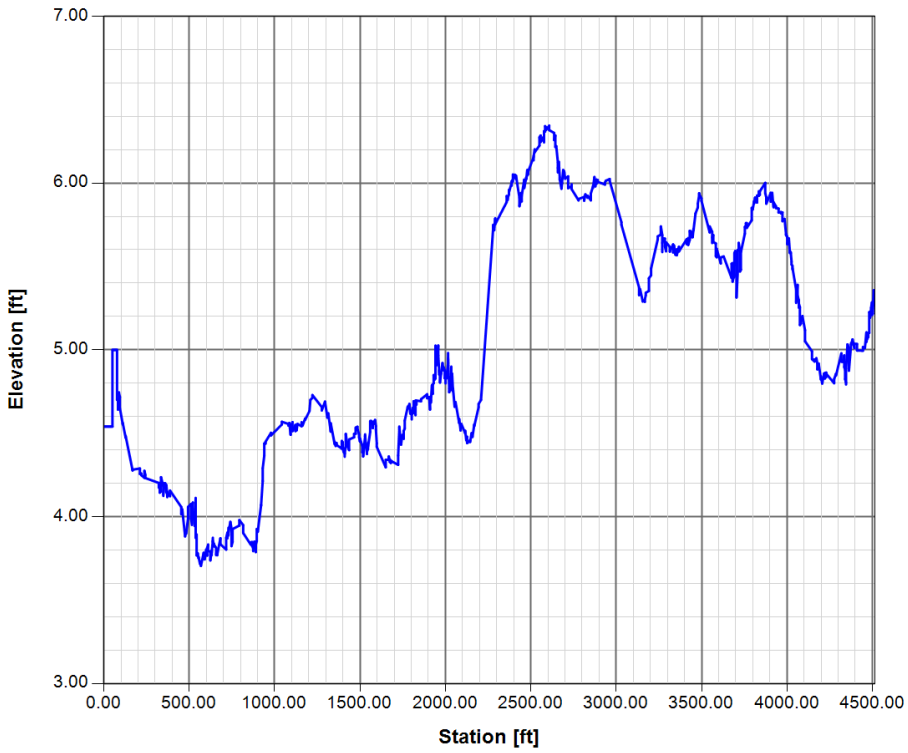
Weir Cross Section: XW-BULKHEAD Scenario: XW-BULKHEAD



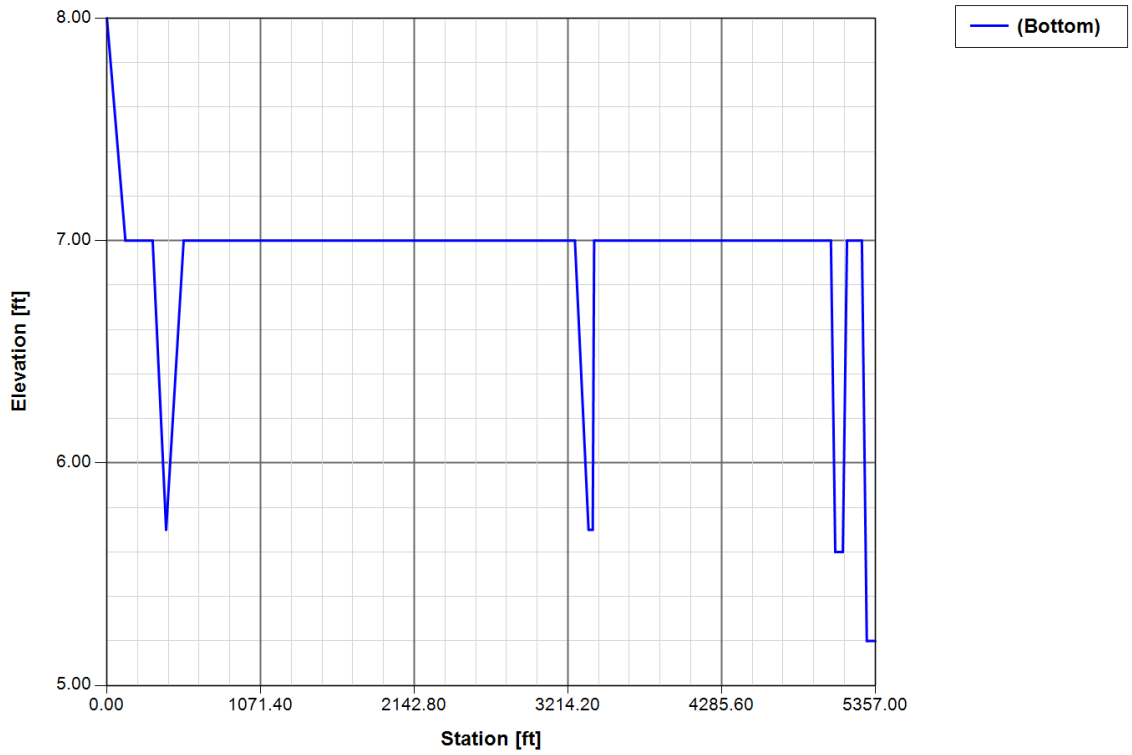
Weir Cross Section: XW-EUCLID Scenario: XW-EUCLID



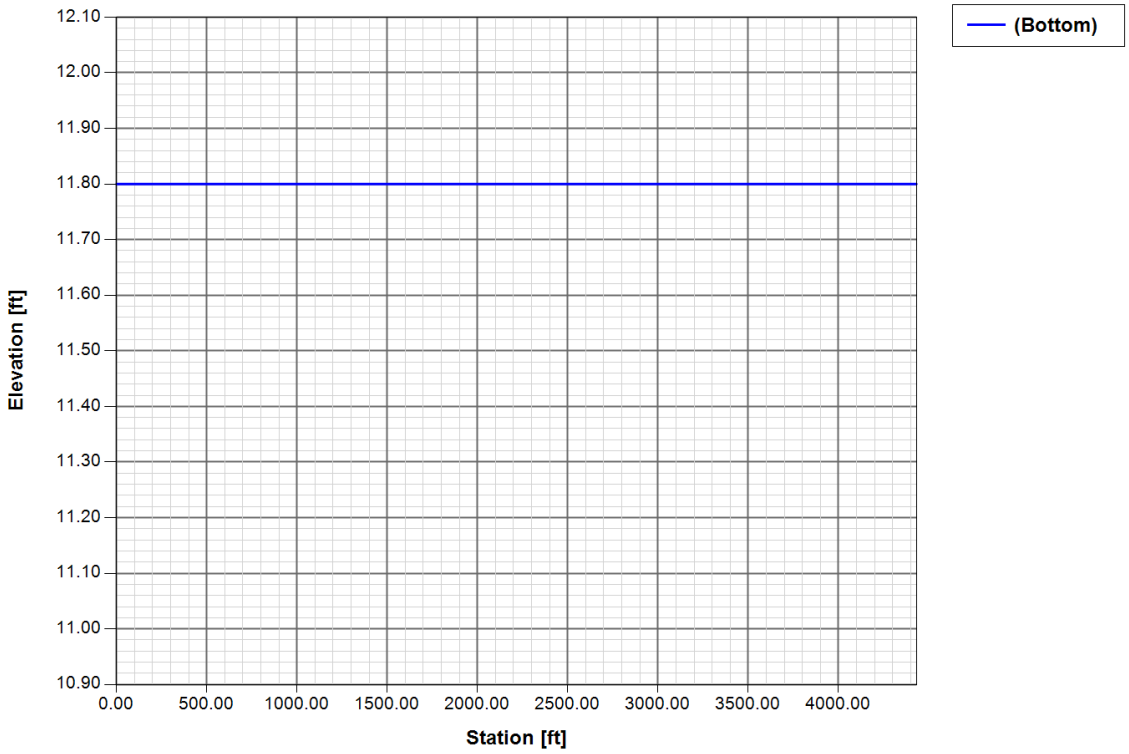
Weir Cross Section: XW-MYRTLE_LAUREL Scenario: XW-MYRTLE_LAUREL



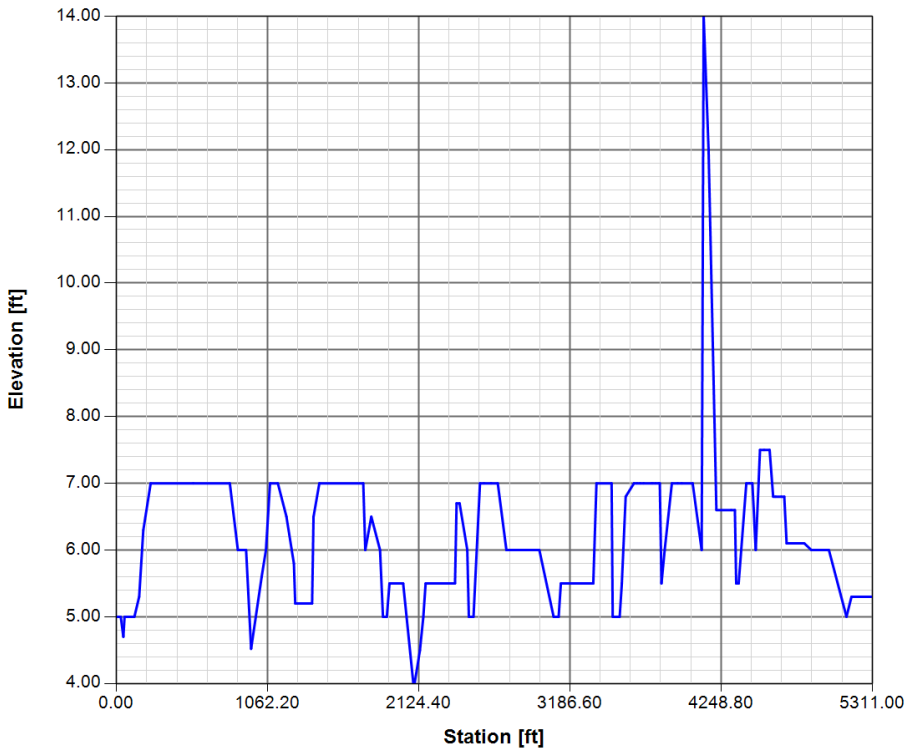
Weir Cross Section: XW-VOV Scenario: XW-VOV



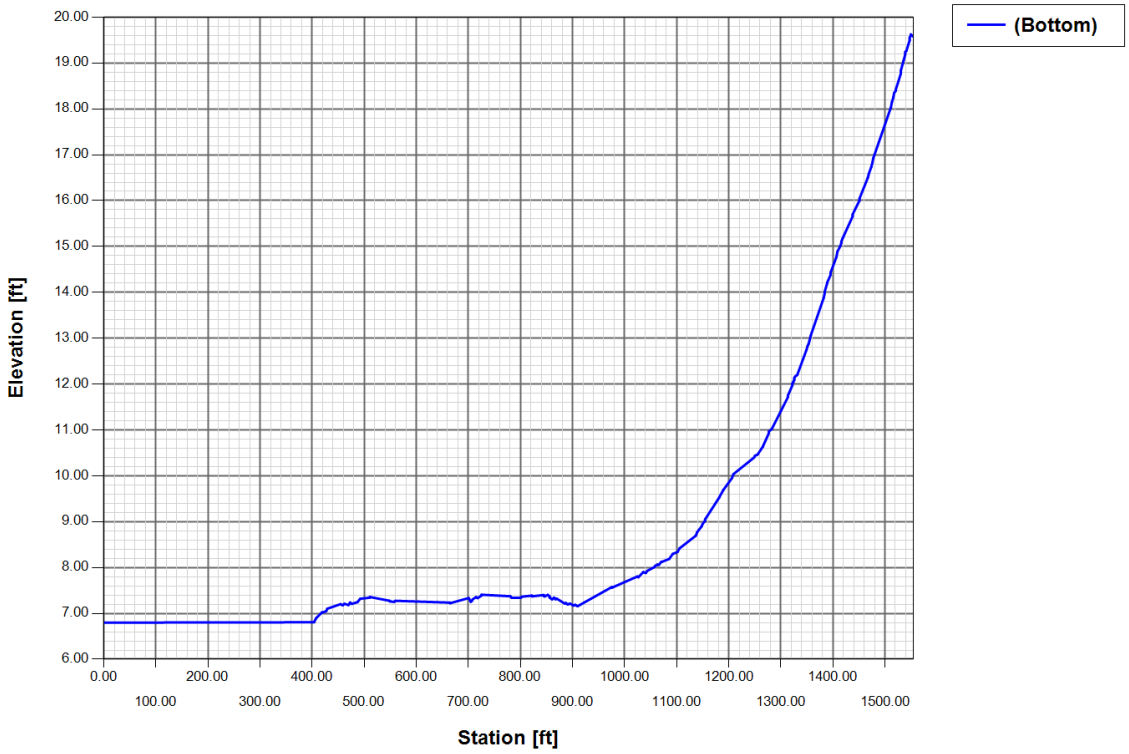
Weir Cross Section: XW-A1A Scenario: XW-A1A



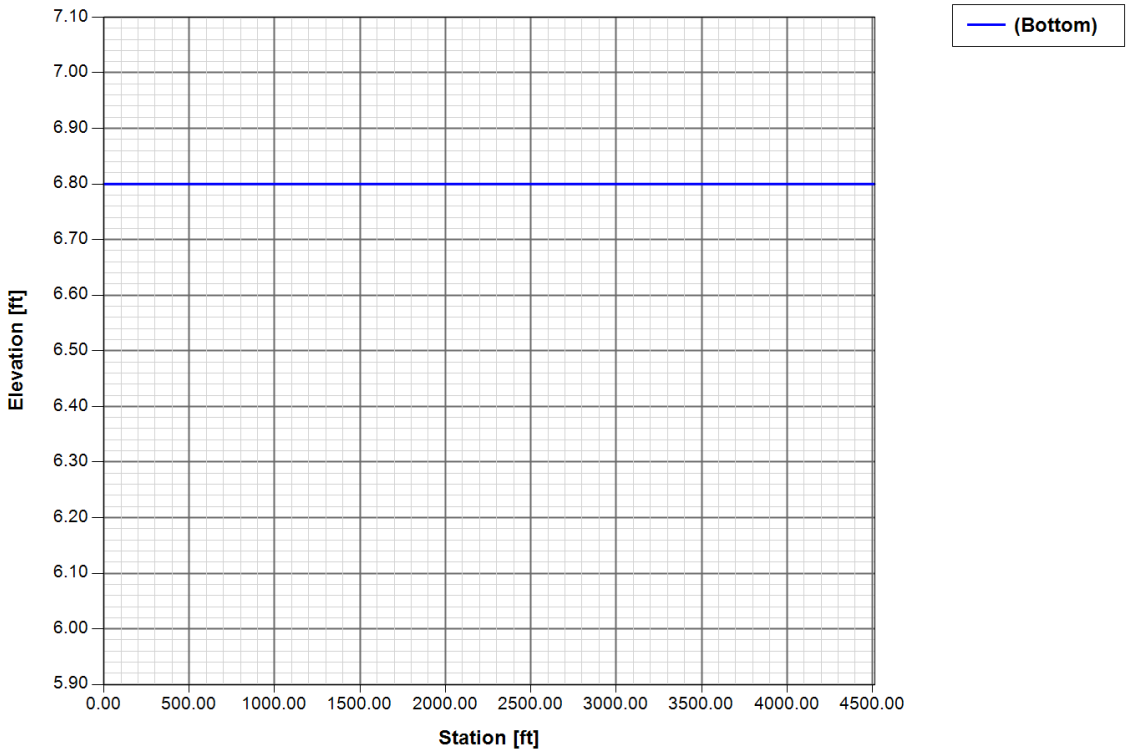
Weir Cross Section: XW-BULKHEAD Scenario: XW-BULKHEAD



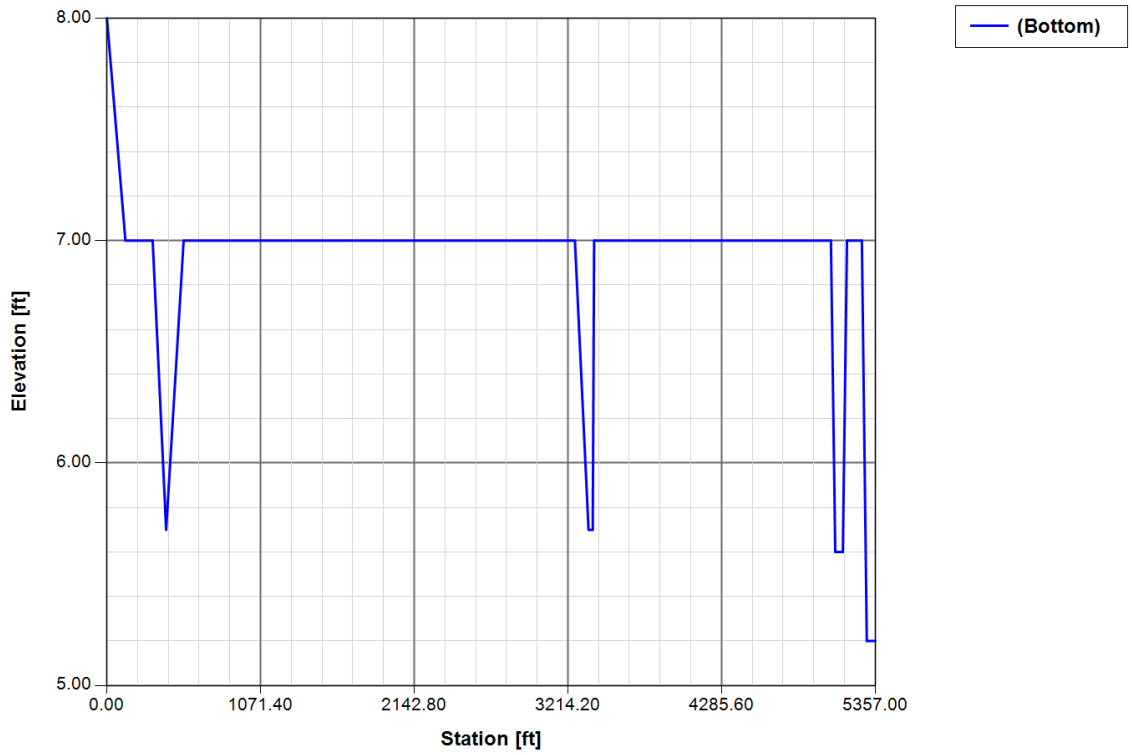
Weir Cross Section: XW-EUCLID Scenario: XW-EUCLID



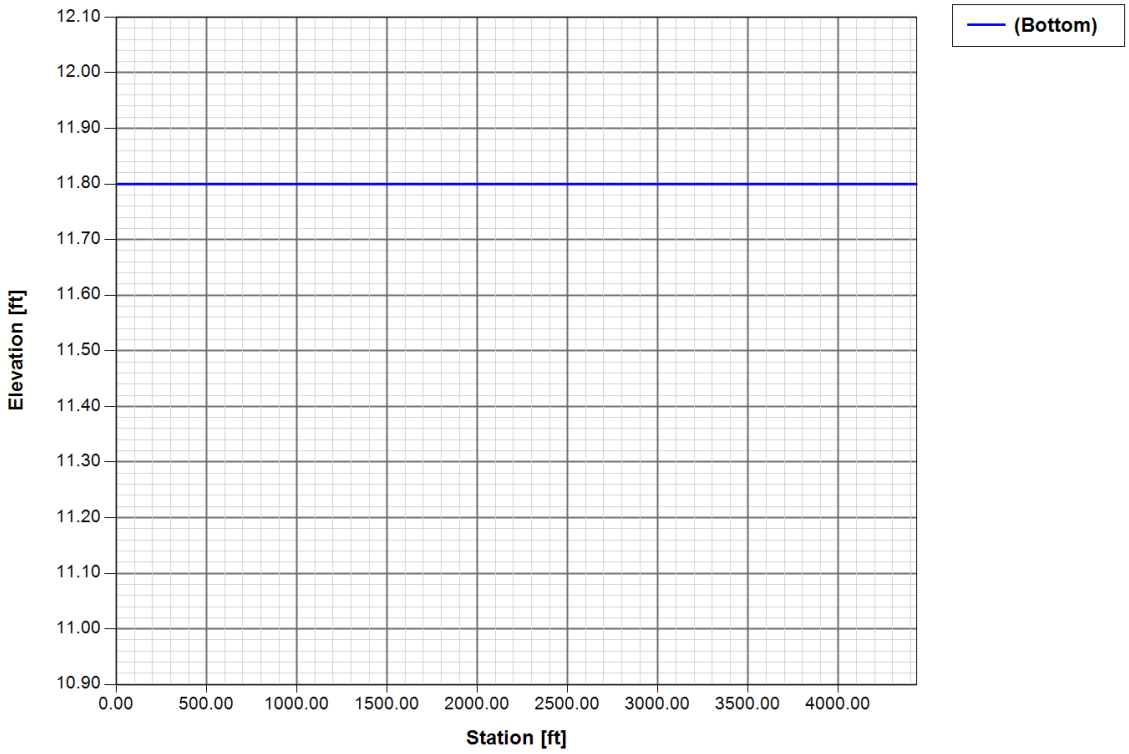
Weir Cross Section: XW-MYRTLE_LAUREL Scenario: XW-MYRTLE_LAUREL



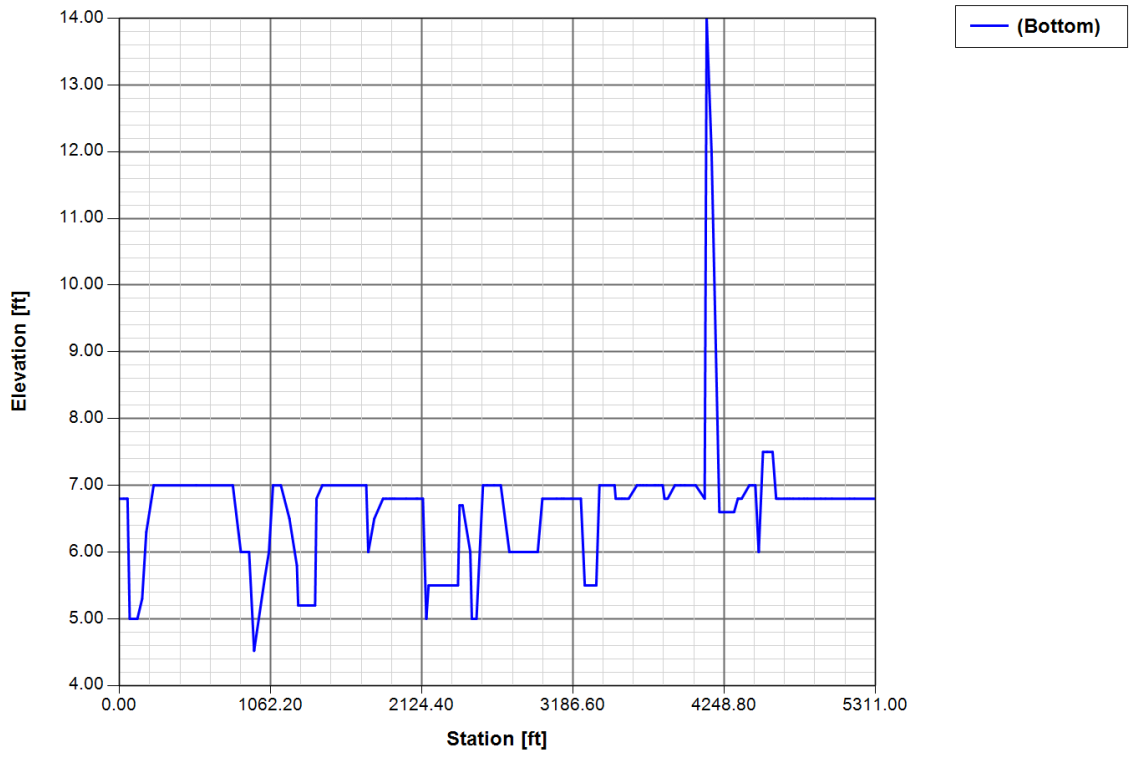
Weir Cross Section: XW-VOV Scenario: XW-VOV



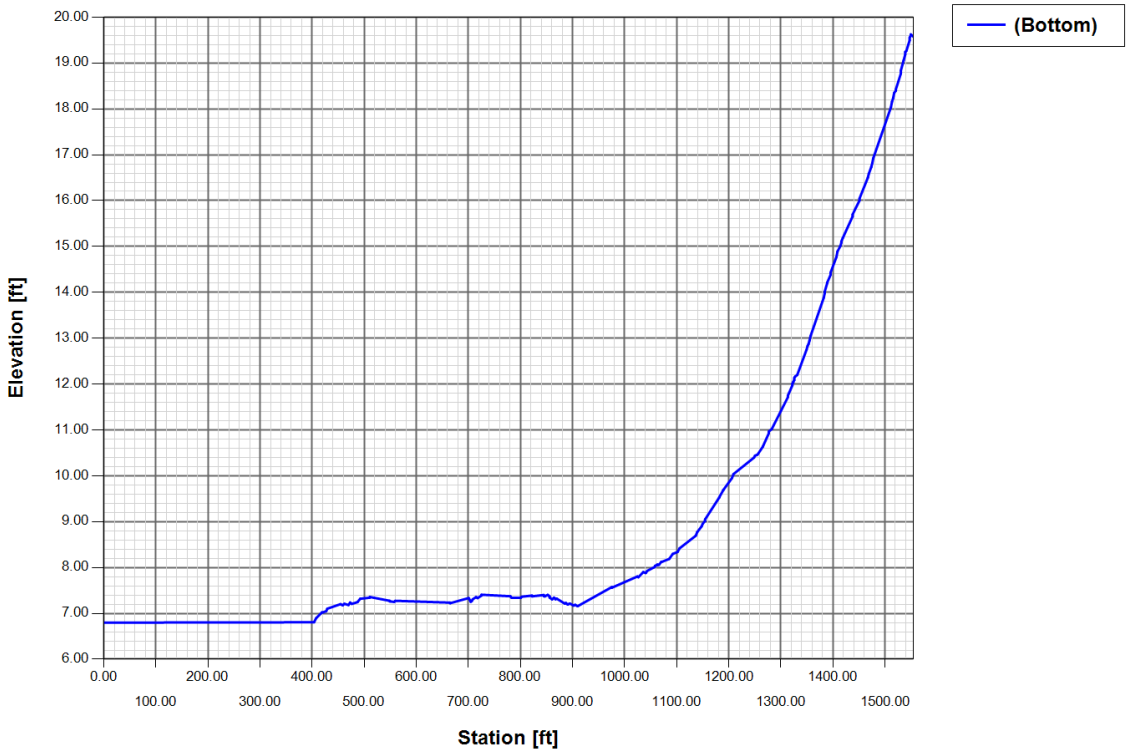
Weir Cross Section: XW-A1A Scenario: XW-A1A



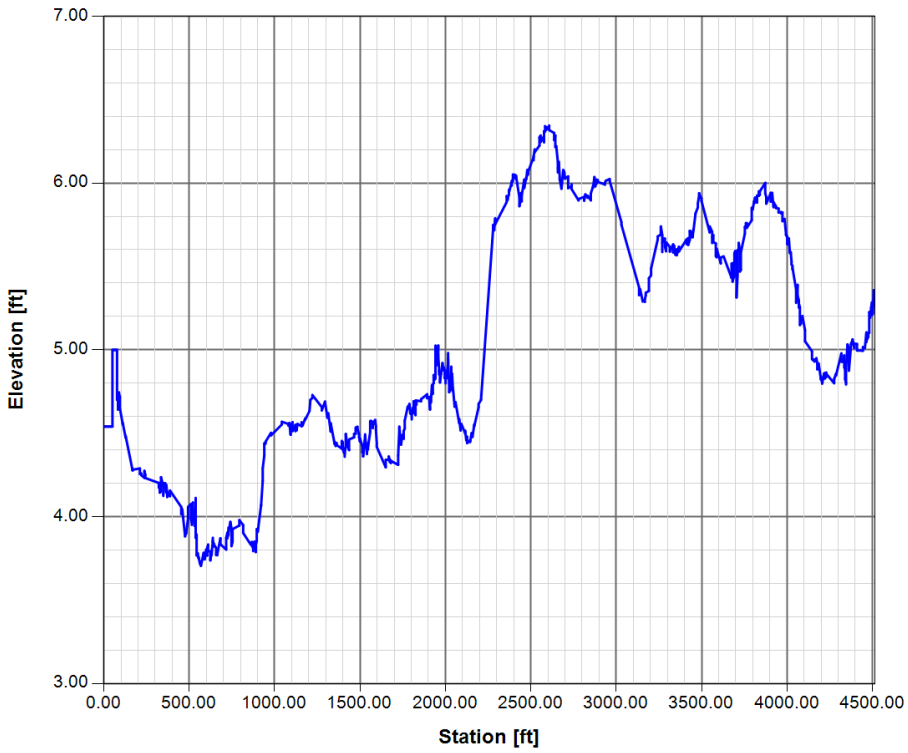
Weir Cross Section: XW-BULKHEAD Scenario: XW-BULKHEAD



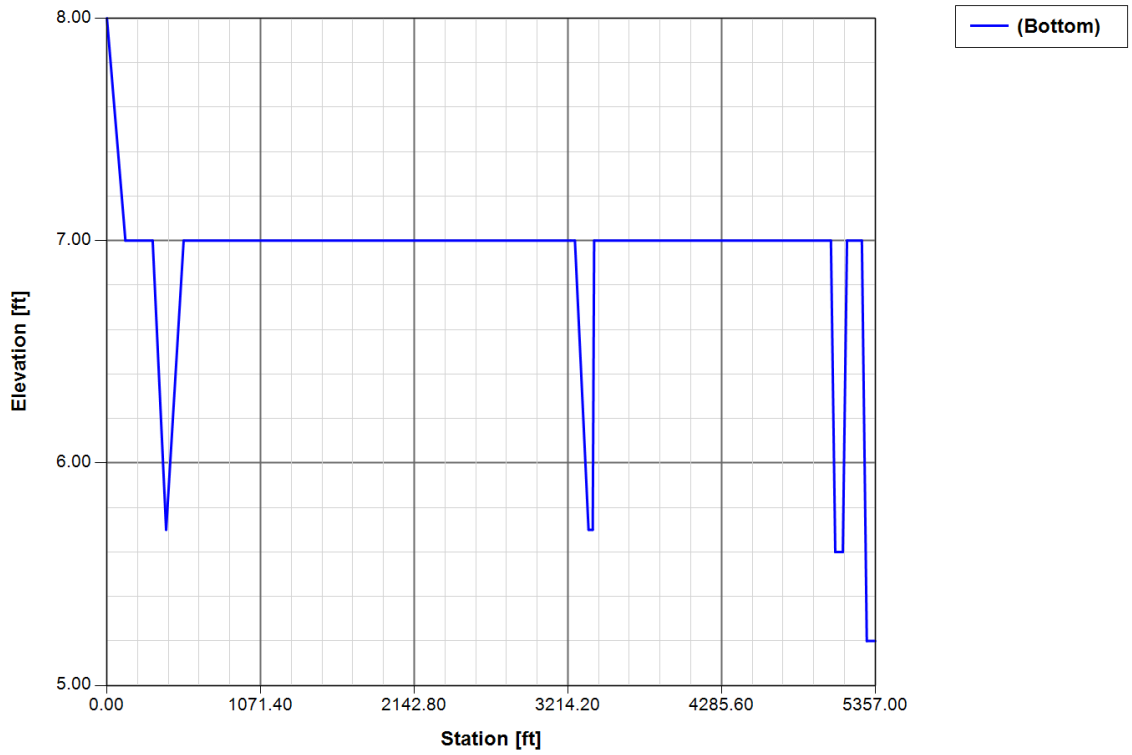
Weir Cross Section: XW-EUCLID Scenario: XW-EUCLID



Weir Cross Section: XW-MYRTLE_LAUREL Scenario: XW-MYRTLE_LAUREL



Weir Cross Section: XW-VOV Scenario: XW-VOV



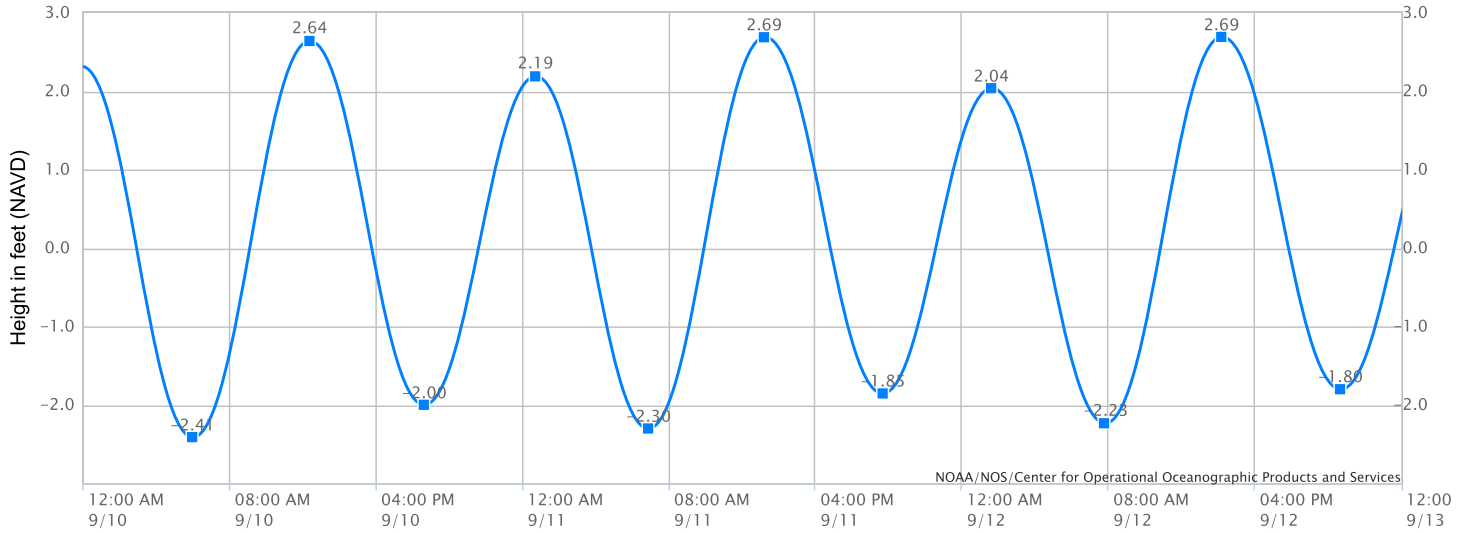
Appendix C:
Data Collection

Pertinent Source Data

Plans Excerpts

Help Print

NOAA/NOS/CO-OPS
Tide Predictions at 8720554, Vilano Beach ICWW FL
From 2017/09/10 12:00 AM LST/LDT to 2017/09/12 11:59 PM LST/LDT



Warning: The predictions on this page refer to NAVD and not to the chart datum of MLLW; Therefore should not be used for navigation purposes.
Note: The interval is High/Low, the solid blue line depicts a curve fit between the high and low values and approximates the segments between.
Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.

High/Low Tide Prediction Data Listing

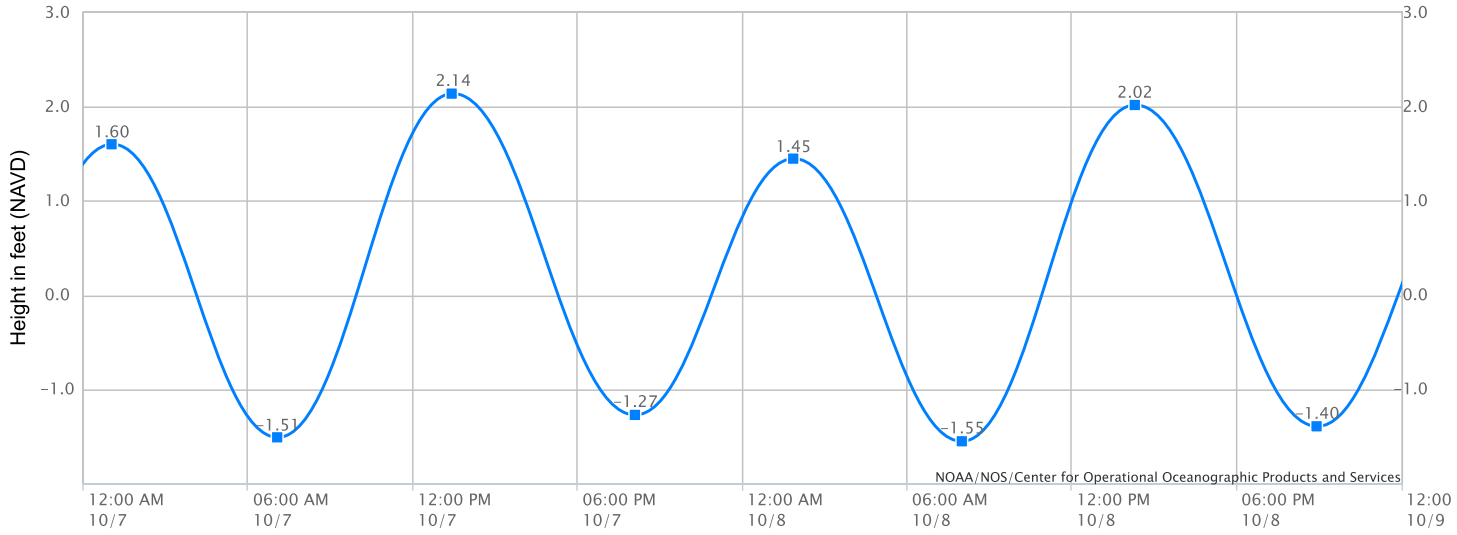
Station Name: Vilano Beach ICWW, FL
Action: Daily
Product: Tide Predictions
Start Date & Time: 2017/9/10 12:00 AM
End Date & Time: 2017/9/12 11:59 PM

Source: NOAA/NOS/CO-OPS
Prediction Type: Harmonic
Datum: NAVD
Height Units: Feet
Time Zone: LST/LDT

Date	Day	Time	Hgt	Time	Hgt	Time	Hgt	Time	Hgt
2017/09/10	Sun	05:58 AM	-2.41 L	12:21 PM	2.64 H	6:36 PM	-2.00 L		
2017/09/11	Mon	12:42 AM	2.19 H	06:51 AM	-2.30 L	1:13 PM	2.69 H	7:39 PM	-1.85 L
2017/09/12	Tue	01:37 AM	2.04 H	07:49 AM	-2.23 L	2:11 PM	2.69 H	8:41 PM	-1.80 L

Help Print

NOAA/NOS/CO-OPS
Tide Predictions at 8720554, Vilano Beach ICWW FL
From 2016/10/07 12:00 AM LST/LDT to 2016/10/08 11:59 PM LST/LDT



Warning: The predictions on this page refer to NAVD and not to the chart datum of MLLW; Therefore should not be used for navigation purposes.
Note: The interval is High/Low, the solid blue line depicts a curve fit between the high and low values and approximates the segments between.
Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.

High/Low Tide Prediction Data Listing

Station Name: Vilano Beach ICWW, FL
Action: Daily
Product: Tide Predictions
Start Date & Time: 2016/10/7 12:00 AM
End Date & Time: 2016/10/8 11:59 PM

Source: NOAA/NOS/CO-OPS
Prediction Type: Harmonic
Datum: NAVD
Height Units: Feet
Time Zone: LST/LDT

Date	Day	Time	Hgt	Time	Hgt	Time	Hgt	Time	Hgt
2016/10/07	Fri	01:03 AM	1.60 H	07:04 AM	-1.51 L	1:27 PM	2.14 H	8:05 PM	-1.27 L
2016/10/08	Sat	01:52 AM	1.45 H	07:59 AM	-1.55 L	2:18 PM	2.02 H	8:56 PM	-1.40 L

Datums for 8720554, Vilano Beach ICWW FL

NOTICE: All data values are relative to the NAVD88.

Elevations on NAVD88

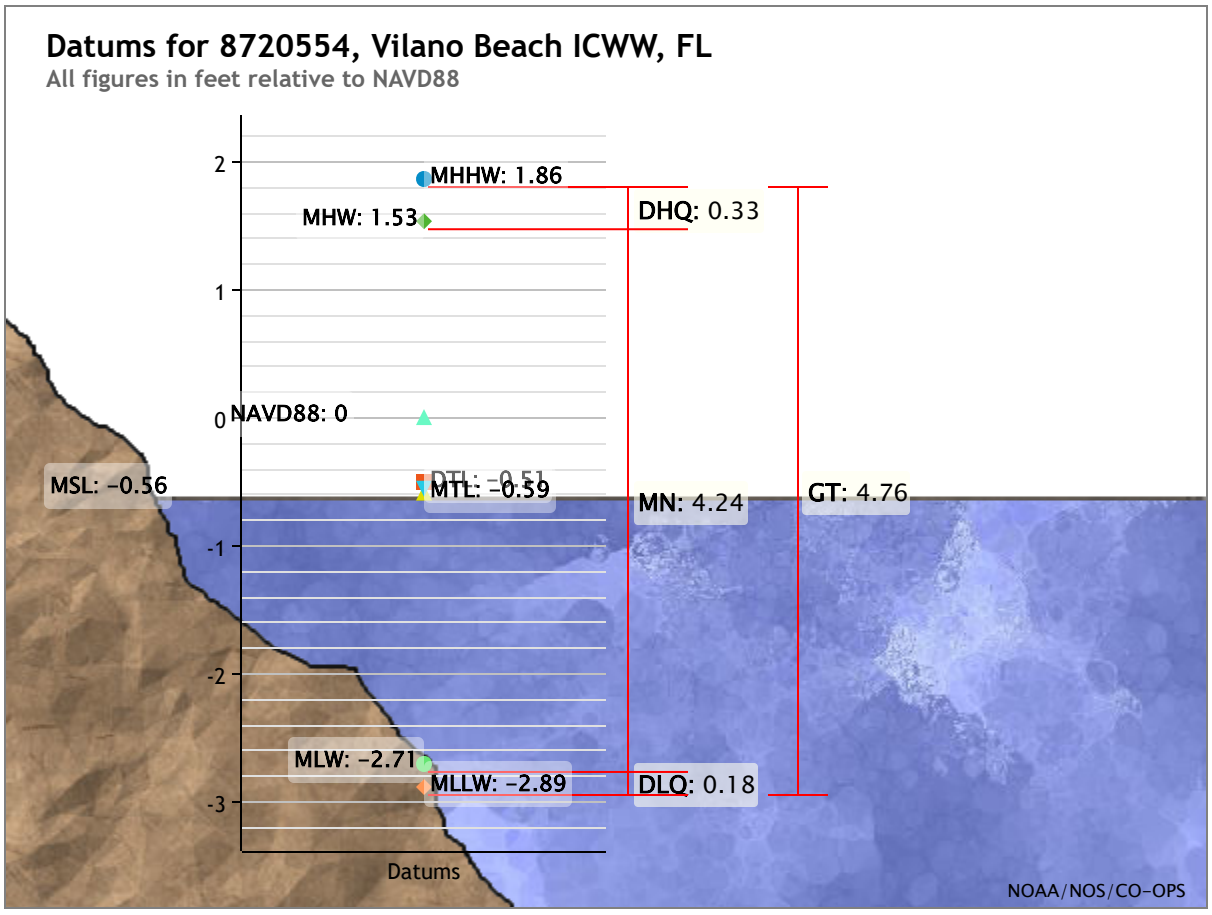
Station: 8720554, Vilano Beach ICWW, FL
Status: Accepted (Aug 23 2011)
Units: Feet
Control Station: 8720218 Mayport (Bar Pilots Dock), FL
T.M.: 75
Epoch: (/datum_options.html#NTDE) 1983-2001
Datum: NAVD88

Datum	Value	Description
MHHW (/datum_options.html#MHHW)	1.86	Mean Higher-High Water
MHW (/datum_options.html#MHW)	1.53	Mean High Water
MTL (/datum_options.html#MTL)	-0.59	Mean Tide Level
MSL (/datum_options.html#MSL)	-0.56	Mean Sea Level
DTL (/datum_options.html#DTL)	-0.51	Mean Diurnal Tide Level
MLW (/datum_options.html#MLW)	-2.71	Mean Low Water
MLLW (/datum_options.html#MLLW)	-2.89	Mean Lower-Low Water
NAVD88 (/datum_options.html)	0.00	North American Vertical Datum of 1988
STND (/datum_options.html#STND)	-0.01	Station Datum
GT (/datum_options.html#GT)	4.76	Great Diurnal Range
MN (/datum_options.html#MN)	4.24	Mean Range of Tide
DHQ (/datum_options.html#DHQ)	0.33	Mean Diurnal High Water Inequality
DLQ (/datum_options.html#DLQ)	0.18	Mean Diurnal Low Water Inequality

Datum	Value	Description
HWI (/datum_options.html#HWI)	1.13	Greenwich High Water Interval (in hours)
LWI (/datum_options.html#LWI)	7.30	Greenwich Low Water Interval (in hours)
Max Tide (/datum_options.html#MAXTIDE)		Highest Observed Tide
Max Tide Date & Time (/datum_options.html#MAXTIDEDT)		Highest Observed Tide Date & Time
Min Tide (/datum_options.html#MINTIDE)		Lowest Observed Tide
Min Tide Date & Time (/datum_options.html#MINTIDEDT)		Lowest Observed Tide Date & Time
HAT (/datum_options.html#HAT)	3.65	Highest Astronomical Tide
HAT Date & Time	10/10/2033 14:42	HAT Date and Time
LAT (/datum_options.html#LAT)	-4.25	Lowest Astronomical Tide
LAT Date & Time	06/05/2035 18:30	LAT Date and Time

Tidal Datum Analysis Periods

10/01/2003 - 07/31/2004



Showing datums for

8720554 Vilano Beach ICW…

Datum

NAVD88

Data Units
- (•) Feet
- ( ) Meters

Epoch
- (•) Present (1983-2001)
- ( ) Superseded (1960-1978)

Submit

Show nearby stations

Products available at 8720554 Vilano Beach ICWW, FL

TIDES/WATER LEVELS

Water Levels

NOAA Tide Predictions (/noaatidepredictions.html?id=8720554)

Harmonic Constituents (/harcon.html?id=8720554)

Sea Level Trends

Datums (/datums.html?id=8720554)

Bench Mark Sheets (/benchmarks.html?id=8720554)

Extreme Water Levels (/est/est_station.shtml?stnid=8720554)

Reports (/reports.html?id=8720554)

METEOROLOGICAL/OTHER

Meteorological Observations

Water Temp/Conductivity

PORTS®

This station is not a member of PORTS®

OPERATIONAL FORECAST SYSTEMS

This station is not a member of OFS

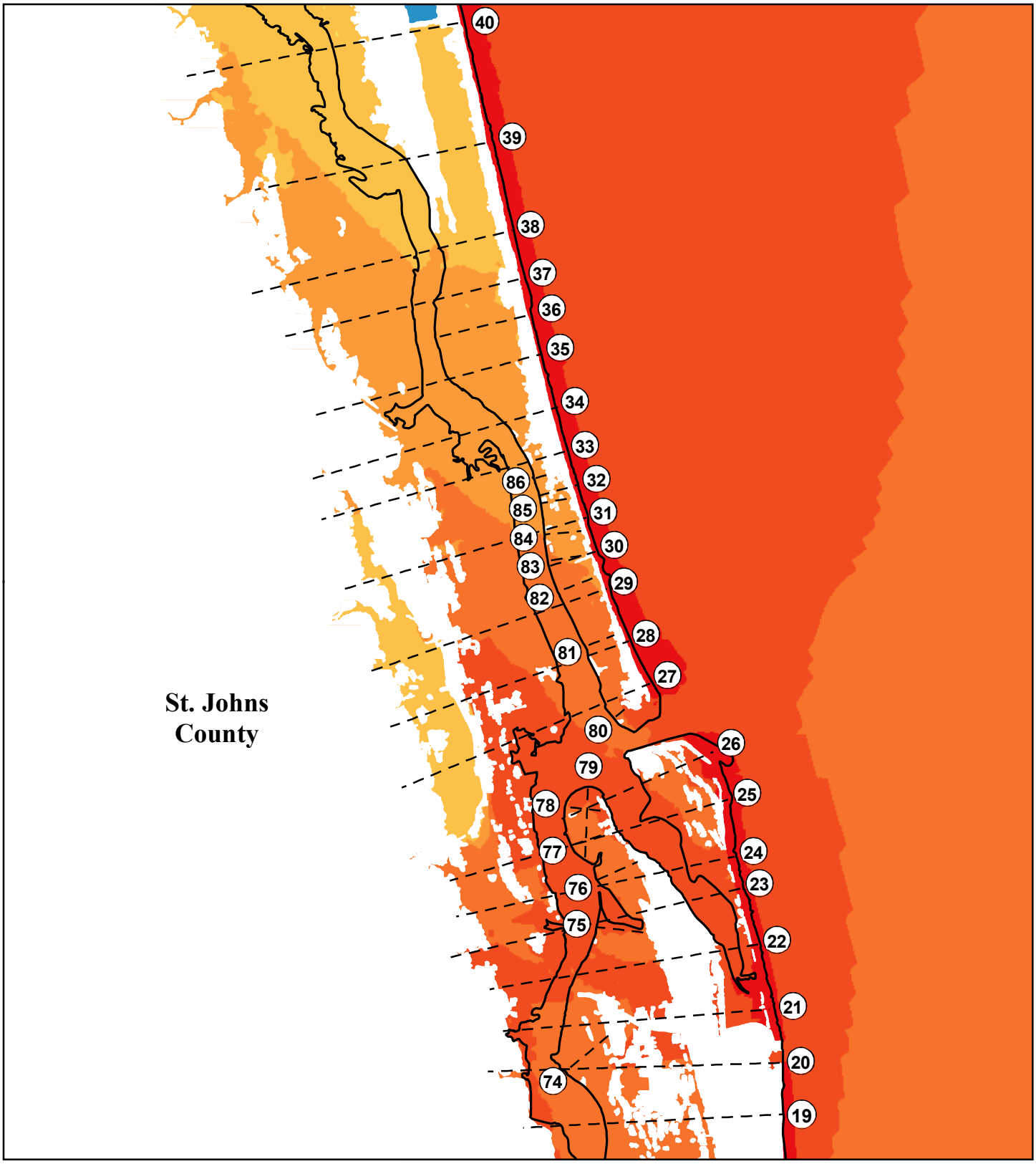
INFORMATION

Station Home Page (/stationhome.html?id=8720554)

Data Inventory (/inventory.html?id=8720554)

Website Owner: Center for Operational Oceanographic Products and Services

Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas, continued



Elevation (Feet, NAVD88)

< 2.5	4.0 - 4.5	6.0 - 6.5
2.5 - 3	4.5 - 5	6.5 - 7
3.0 - 3.5	5.0 - 5.5	7.0 - 7.5
3.5- 4	5.5 - 6	> 7.5

Coastal Transects

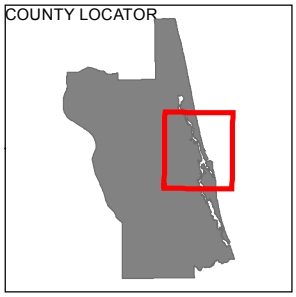
County Boundaries

1 inch = 8,000 feet 1:96,000

0 1,600 3,200 6,400 9,600 12,800 Feet

Map Projection:
State Plane Florida East FIPS 0901;
North American Datum 1983

COUNTY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

1 Percent-Annual-Chance Stillwater Elevation Map

ST. JOHNS COUNTY, FLORIDA

FEMA

Note: This figure displays 1%-annual-chance stillwater elevations (including wave set-up). Overland wave height information is not included. Base Flood Elevations are not displayed.

Table 17: Coastal Transect Parameters, continued

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
		Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Atlantic Ocean	29	18.5	13.6	4.9 3.5 - 4.9	5.3 3.8 - 5.3	6.5 4.8 - 6.5	8.0 5.8 – 8.0	10.4 8.3 - 10.4
Atlantic Ocean	30	18.3	13.6	5.0 4.1 – 5.0	5.4 4.3 - 5.4	6.6 5.3 - 6.6	8.0 6.4 – 8.0	10.4 8.2 - 10.4
Atlantic Ocean	31	18.3	13.6	4.0 3.2 - 4.4	4.1 3.5 - 4.7	6.8 4.3 - 6.8	8.0 5.9 - 8.0	10.4 8.0 - 10.4
Atlantic Ocean	32	18.7	13.6	5.2 4.2 - 5.2	5.6 4.5 - 5.6	6.9 5.5 - 6.9	8.1 6.1 - 8.1	10.4 7.91 - 10.4
Atlantic Ocean	33	18.2	13.0	5.2 4.0 - 5.2	5.5 4.3 - 5.6	6.9 4.5 - 6.9	8.1 6.1 - 8.1	10.5 7.9 - 10.5
Atlantic Ocean	34	18.6	13.0	5.1 3.5 - 5.2	5.5 3.8 - 5.6	6.8 4.7 - 6.9	8.1 6.3 - 8.1	10.5 7.8 - 10.5
Atlantic Ocean	35	18.6	13.1	5.2 3.8 - 5.3	5.6 4.1 - 5.7	6.9 5.1 – 7.0	8.2 6.0 - 8.2	10.5 7.6 - 10.5

Table 17: Coastal Transect Parameters, continued

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
		Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Matanzas River	78	2.1	3.4	4.5 4.4 - 4.5	4.8 4.8 - 4.8	5.6 5.1 - 6.1	6.9 6.9 - 7.2	9.1 9.1 - 9.2
Matanzas River	79	2.8	3.7	4.7 4.6 - 4.7	5.0 4.4 - 5.0	6.2 5.1 - 6.2	7.2 6.7 - 7.2	9.4 9.0 - 9.4
Tolomato River	80	2.9	6.2	4.5 4.5 - 4.5	4.9 4.9 - 4.9	6.0 5.4 – 6.0	6.9 6.7 - 7.2	8.8 8.8 - 9.2
Tolomato River	81	2.7	3.3	4.4 4.2 - 4.4	4.8 4.5 - 5.0	5.9 5.1 - 5.9	6.8 6.5 - 6.8	8.6 8.5 - 8.6
Tolomato River	82	3.0	3.1	4.4 4.1 - 4.5	4.7 4.3 - 4.8	5.8 5.2 - 5.9	6.7 6.3 - 6.7	8.4 8.2 - 8.4
Tolomato River	83	2.3	3.3	4.3 4.1 - 4.3	4.6 4.3 - 4.6	5.7 5.3 - 5.9	6.6 6.4 - 6.6	8.3 8.2 - 8.3
Tolomato River	84	2.8	3.1	4.3 3.9 - 4.3	4.6 4.2 - 4.6	5.7 4.4 - 5.7	6.5 6.1 - 6.5	8.2 8.1 - 8.2

Table 17: Coastal Transect Parameters, continued

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
		Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Tolomato River	85	2.7	3.1	4.3 4.3 - 4.3	4.6 4.5 - 4.6	5.7 4.9 - 5.9	6.5 6.1 - 6.5	8.1 7.9 - 8.1
Tolomato River	86	2.8	3.0	4.2 4.1 - 4.2	4.5 4.4 - 4.5	5.3 5.1 - 5.3	6.3 6.2 - 6.3	8.0 8.0 - 8.0

NOAA Atlas 14, Volume 9, Version 2
Location name: Saint Augustine, Florida, USA*
Latitude: 29.9446°, Longitude: -81.3053°
Elevation: 5 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.547** (0.446-0.658)	**0.621** (0.505-0.747)	**0.736** (0.597-0.888)	**0.827** (0.666-1.00)	**0.944** (0.732-1.18)	**1.03** (0.781-1.31)	**1.11** (0.814-1.45)	**1.19** (0.835-1.61)	**1.28** (0.866-1.79)	**1.35** (0.891-1.94)
10-min	**0.801** (0.653-0.963)	**0.909** (0.739-1.09)	**1.08** (0.873-1.30)	**1.21** (0.976-1.47)	**1.38** (1.07-1.72)	**1.51** (1.14-1.92)	**1.63** (1.19-2.13)	**1.74** (1.22-2.35)	**1.88** (1.27-2.63)	**1.97** (1.30-2.83)
15-min	**0.977** (0.796-1.17)	**1.11** (0.902-1.33)	**1.31** (1.06-1.58)	**1.48** (1.19-1.79)	**1.69** (1.31-2.10)	**1.84** (1.40-2.34)	**1.98** (1.45-2.60)	**2.12** (1.49-2.87)	**2.29** (1.55-3.20)	**2.40** (1.59-3.46)
30-min	**1.46** (1.19-1.76)	**1.66** (1.35-2.00)	**1.97** (1.60-2.38)	**2.21** (1.78-2.68)	**2.54** (1.96-3.16)	**2.77** (2.10-3.52)	**2.99** (2.20-3.92)	**3.21** (2.26-4.34)	**3.48** (2.35-4.87)	**3.66** (2.42-5.26)
60-min	**1.92** (1.57-2.31)	**2.17** (1.77-2.61)	**2.58** (2.09-3.12)	**2.92** (2.35-3.54)	**3.39** (2.64-4.26)	**3.75** (2.86-4.80)	**4.11** (3.02-5.42)	**4.48** (3.16-6.10)	**4.97** (3.37-6.99)	**5.34** (3.53-7.67)
2-hr	**2.39** (1.96-2.85)	**2.69** (2.20-3.21)	**3.20** (2.61-3.83)	**3.63** (2.95-4.37)	**4.24** (3.34-5.31)	**4.73** (3.64-6.03)	**5.23** (3.88-6.87)	**5.75** (4.09-7.80)	**6.46** (4.42-9.06)	**7.01** (4.67-10.0)
3-hr	**2.63** (2.17-3.12)	**2.96** (2.44-3.52)	**3.54** (2.91-4.23)	**4.06** (3.32-4.87)	**4.82** (3.83-6.05)	**5.44** (4.21-6.94)	**6.10** (4.56-8.01)	**6.80** (4.87-9.23)	**7.78** (5.36-10.9)	**8.57** (5.72-12.2)
6-hr	**3.02** (2.51-3.56)	**3.44** (2.86-4.07)	**4.21** (3.49-4.99)	**4.92** (4.06-5.87)	**6.02** (4.84-7.57)	**6.94** (5.44-8.86)	**7.95** (6.00-10.4)	**9.04** (6.54-12.3)	**10.6** (7.37-14.8)	**11.9** (8.00-16.8)
12-hr	**3.41** (2.86-3.99)	**3.97** (3.33-4.65)	**5.00** (4.18-5.88)	**5.98** (4.97-7.07)	**7.50** (6.10-9.43)	**8.81** (6.96-11.2)	**10.2** (7.81-13.4)	**11.8** (8.62-16.0)	**14.1** (9.87-19.6)	**16.0** (10.8-22.4)
24-hr	**3.92** (3.32-4.56)	**4.58** (3.87-5.33)	**5.83** (4.92-6.81)	**7.04** (5.90-8.27)	**8.95** (7.37-11.2)	**10.6** (8.47-13.5)	**12.5** (9.58-16.2)	**14.5** (10.7-19.5)	**17.5** (12.3-24.2)	**19.9** (13.6-27.8)
2-day	**4.62** (3.94-5.33)	**5.33** (4.55-6.16)	**6.71** (5.71-7.79)	**8.07** (6.82-9.41)	**10.2** (8.51-12.8)	**12.2** (9.78-15.3)	**14.3** (11.1-18.5)	**16.6** (12.3-22.3)	**20.1** (14.3-27.7)	**23.0** (15.8-31.9)
3-day	**5.05** (4.34-5.81)	**5.86** (5.03-6.75)	**7.40** (6.32-8.55)	**8.88** (7.54-10.3)	**11.2** (9.34-13.9)	**13.2** (10.7-16.6)	**15.5** (12.0-19.9)	**18.0** (13.4-23.9)	**21.6** (15.4-29.6)	**24.5** (16.9-33.9)
4-day	**5.40** (4.66-6.19)	**6.28** (5.40-7.20)	**7.91** (6.79-9.11)	**9.46** (8.07-11.0)	**11.9** (9.92-14.6)	**14.0** (11.3-17.4)	**16.3** (12.7-20.9)	**18.8** (14.0-24.9)	**22.5** (16.1-30.7)	**25.5** (17.6-35.1)
7-day	**6.30** (5.47-7.18)	**7.22** (6.26-8.24)	**8.93** (7.72-10.2)	**10.5** (9.05-12.1)	**13.0** (11.0-15.9)	**15.2** (12.4-18.8)	**17.6** (13.8-22.4)	**20.1** (15.1-26.5)	**23.9** (17.2-32.4)	**26.9** (18.7-36.9)
10-day	**7.16** (6.25-8.13)	**8.12** (7.07-9.23)	**9.87** (8.57-11.3)	**11.5** (9.93-13.2)	**14.0** (11.8-17.0)	**16.2** (13.2-19.9)	**18.5** (14.6-23.5)	**21.1** (15.9-27.6)	**24.8** (17.9-33.5)	**27.8** (19.4-37.9)
20-day	**9.78** (8.60-11.0)	**11.0** (9.66-12.4)	**13.1** (11.4-14.8)	**14.9** (13.0-17.0)	**17.6** (14.8-20.9)	**19.7** (16.2-23.9)	**22.0** (17.4-27.4)	**24.4** (18.4-31.5)	**27.7** (20.1-37.0)	**30.4** (21.3-41.2)
30-day	**12.0** (10.6-13.4)	**13.5** (11.9-15.1)	**15.9** (14.0-17.9)	**18.0** (15.7-20.4)	**20.9** (17.6-24.5)	**23.1** (19.0-27.7)	**25.4** (20.1-31.4)	**27.7** (21.0-35.4)	**30.9** (22.4-40.8)	**33.3** (23.4-44.9)
45-day	**14.7** (13.1-16.4)	**16.6** (14.7-18.5)	**19.5** (17.3-21.9)	**22.0** (19.3-24.8)	**25.2** (21.3-29.4)	**27.7** (22.9-32.9)	**30.1** (23.9-36.9)	**32.5** (24.6-41.2)	**35.6** (25.9-46.7)	**37.9** (26.8-50.9)
60-day	**17.0** (15.2-18.9)	**19.2** (17.1-21.4)	**22.6** (20.1-25.3)	**25.4** (22.4-28.6)	**29.1** (24.6-33.7)	**31.8** (26.3-37.6)	**34.4** (27.4-42.0)	**36.9** (28.1-46.6)	**40.1** (29.2-52.5)	**42.4** (30.1-56.9)

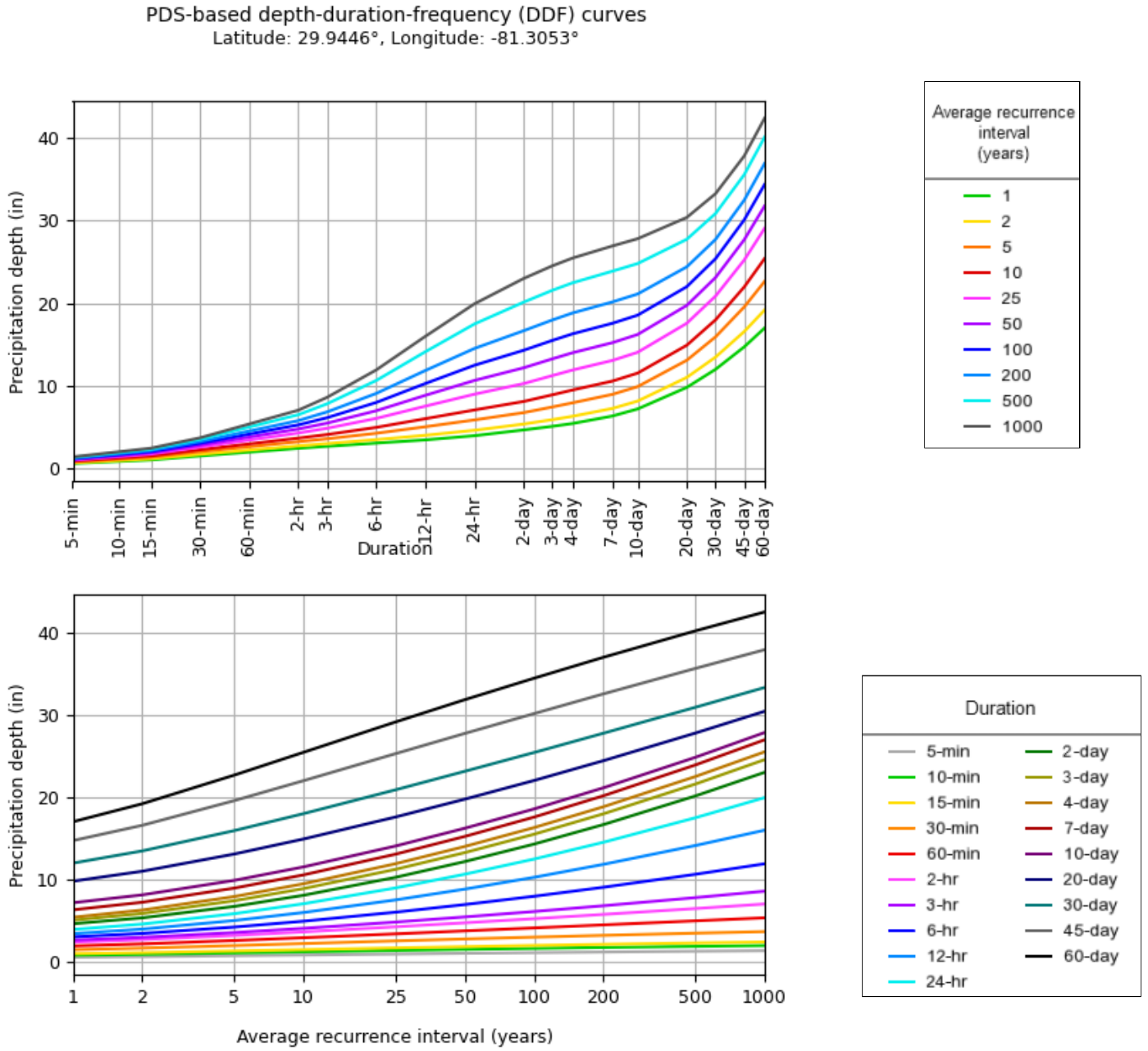
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



NOAA Atlas 14, Volume 9, Version 2

Created (GMT): Fri Dec 15 04:01:06 2023

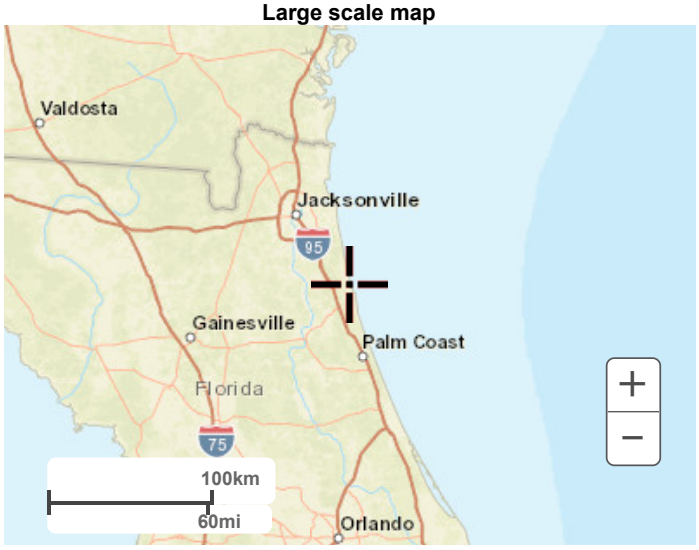
Back to Top

Maps & aerials

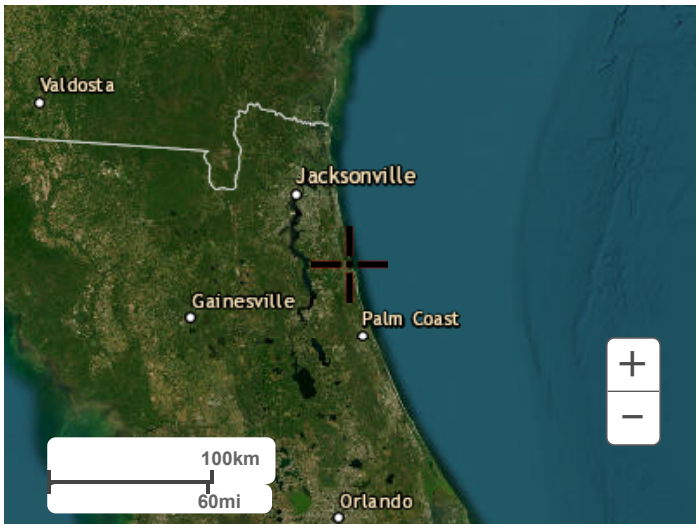
Small scale terrain

Large scale terrain

Large scale map



Large scale aerial



Back to Top

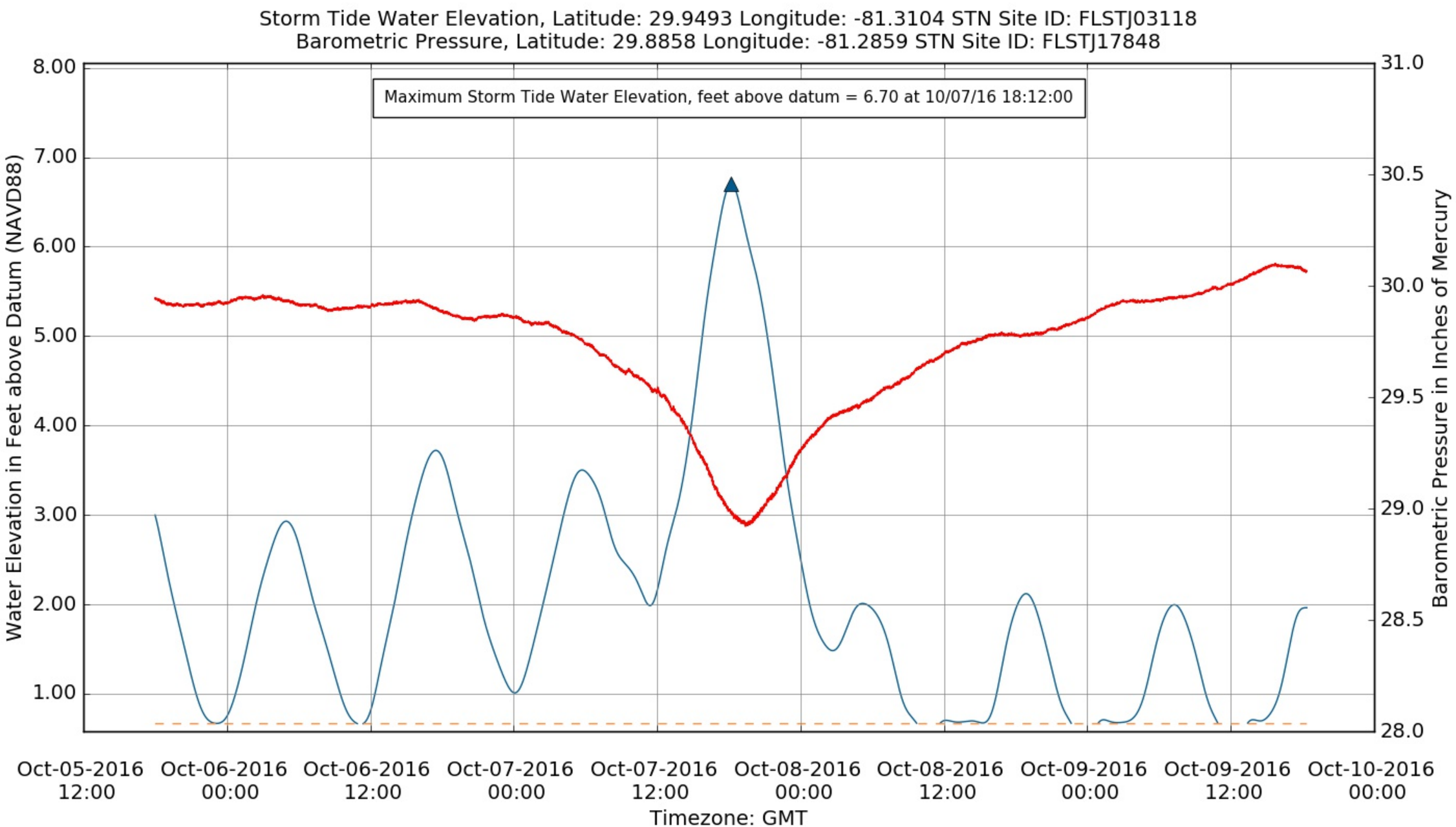
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

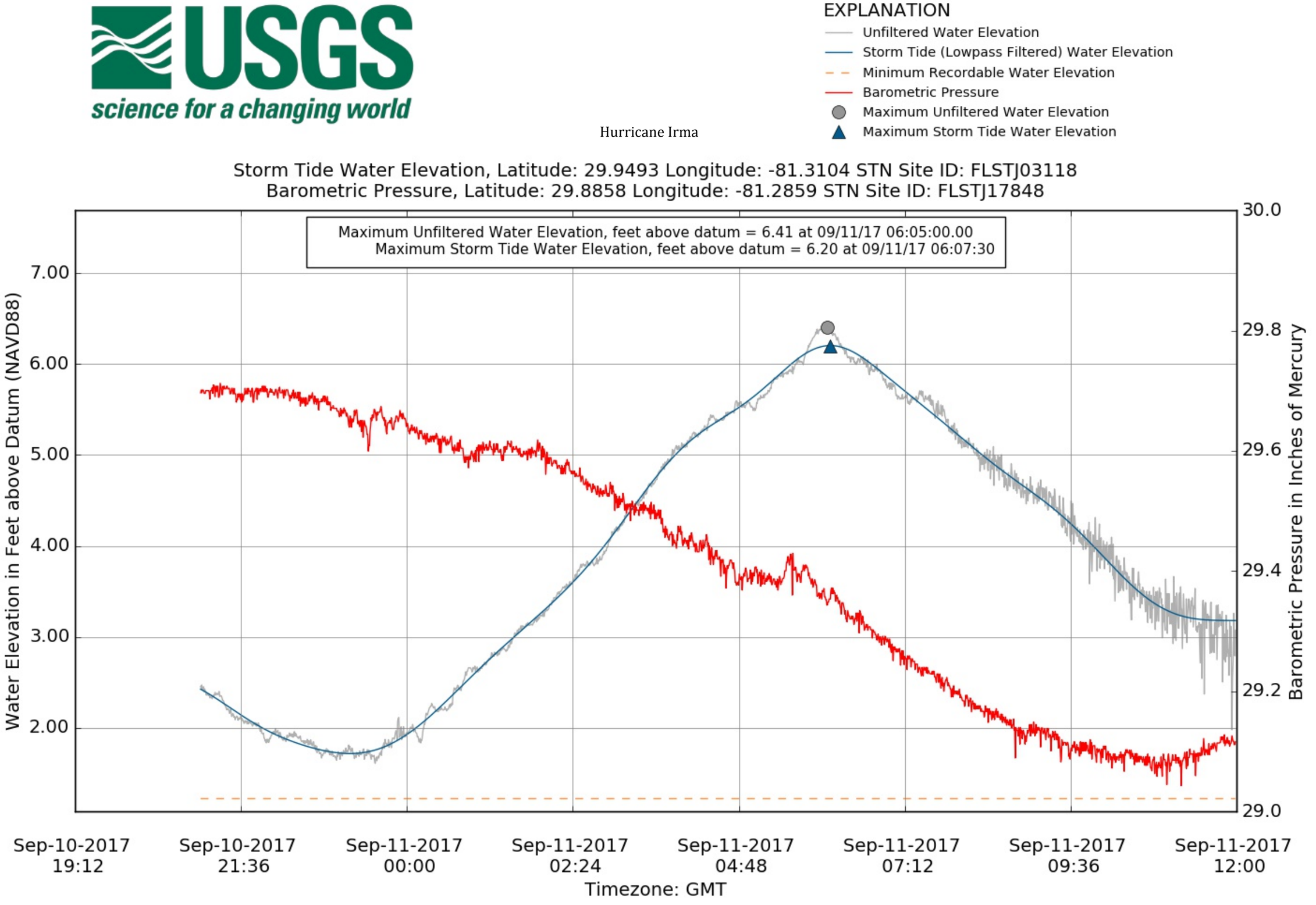
EXPLANATION

- Storm Tide (Lowpass Filtered) Water Elevation
- Minimum Recordable Water Elevation
- Barometric Pressure
- Maximum Storm Tide Water Elevation

Hurricane Matthew



Hurricane Irma



AS-BUILT SURVEY PREPARED BY:

DRMP
ENGINEERS • SURVEYORS • PLANNERS • SCIENTISTS
Certificate of Authorization No. 2648
4540 Southside Blvd., Suite 1001, Jacksonville, Florida 32216

"AS-BUILT"

MATCHLINE (SEE SHEET 7)

16th Street (60' RIGHT-OF-WAY)
17th Street (60' RIGHT-OF-WAY)
Boating Club Road (60' RIGHT-OF-WAY)
Laurel Street (50' RIGHT-OF-WAY)
Myrtle Street (50' RIGHT-OF-WAY)

INTRACOASTAL WATERWAY
MEAN HIGH TIDE = ±1.46

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

PHASE 1 CONSTRUCTION TO INCLUDE:
STR. 17-77
STR. 17-76
REMOVE EX. 24" CMP/EX. INLET
40 L.F. BOX CULVERT

39.1 LF
40 L.F. ~ 3'x10' BOX CULVERT @ 0.25% SLOPE

REMOVE 24" CMP TO WEST AND REMOVE EXIST. INLET
EXISTING DRAINAGE STRUCTURES AND PIPE TO BE REMOVED
10x30 TEMPORARY CONSTRUCTION EASEMENT
REMOVE & REPLACE 31 S.Y. ~ CONC. DRIVEWAY
REMOVE & REPLACE 41 S.Y. ~ CONC. DRIVEWAY
REMOVE & REPLACE 39 S.Y. ~ CONC. DRIVEWAY
REMOVE & REPLACE 38 S.Y. ~ CONC. DRIVEWAY
REMOVE & REPLACE 33 S.Y. ~ CONC. DRIVEWAY
REMOVE & REPLACE 40 S.Y. ~ CONC. DRIVEWAY

STA. 151+50.26 @ SIXTEENTH STREET = STA. 1018+19.87 @ LAUREL STREET
STA. 2018+19.66 @ MYRTLE STREET = STA. 156+00.00 @ SIXTEENTH STREET
STA. 130+50.15 @ SEVENTEENTH STREET = STA. 1015+59.85 @ LAUREL STREET
STA. 2015+59.65 @ MYRTLE STREET = STA. 135+00.00 @ SEVENTEENTH STREET
STA. 105+50.00 @ BOATING CLUB ROAD = STA. 1012+99.83 @ LAUREL STREET

FLOATING TURBIDITY BARRIER
5' T.C.E.

CONTRACTOR'S CERTIFICATION

DATE:

INFORMATION PROVIDED BY:
PETTICOAT CONTRACTING, INC.
11025 BLASIUS ROAD
ST. AUGUSTINE, FL 32226
(904) 751-0888

I HEREBY CERTIFY THAT THE MATERIALS AND QUANTITIES USED IN THE CONSTRUCTION OF THE STORM AND DRAINAGE SYSTEM ARE IN ACCORDANCE WITH THE APPROVED PLANS AND SJCUD SPECIFICATIONS, UNLESS OTHERWISE APPROVED BY THE SJCUD.

Clyde Cross
CONTRACTOR'S SIGNATURE
CUC053980
CONTRACTOR'S STATE LICENSE NUMBER

SURVEYOR'S NOTES

1. LAST DATE OF FIELD WORK: 4-18-07
2. ADDITIONS OR DELETIONS TO THIS MAP ARE PROHIBITED WITHOUT THE WRITTEN CONSENT OF DRMP, INC.
3. AS-BUILT INFORMATION SHOWN HEREON IN BOLD LINEWORK AND TEXT. ALL OTHER INFORMATION IS BASED ON PROPOSED CONSTRUCTION PLANS PREPARED BY CONNELLY & WICKER INC..
4. ELEVATIONS SHOWN HEREON ARE RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 AND ARE BASED ON TBM 18 DESCRIBED AS RAILROAD SPIKE IN 30" OAK TREE NEAR THE SOUTHEAST CORNER OF MYRTLE STREET AND EUCLID AVENUE. ELEVATION=5.58'

SURVEYOR'S CERTIFICATION

I HEREBY CERTIFY THAT THE STORM AND DRAINAGE SYSTEM ARE AT THE HORIZONTAL AND VERTICAL LOCATIONS AS SHOWN ON THESE "AS-BUILT" DRAWINGS AND MEET THE MINIMUM TECHNICAL STANDARDS SET FORTH BY THE BOARD OF PROFESSIONAL SURVEYORS AND MAPPERS IN CHAPTER 61G17-6, FLORIDA ADMINISTRATIVE CODE, PURSUANT TO SECTION 472.027 FLORIDA STATUTES.

4/19/07

WILLIAM J. MELROSE IV, P.S.M.
FLORIDA REGISTRATION NO. LS 5843
NOT VALID WITHOUT THE SIGNATURE AND ORIGINAL RAISED SEAL OF THE SIGNING FLORIDA LICENSED SURVEYOR AND MAPPER

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
8/12/06	LML	PHASE 1 CONSTRUCTION REVISION			

Connelly & Wicker Inc.
Consulting Engineers
10060 Skinner Lake Dr., Suite 500 Jacksonville, Florida 32246
904.265.3030 EB No. B: 30003650 Fax 904.265.3031

Engineer of Record:
Richard C. Welch, P.E.
FL PE No. 40279

ST. JOHNS COUNTY
NORTH BEACH
DRAINAGE IMPROVEMENTS

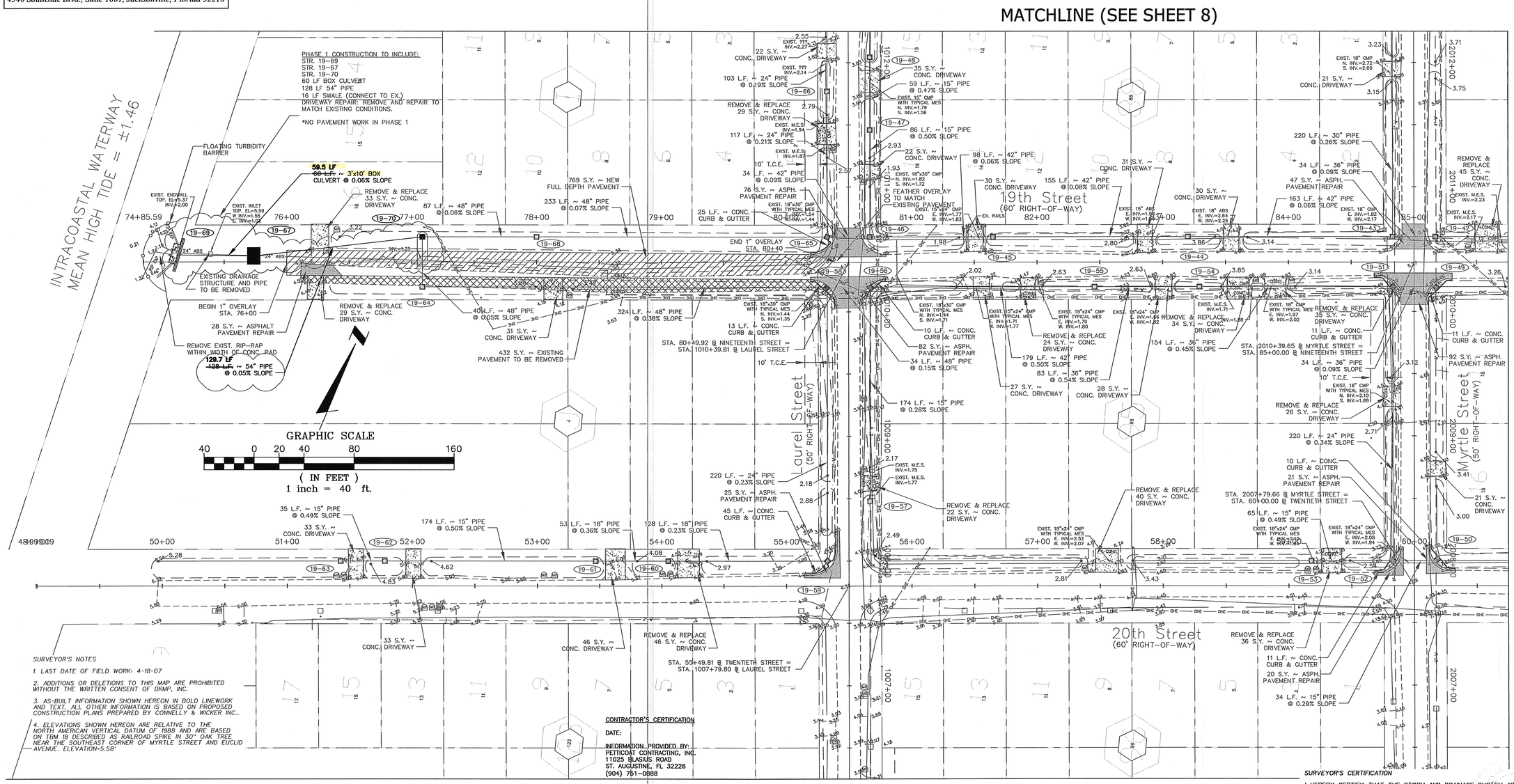
"AS-BUILT" PLAN SHEET

SHEET NO. 6

AS-BUILT SURVEY PREPARED BY:

DRMP
ENGINEERS • SURVEYORS • PLANNERS • SCIENTISTS
Certificate of Authorization No. 2648
4540 Southside Blvd., Suite 1001, Jacksonville, Florida 32216

"AS-BUILT"



SURVEYOR'S NOTES

1. *LAST DATE OF FIELD WORK: 4-18-07*
2. *ADDITIONS OR DELETIONS TO THIS MAP ARE PROHIBITED WITHOUT THE WRITTEN CONSENT OF DRMP, INC.*
3. *AS-BUILT INFORMATION SHOWN HEREON IN BOLD LINEWORK AND TEXT. ALL OTHER INFORMATION IS BASED ON PROPOSED CONSTRUCTION PLANS PREPARED BY CONNELLY & WICKER INC..*
4. *ELEVATIONS SHOWN HEREON ARE RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 AND ARE BASED ON TBM 18 DESCRIBED AS RAILROAD SPIKE IN 30" OAK TREE NEAR THE SOUTHEAST CORNER OF MYRTLE STREET AND EUCLID AVENUE. ELEVATION=5.58'*

CONTRACTOR'S CERTIFICATION

DATE:

INFORMATION PROVIDED BY:
PETTICOAT CONTRACTING, INC.
11025 BLASIUS ROAD
ST. AUGUSTINE, FL 32226
(904) 751-0888

I HEREBY CERTIFY THAT THE MATERIALS AND QUANTITIES USED IN THE CONSTRUCTION OF THE STORM AND DRAINAGE SYSTEM ARE IN ACCORDANCE WITH THE APPROVED PLANS AND SJCUD SPECIFICATIONS, UNLESS OTHERWISE APPROVED BY THE SJCUD.

Clyde Cron
CONTRACTOR'S SIGNATURE
CUC053980
CONTRACTOR'S STATE LICENSE NUMBER

SURVEYOR'S CERTIFICATION

I HEREBY CERTIFY THAT THE STORM AND DRAINAGE SYSTEM ARE AT THE HORIZONTAL AND VERTICAL LOCATIONS AS SHOWN ON THESE "AS-BUILT" DRAWINGS AND MEET THE MINIMUM TECHNICAL STANDARDS SET FORTH BY THE BOARD OF PROFESSIONAL SURVEYORS AND MAPPERS IN CHAPTER 61G17-6, FLORIDA ADMINISTRATIVE CODE, PURSUANT TO SECTION 472.027 FLORIDA STATUTES.

4/19/07

WILLIAM J. MELROSE IV, P.S.M.
FLORIDA REGISTRATION NO. LS 5843
NOT VALID WITHOUT THE SIGNATURE AND ORIGINAL RAISED SEAL OF THE SIGNING FLORIDA LICENSED SURVEYOR AND MAPPER

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
8-12-06	LML	REVISION TO OUTFALL SYSTEM (60" PIPE AND PHASING)			
9-13-06	RCW	REVISION TO PIPE SIZE AND SLOPE			

Connelly & Wicker Inc.
Consulting Engineers
10060 Skinner Lake Dr., Suite 500 Jacksonville, Florida 32246
904.265.3030 EB No. B: 30003650 Fax 904.265.3031
Engineer of Record: Richard C. Welch, P.E. FL PE No. 40279

ST. JOHNS COUNTY
NORTH BEACH
DRAINAGE IMPROVEMENTS

"AS-BUILT"
PLAN SHEET

SHEET NO. 6

INTRACOASTAL WATERWAY
MEAN HIGH TIDE = ±1.46

Sixteenth Street (60' RIGHT-OF-WAY)

Laurel Street (50' RIGHT-OF-WAY)

Myrtle Street (50' RIGHT-OF-WAY)

Seventeenth Street (60' RIGHT-OF-WAY)

Boating Club Road (60' RIGHT-OF-WAY)

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

148+37.82 149+00 150+00 151+00 152+00 153+00 154+00 155+00 156+00 157+00 158+00

126+57.54 127+00 128+00 129+00 132+00 133+00 134+00 135+00 136+00 137+00

100+71.99 101+00 102+00 103+00 104+00 107+00 108+00 109+00 110+00 111+00 112+00

2019+00 2018+00 2017+00 2016+00 2015+00 2014+00 2013+00 2012+00

132 L.F. ~ 15" PIPE @ 0.50% SLOPE

86 L.F. ~ 15" PIPE @ 0.20% SLOPE

69 L.F. ~ 18" PIPE @ 0.36% SLOPE

STA. 151+50.26 @ SIXTEENTH STREET = STA. 1018+19.87 @ LAUREL STREET

STA. 2018+19.66 @ MYRTLE STREET = STA. 156+00.00 @ SIXTEENTH STREET

37 L.F. ~ 15" PIPE @ 0.24% SLOPE

192 L.F. ~ 24" PIPE @ 0.35% SLOPE

166 L.F. ~ 18" PIPE @ 0.30% SLOPE

34 L.F. ~ 48" PIPE @ 0.06% SLOPE

165 L.F. ~ 48" PIPE @ 0.10% SLOPE

EXIST. ENDWALL TOP. EL=4.97 INV.=1.50

EXIST. INLET TOP. EL=3.87 W. INV.=0.99 E. INV.=1.14

59 L.F. ~ 3'x10' BOX CULVERT @ 0.17% SLOPE

303 L.F. ~ 54" PIPE @ 0.04% SLOPE

34 L.F. ~ 54" PIPE @ 0.06% SLOPE

EXIST. INLET TOP. EL=3.62 S. INV.=1.48 (15" CMP) E. INV.=1.50 (15" CMP)

155 L.F. ~ 54" PIPE @ 0.04% SLOPE

EXIST. INLET TOP. EL=3.75 S. INV.=1.50 E. INV.=1.50 (15" CMP)

EXIST. INLET TOP. EL=3.91 E. INV.=1.75 W. INV.=1.75

260 L.F. ~ 54" PIPE @ 0.04% SLOPE

EXIST. INLET TOP. EL=4.92 E. INV.=1.92 W. INV.=1.58

EXIST. INLET TOP. EL=4.89 S. INV.=2.43 W. INV.=1.92

EXIST. ??? E. INV.=2.09 W. INV.=1.89

20 L.F. ~ 48" PIPE @ 0.20% SLOPE

FLOATING TURBIDITY BARRIER

302 L.F. ~ 48" PIPE @ 0.04% SLOPE

STA. 130+50.15 @ SEVENTEENTH STREET = STA. 1015+59.85 @ LAUREL STREET

42 L.F. ~ 42" PIPE @ 0.07% SLOPE

112 L.F. ~ 42" PIPE @ 0.13% SLOPE

113 L.F. ~ 42" PIPE @ 0.05% SLOPE

97 L.F. ~ 42" PIPE @ 0.05% SLOPE

90 L.F. ~ 42" PIPE @ 0.14% SLOPE

36 L.F. ~ 42" PIPE @ 0.06% SLOPE

210 L.F. ~ 42" PIPE @ 0.04% SLOPE

STA. 2015+59.65 @ MYRTLE STREET = STA. 135+00.00 @ SEVENTEETH STREET

5' T.C.E.

180 L.F. ~ 15" PIPE @ 0.50% SLOPE

220 L.F. ~ 24" PIPE @ 0.13% SLOPE

52 L.F. ~ 15" PIPE @ 0.23% SLOPE

43 L.F. ~ 15" PIPE @ 0.23% SLOPE

110 L.F. ~ 18" PIPE @ 0.18% SLOPE

132 L.F. ~ 24" PIPE @ 0.11% SLOPE

EXIST. INLET TOP. EL=3.65 S. INV.=1.74 (15" CMP) E. INV.=1.87 (15" CMP) W. INV.=1.54 (15" CMP)

EXIST. 12" CMP E. INV.=2.50 W. INV.=2.53

EXIST. 15" CMP E. INV.=2.50

EXIST. INLET TOP. EL=3.76 S. INV.=1.52 (15" CMP) W. INV.=1.52

30 L.F. ~ 15" PIPE @ 0.27% SLOPE

97 L.F. ~ 15" PIPE @ 0.23% SLOPE

220 L.F. ~ 24" PIPE @ 0.12% SLOPE

EXIST. 12" CMP E. INV.=1.92 W. INV.=2.28

EXIST. M.E.S. INV.=1.93

EXIST. 18" ABS E. INV.=??

UD TO CATCH BASIN CANNOT ACCESSE TOP. EL=3.83

EXIST. M.E.S. INV.=1.99

EXIST. 15" CMP E. INV.=2.01 W. INV.=2.01

EXIST. M.E.S. INV.=1.87

EXIST. M.E.S. INV.=2.00

EXIST. 15" CMP E. INV.=2.07 W. INV.=2.13

EX. RAILS

EXIST. 15" CMP E. INV.=2.34 W. INV.=2.44

EXIST. 12" CMP E. INV.=2.57 W. INV.=2.51

EXIST. ??? TOP.=4.40

STA. 105+50.00 @ BOATING CLUB ROAD = STA. 1012+99.83 @ LAUREL STREET

STA. 2012+99.65 @ MYRTLE STREET = STA. 110+00.00 @ BOATING CLUB ROAD

MATCHLINE (SEE SHEET 7)

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Connelly & Wicker Inc.
Consulting Engineers
1711 South 5th Street Jacksonville Beach, FL 32250-4040
904.249.7995 EB No. B: 30003650 Fax 904.241.1126

Engineer of Record:
Timothy A. Focht, P.E.
FL PE No. 60810

ST. JOHNS COUNTY
NORTH BEACH DRAINAGE IMPROVEMENTS

PLAN SHEET

SHEET NO. 6

48328-3

STORM SEWER STRUCTURE TABLE

STR. No.	TYPE	TOP ELEV.	INVERTS	STATION OFFSET	REMARKS
17-1	TYPE "C" INLET	3.91	(W) = 0.65	188+93.02, 19.72' RT	FDOT INDEX 232; CAST IRON GRATE
17-2	TYPE "C" INLET	3.33	(W) = 0.27, (E) = 0.52	188+37.31, 19.66' RT	FDOT INDEX 232; CAST IRON GRATE
17-3	TYPE "C" INLET	3.20	(E) = 0.09, (S) = -0.41	187+16.69, 19.51' RT	FDOT INDEX 232; CAST IRON GRATE
17-4	TYPE "E" INLET	3.61	(N&W) =-0.74	165+16.73, 20.50' LT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT = 3.11
17-5	TYPE "C" INLET	4.07	(E) = 0.09	162+78.22, 20.81' LT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT = 3.57
17-6	TYPE "C" INLET	3.50	(E&W) = -0.12	163+85.19, 20.67' LT	FDOT INDEX 232; CAST IRON GRATE
17-7	CURB INLET	4.71	(S) = -1.35, (W) = -0.30, (E) = -0.80	164+84.04, 20.54' LT	12" SLOT = 2.71
17-8	TYPE "C" INLET	4.33	(W) = 1.23	167+15.23, 19.76' RT	FDOT INDEX 232; CAST IRON GRATE
17-9	TYPE "C" INLET	3.49	(E) = 0.24, (W) = -0.01	165+16.78, 19.50' RT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT = 2.99
17-10	CURB INLET	4.66	(E) = -0.22, (W) = -0.47	144+16.82, 20.47' LT	12" SLOT = 2.55
17-11	TYPE "C" INLET	3.65	(E) = 0.89	162+83.84, 19.20' RT	FDOT INDEX 232; CAST IRON GRATE
17-12	CURB INLET	4.66	(N) = -1.35, (S) = -1.85, (E) = -0.35, (W) = -0.10	164+82.78, 19.46' RT	12" SLOT = 3.10
17-13	TYPE "E" INLET	2.84	(N&S) = -2.01	4016+93.05, 16.73' LT	FDOT INDEX 232; CAST IRON GRATE
17-14	TYPE "C" INLET	3.98	(W) = -2.09, (E) = -0.54, (N) = -2.09	143+82.82, 20.51' LT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 5.5'x4.5', 12" SLOT = 3.08
17-15	TYPE "C" INLET	14.94	(W) = 10.54	121+96.53, 20.05' LT	FDOT INDEX 232; CAST IRON GRATE
17-16	TYPE "C" INLET	12.81	(W) = 8.50, (E) = 10.07	121+02.10, 20.18' LT	FDOT INDEX 232; CAST IRON GRATE
17-17	TYPE "C" INLET	10.97	(E) = 8.23, (W) = 3.39	120+48.72, 20.26' LT	FDOT INDEX 232; CAST IRON GRATE
17-18	MANHOLE	5.86	(N&E) = 2.74	119+16.91, 20.44' LT	FDOT INDEX 200 & 201
17-19	TYPE "C" INLET	3.88	(N) = 0.90, (S) = 1.15	4013+94.94, 17.31' RT	FDOT INDEX 232; CAST IRON GRATE
17-20	CURB INLET	4.65	(W) = 0.09, (E) = 0.84, (S) = 0.59	144+16.87, 19.53' RT	12" SLOT = 3.59
17-21	TYPE "C" INLET	7.63	(W) = 2.83	146+08.10, 20.21' LT	FDOT INDEX 232; CAST IRON GRATE
17-22	TYPE "C" INLET	5.27	(W) = 0.42, (E) = 2.52	145+45.30, 20.30' LT	FDOT INDEX 232; CAST IRON GRATE
17-23	TYPE "C" INLET	7.62	(W) = 2.76	146+03.90, 19.78' RT	FDOT INDEX 232; CAST IRON GRATE
17-24	TYPE "C" INLET	5.21	(W) = 1.46, (E) = 2.46	145+43.73, 19.70' RT	FDOT INDEX 232; CAST IRON GRATE
17-25	TYPE "E" INLET	2.84	(W) = -2.17, (E) = -1.17	143+82.87, 19.49' RT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT = 2.34
17-25B	MANHOLE	2.75	(E&W) = -2.30	141+74.87, 19.21' RT	FDOT INDEX 200 & 201
17-26	TYPE "C" INLET	4.10	(E&W) = -2.21	141+50.39, 20.83' LT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 5.5'x4', 12" SLOT = 2.75
17-27	TYPE "C" INLET	3.04	(S) = 0.29	3016+68.27, 17.15' RT	FDOT INDEX 232; CAST IRON GRATE
17-28	TYPE "C" INLET	3.96	(E&W) = -2.30, (N) = -0.05	139+66.82, 21.07' LT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 5.5'x4', 12" SLOT = 3.46
17-29	TYPE "C" INLET	3.31	(E) = 0.48	112+97.48, 20.47' LT	FDOT INDEX 232; CAST IRON GRATE
17-30	CURB INLET	4.41	(W) = -0.19, (E) = -0.44	114+35.50, 20.52' LT	12" SLOT = 2.57
17-31	TYPE "C" INLET	3.07	(W) = 0.33	117+62.69, 20.65' LT	FDOT INDEX 232; CAST IRON GRATE
17-32	TYPE "C" INLET	3.54	(E&W) = 0.13	116+70.46, 20.78' LT	FDOT INDEX 232; CAST IRON GRATE
17-33	TYPE "C" INLET	3.42	(W) = -0.38, (E) = -0.13	115+32.58, 20.97' LT	FDOT INDEX 232; CAST IRON GRATE
17-34	CURB INLET	4.00	(E&W) = -0.50, (N) = -1.00	114+66.91, 21.06' LT	12" SLOT = 2.75
17-35	TYPE "C" INLET	2.99	(N) = -1.62, (S) = -1.12	3014+16.93, 17.21' RT	FDOT INDEX 232; CAST IRON GRATE
17-36	CURB INLET	4.89	(E&W) = -2.44, (S) = -1.94	139+66.86, 18.93' RT	12" SLOT = 3.26
17-37	TYPE "C" INLET	4.01	(E) = 1.26	157+22.97, 20.40' LT	FDOT INDEX 232; CAST IRON GRATE
17-38	TYPE "C" INLET	4.03	(E&W) = 1.09	158+09.91, 20.44' LT	FDOT INDEX 232; CAST IRON GRATE
17-39	TYPE "C" INLET	4.22	(E&W) = 0.92	158+81.35, 20.47' LT	FDOT INDEX 232; CAST IRON GRATE
17-40	CURB INLET	5.13	(W) = 0.57, (S) = 0.32	160+32.79, 20.54' LT	12" SLOT = 3.51
17-41	TYPE "C" INLET	3.76	(N&S) = 0.20	3017+77.14, 16.84' LT	FDOT INDEX 232; CAST IRON GRATE
17-42	TYPE "C" INLET	4.25	(N) = 0.13, (S) = -0.37	3017+39.34, 16.85' LT	FDOT INDEX 232; CAST IRON GRATE
17-43	TYPE "C" INLET	3.97	(W) = -2.86, (E) = -2.36, (N) = -0.86	139+32.79, 20.53' LT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 6'x4', 12" SLOT = 3.47

STORM SEWER STRUCTURE TABLE

STR. No.	TYPE	TOP ELEV.	INVERTS	STATION OFFSET	REMARKS
17-44	TYPE "C" INLET	3.98	(E&W) = -2.92	137+86.35, 20.47' LT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 6'x4'
17-45	CURB INLET	5.14	(W) = -2.97, (E) = -2.47	139+31.99, 19.46' RT	12" SLOT = 3.45
17-46	TYPE "C" INLET	4.20	(E&W) = -3.15	137+27.49, 19.56' RT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 5.5'x4'
17-47	TYPE "C" INLET	4.64	(E&W) = -2.97	136+82.65, 20.42' LT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 6'x4'
17-48	TYPE "C" INLET	2.94	(SW) = 0.19	2017+60.27, 17' RT	FDOT INDEX 232; CAST IRON GRATE
17-49	TYPE "C" INLET	4.52	(E&W) = -3.13	135+16.99, 20.35' LT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 6'x4', 12" SLOT = 4.05
17-50	TYPE "C" INLET	3.79	(E) = 0.68	108+88.10, 20.31' LT	FDOT INDEX 232; CAST IRON GRATE
17-51	CURB INLET	5.00	(E&W) = 0.46	109+85.47, 20.34' LT	12" SLOT = 3.94
17-52	TYPE "C" INLET	4.90	(W) = 0.38, (N) = -0.37	110+16.98, 20.36' LT	FDOT INDEX 232; CAST IRON GRATE W/ FLUME, 12" SLOT = 3.19
17-54	CURB INLET	5.47	(E&W) = -3.23, (S) = -0.63	135+17.01, 19.65' RT	12" SLOT = 4.43 TYPE "J" BOT., ALT. B, 5.5'x4'
17-55	TYPE "C" INLET	4.05	(S) = -0.15, (NE) = 0.10	2017+44.81, 17' LT	FDOT INDEX 232; CAST IRON GRATE
17-56	TYPE "C" INLET	5.33	(N) = -0.65, (W) = -3.65, (E) = -3.15	134+82.98, 20.34' LT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 6.5'x4' W/ FLUME, 12" SLOT = 3.71
17-57	TYPE "C" INLET	2.73	(E&W) = -3.75	132+21.51, 20.23' LT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 6.5'x4'
17-58	CURB INLET	5.32	(E&W) = -3.25	134+81.06, 19.66' RT	12" SLOT = 3.94 TYPE "J" BOT., ALT. B, 5.5'x4'
17-59	TYPE "C" INLET	4.16	(E&W) = -3.30	133+83.69, 19.70' RT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 5.5'x4'
17-60	TYPE "C" INLET	2.99	(E&W) = -3.43	131+78.98, 19.79' RT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 5.5'x4'
17-61	TYPE "C" INLET	3.20	(E&W) = -3.49	130+67.15, 19.84' RT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 5.5'x4'
17-62	CURB INLET	4.10	(E&W) = -3.63, (S) = -1.38	1013+58.82, 17' RT	12" SLOT = 2.67
17-63	TYPE "C" INLET	2.42	(N) = -0.48	101+92.69, 20.03' LT	FDOT INDEX 232; CAST IRON GRATE
17-64	TYPE "C" INLET	2.69	(E) = -0.06	102+36.61, 20.05' LT	FDOT INDEX 232; CAST IRON GRATE
17-65	TYPE "C" INLET	2.76	(E&W) = -0.16	102+36.61, 20.05' LT	FDOT INDEX 232; CAST IRON GRATE
17-66	TYPE "C" INLET	2.71	(W) = -0.28, (E) = -0.53	102+89.25, 20.07' LT	FDOT INDEX 232; CAST IRON GRATE
17-67	TYPE "C" INLET	2.61	(W) = -0.73, (E) = -1.23	103+99.32, 20.12' LT	FDOT INDEX 232; CAST IRON GRATE
17-68	CURB INLET	3.98	(N&W) = -1.37	105+33.03, 20.17' LT	12" SLOT = 2.79
17-69	CURB INLET	3.98	(E&W) = -3.66, (S) = -1.66	130+33.15, 19.85' RT	12" SLOT = 2.40
17-70	TYPE "C" INLET	3.69	(N&E) = -3.78	128+26.05, 19.94' RT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 6'x6'
17-71	TYPE "C" INLET	4.25	(W) = 1.02	153+03.20, 20.20' LT	FDOT INDEX 232; CAST IRON GRATE
17-72	TYPE "C" INLET	3.35	(E) = 0.36, (S) = 0.11	151+68.78, 20.14' LT	FDOT INDEX 232; CAST IRON GRATE
17-73	TYPE "C" INLET	2.86	(N) = -0.14, (S) = -0.64	1017+69.33, 17' RT	FDOT INDEX 232; CAST IRON GRATE
17-74	TYPE "C" INLET	2.88	(E&W) = -3.81, (N) = -1.31	130+67.14, 20.16' LT	FDOT INDEX 232; CAST IRON GRATE TYPE "J" BOT., ALT. B, 6.5'x4', 12" SLOT = 2.38
17-75	CURB INLET	4.00	(E&W) = -3.83	130+33.14, 20.15' LT	12" SLOT = 2.26
17-76	MANHOLE	3.69	(S) = -3.82, (E) = -3.95, (W) = 1.66	128+26.05, 0' RT	FDOT INDEX 200 & 201 (SEE DETAIL) TYPE "J" BOT., ALT. B
17-77	ENDWALL	-	(E) = 1.56	126+72.05, 0' RT	FDOT INDEX 290; SEE DETAIL

NOTE: ALL INLETS WITH SLOTS DEEPER THAN 6" SHALL BE CONSTRUCTED WITH HORIZONTAL BARS AT A MAXIMUM VERTICAL SPACING OF 6 INCHES. 1" DIA. GALVANIZED PIPE IMBEDDED 2" IN PRECAST STRUCTURE OR OTHER APPROVED METHOD.

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Engineer of Record: Timothy A. Focht, P.E. FL PE No. 60810

Connelly & Wicker Inc.
Consulting Engineers
1711 South 5th Street Jacksonville Beach, FL 32250-4040
904.249.7995 EB No. B: 30003650 Fax 904.241.1126

ST. JOHNS COUNTY
NORTH BEACH
DRAINAGE IMPROVEMENTS

DRAINAGE STRUCTURE TABLES
(17th STREET BASIN)

SHEET NO. 9

48823-3

MATCHLINE (SEE SHEET 8)

INTRACOASTAL WATERWAY
MEAN HIGH TIDE = ±1.46

Nineteenth Street
(60' RIGHT-OF-WAY)

Laurel Street
(50' RIGHT-OF-WAY)

Myrtle Street
(50' RIGHT-OF-WAY)

Twentieth Street
(60' RIGHT-OF-WAY)

MATCHLINE (SEE SHEET 7)

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

87 L.F. ~ 24"x120" BOX CULVERT @ 0.06% SLOPE
EXIST. END WALL TOP. EL.=3.32 INV.=2.00
EXIST. INLET TOP. EL.=5.59 W. INV.=1.55 E. INV.=1.02
57 L.F. ~ 36" PIPE @ 0.07% SLOPE
REMOVE EXIST. RIP-RAP WITHIN WIDTH OF CONC. PAD
433 L.F. ~ 36" PIPE @ 0.07% SLOPE
376 L.F. ~ 36" PIPE @ 0.06% SLOPE
15 L.F. ~ 30" PIPE @ 0.20% SLOPE
STA. 80+49.92 ℄ NINETEENTH STREET = STA. 1010+39.81 ℄ LAUREL STREET
103 L.F. ~ 24" PIPE @ 0.12% SLOPE
EXIST. YYY INV.=2.27
EXIST. YYY INV.=2.14
59 L.F. ~ 15" PIPE @ 0.22% SLOPE
EXIST. 18" CMP WITH TYPICAL MES N. INV.=1.79 S. INV.=1.58
EXIST. M.E.S. INV.=1.94
117 L.F. ~ 24" PIPE @ 0.13% SLOPE
86 L.F. ~ 15" PIPE @ 0.23% SLOPE
34 L.F. ~ 36" PIPE @ 0.06% SLOPE
EXIST. 18"x30" CMP WITH TYPICAL MES E. INV.=1.54 S. INV.=1.44
EXIST. 18"x30" CMP N. INV.=1.82 S. INV.=1.72
98 L.F. ~ 36" PIPE @ 0.05% SLOPE
EXIST. 18" CMP W. INV.=1.83
155 L.F. ~ 36" PIPE @ 0.06% SLOPE
EXIST. 18" ABS E. INV.=1.58 W. INV.=1.53
EXIST. 18" ABS E. INV.=2.94 W. INV.=2.25
163 L.F. ~ 36" PIPE @ 0.06% SLOPE
EXIST. 18" CMP E. INV.=1.82 W. INV.=2.17
EXIST. M.E.S. INV.=2.33
EXIST. M.E.S. INV.=2.17
208 L.F. ~ 24" PIPE @ 0.12% SLOPE
220 L.F. ~ 24" PIPE @ 0.12% SLOPE
34 L.F. ~ 36" PIPE @ 0.06% SLOPE
EXIST. 18" CMP N. INV.=2.72 S. INV.=2.60
17 L.F. ~ 36" PIPE @ 0.06% SLOPE
17 L.F. ~ 36" PIPE @ 0.06% SLOPE
EXIST. 18"x30" CMP WITH TYPICAL MES E. INV.=1.44 W. INV.=1.34
12 L.F. ~ 18" PIPE @ 0.29% SLOPE
EXIST. 18"x24" CMP WITH TYPICAL MES E. INV.=1.71 W. INV.=1.77
EXIST. 18"x24" CMP WITH TYPICAL MES E. INV.=1.79 W. INV.=1.69
53 L.F. ~ 36" PIPE @ 0.06% SLOPE
EXIST. 18"x24" CMP E. INV.=1.88 W. INV.=1.82
42 L.F. ~ 36" PIPE @ 0.06% SLOPE
EXIST. M.E.S. INV.=1.71 W. INV.=1.88
12 L.F. ~ 36" PIPE @ 0.08% SLOPE
12 L.F. ~ 24" PIPE @ 0.17% SLOPE
12 L.F. ~ 36" PIPE @ 0.17% SLOPE
12 L.F. ~ 24" PIPE @ 0.25% SLOPE
STA. 2010+39.65 ℄ MYRTLE STREET = STA. 85+00.00 ℄ NINETEENTH STREET
162 L.F. ~ 36" PIPE @ 0.06% SLOPE
34 L.F. ~ 36" PIPE @ 0.06% SLOPE
34 L.F. ~ 36" PIPE @ 0.09% SLOPE
155 L.F. ~ 15" PIPE @ 0.23% SLOPE
EXIST. 18" CMP WITH TYPICAL MES N. INV.=2.10 S. INV.=1.68
196 L.F. ~ 24" PIPE @ 0.12% SLOPE
196 L.F. ~ 24" PIPE @ 0.12% SLOPE
188 L.F. ~ 30" PIPE @ 0.44% SLOPE
EXIST. M.E.S. INV.=1.75
EXIST. M.E.S. INV.=1.77
22 L.F. ~ 24" PIPE @ 0.14% SLOPE
17 L.F. ~ 24" PIPE @ 0.12% SLOPE
STA. 2007+79.66 ℄ MYRTLE STREET = STA. 60+00.00 ℄ TWENTIETH STREET
53 L.F. ~ 15" PIPE @ 0.23% SLOPE
EXIST. 18"x24" CMP WITH TYPICAL MES E. INV.=2.40 W. INV.=2.30
12 L.F. ~ 18" PIPE @ 0.12% SLOPE
12 L.F. ~ 15" PIPE @ 0.25% SLOPE
12 L.F. ~ 15" PIPE @ 0.25% SLOPE
12 L.F. ~ 15" PIPE @ 0.25% SLOPE
35 L.F. ~ 15" PIPE @ 0.23% SLOPE
174 L.F. ~ 18" PIPE @ 0.18% SLOPE
53 L.F. ~ 24" PIPE @ 0.11% SLOPE
106 L.F. ~ 24" PIPE @ 1.04% SLOPE
STA. 55+49.81 ℄ TWENTIETH STREET = STA. 1007+79.80 ℄ LAUREL STREET
EXIST. 18"x24" CMP WITH TYPICAL MES E. INV.=2.32 W. INV.=2.07
EXIST. 18"x24" CMP WITH TYPICAL MES E. INV.=2.40 W. INV.=2.30

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Connelly & Wicker Inc.
Consulting Engineers
1711 South 5th Street Jacksonville Beach, FL 32250-4040
904.249.7995 EB No. B: 30003650 Fax 904.241.1126
Engineer of Record: Richard C. Welch, P.E. FL PE No. 40279

ST. JOHNS COUNTY
NORTH BEACH DRAINAGE IMPROVEMENTS

PLAN SHEET

SHEET NO. 6

STORM SEWER STRUCTURE TABLE

STR. No.	TYPE	TOP ELEV.	INVERTS	STATION OFFSET	REMARKS
19-1	TYPE "C" INLET	12.94	(W)=10.19	121+6.55, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-2	TYPE "C" INLET	10.19	(W)=7.44, (E)=7.44	120+30.28, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-3	TYPE "C" INLET	6.35	(W)=3.60, (E)=3.60	119+28.95, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-4	MANHOLE	7.20	(E)=3.57, (S)=0.90	119+16.95, 20' RT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 3.5'x3.5'
19-5	TYPE "C" INLET	3.49	(W)=0.66	116+67.32, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-6	TYPE "C" INLET	3.48	(W)=0.49, (E)=0.49	115+92.43, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-7	TYPE "C" INLET	3.05	(W)=0.25, (E)=0.25	114+83.95, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-8	TYPE "E" INLET	3.45	(N)=-0.56, (S)=-0.56	3012+68.52, 17' RT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=2.70 (S)
19-9	MANHOLE	4.40	(W)=-0.48, (E)=0.21, (S)=-0.54	114+66.95, 20'RT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 3.5'x4'
19-10	TYPE "C" INLET	2.37	(E)=-0.38	114+21.33, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-11	TYPE "C" INLET	3.12	(W)=0.20	112+7.53, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-12	TYPE "C" INLET	3.25	(W)=-0.19, (E)=0.06	111+44.74, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-13	TYPE "C" INLET	3.60	(W)=-0.38, (E)=-0.38	110+34.01, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-14	MANHOLE	4.80	(E)=-0.41, (S)=-0.41	110+17.01, 20' RT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 3.5'x3.5'
19-15	TYPE "C" INLET	3.63	(N)=-0.44, (S)=-0.94	2012+67.99, 17' RT	FDOT INDEX 232; CAST IRON GRATE
19-16	TYPE "E" INLET	3.85	(E)=-0.94, (S)=-0.94	109+83.01, 20' RT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=3.10 (W,S)
19-17	TYPE "C" INLET	4.05	(W)=-0.35, (E)=-0.85	109+1.33, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-18	TYPE "C" INLET	3.93	(W)=0.04, (E)=-0.21	108+26.85, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-19	TYPE "C" INLET	3.71	(W)=0.15, (E)=0.15	107+76.29, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-20	–	–	–	–	–
19-21	TYPE "C" INLET	3.15	(E)=0.23	107+40.27, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-22	–	–	–	–	–
19-23	TYPE "C" INLET	1.98	(W)=-0.70, (S)=-1.20	105+33.04, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-24	TYPE "C" INLET	3.73	(W)=0.78, (E)=0.53	103+51.30, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-25	TYPE "C" INLET	3.76	(E)=1.01	102+50.55, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-26	TYPE "C" INLET	7.10	(W)=0.90	96+14.10, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-27	TYPE "C" INLET	3.23	(W)=0.48, (E)=0.48	94+34.00, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-28	TYPE "C" INLET	3.79	(N)=0.23, (S)=0.23	4010+81.72, 17' RT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=3.29 (N)
19-29	TYPE "C" INLET	2.93	(N)=0.59, (S)=0.34	4011+45.02, 17' RT	FDOT INDEX 232; CAST IRON GRATE
19-30	MANHOLE	4.60	(W)=-0.31, (E)=0.44, (N)=0.19	94+17.00, 20' LT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 3.5'x4'
19-31	TYPE "C" INLET	2.83	(W)=-0.38, (E)=-0.38	93+58.95, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-32	TYPE "E" INLET	3.30	(W)=-1.18, (E)=-0.68	91+8.81, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-33	TYPE "E" INLET	3.91	(W)=-1.31, (E)=-1.31, (N)=-0.81	89+67.00, 20' LT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=3.41 (N,E)
19-34	TYPE "E" INLET	2.50	(W)=-1.35, (E)=-1.35	89+16.80, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-35	TYPE "E" INLET	3.22	(W)=-1.52, (E)=-1.52	87+30.34, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-36	TYPE "E" INLET"	3.22	(W)=-2.11, (E)=-1.61	86+31.68, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-37	TYPE "C" INLET	3.69	(W)=0.76	95+27.23, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-38	TYPE "C" INLET	3.20	(W)=-0.33, (E)=0.42	93+79.05, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-39	TYPE "C" INLET	2.82	(W)=-0.80, (E)=-0.80	89+84.04, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-40	MANHOLE	4.72	(W)=-0.82, (E)=-0.82, (S)=-0.82	89+67.04, 20' RT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 4'x4'
19-41	TYPE "C" INLET	3.62	(N)=-0.80, (S)=-0.80	3010+3.52, 17' RT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=3.00 (S)
19-42	TYPE "C" INLET	4.00	(N)=-0.57, (S)=-0.07	3008+12.52, 17' RT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=3.50 (N)
19-43	MANHOLE	4.85	(E)=-0.05, (N)=-0.05	64+67.09, 20' LT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 3.5'x3.5'
19-44	TYPE "C" INLET	3.50	(W)=-0.03, (E)=-0.03	64+79.09, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-45	TYPE "C" INLET	3.66	(W)=0.28, (E)=0.28	66+52.94, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-46	TYPE "C" INLET	3.90	(W)=0.48, (E)=0.73	67+70.45, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-47	TYPE "C" INLET	3.95	(W)=0.98, (E)=0.98	68+77.99, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-48	TYPE "C" INLET	4.02	(W)=1.13	69+47.45, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-49	MANHOLE	4.60	(W)=-1.36, (E)=-0.86, (S)=-0.86	89+32.83, 20' RT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 4'x4.5'
19-50	TYPE "C" INLET	3.80	(N)=-0.84, (S)=-0.84	3010+3.01, 17' LT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=2.30 (S)
19-51	TYPE "C" INLET	2.77	(N)=-0.71, (S)=0.04	3008+94.31, 17' LT	FDOT INDEX 232; CAST IRON GRATE
19-52	TYPE "C" INLET	2.78	(N)=0.17	3008+37.44, 17' LT	FDOT INDEX 232; CAST IRON GRATE

STORM SEWER STRUCTURE TABLE

STR. No.	TYPE	TOP ELEV.	INVERTS	STATION OFFSET	REMARKS
19-53	TYPE "C" INLET	1.78	(W)=-2.01, (E)=-2.01	87+64.20, 20' RT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 3.5'x6'
19-54	TYPE "C" INLET	2.92	(W)=0.07	61+20.20, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-55	TYPE "E" INLET	4.30	(W)=-2.19, (E)=-2.19, (N)=-1.19	85+16.98, 20' LT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=3.80 (N,E)
19-56	TYPE "E" INLET	4.15	(W)=-2.21, (E)=-2.21, (N)=-1.21	84+82.98, 20' LT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=2.90 (N,W)
19-57	TYPE "E" INLET	3.81	(W)=-2.31, (E)=-2.31	83+20.13, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-58	TYPE "H" INLET	2.59	(W)=-2.90, (E)=-2.40	81+65.01, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-59	TYPE "H" INLET	3.63	(W)=-2.95, (E)=-2.95, (N)=-0.70	80+66.91, 20' LT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=2.00 (N,E)
19-60	TYPE "C" INLET	2.89	(N)=-0.50, (S)=-0.50	1011+45.88, 17' RT	FDOT INDEX 232; CAST IRON GRATE
19-61	TYPE "C" INLET	2.69	(S)=-0.37	1012+4.34, 17' RT	FDOT INDEX 232; CAST IRON GRATE
19-62	TYPE "E" INLET	3.32	(W)=-2.18, (E)=-2.18	85+29.01, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-63	MANHOLE	4.80	(W)=-2.20, (E)=-2.20, (S)=-1.20	85+17.01, 20' RT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 6'x6'
19-64	TYPE "C" INLET	3.32	(N)=-1.17, (S)=-1.17	2010+8.00, 17' RT	FDOT INDEX 232; CAST IRON GRATE
19-65	TYPE "C" INLET	3.90	(N)=-0.94, (S)=-0.19	2008+12.00, 17' RT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=2.90 (N)
19-66	MANHOLE	4.40	(E)=-0.16, (N)=-0.16	60+16.99, 20' LT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 3.5'x3.5'
19-67	TYPE "C" INLET	3.40	(W)=-0.13, (E)=-0.13	60+28.99, 20' LT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=2.90 (E)
19-68	MANHOLE	5.00	(W)=-2.23, (E)=-2.23, (S)=-1.21	84+83.01, 20' RT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 4'x5.5'
19-69	TYPE "C" INLET	3.01	(N)=-1.19, (S)=-1.19	2010+8.00, 17' LT	FDOT INDEX 232; CAST IRON GRATE
19-70	TYPE "C" INLET	3.88	(N)=-0.96 (S)=-0.46	2008+12.00, 17' LT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=2.51 (N)
19-71	MANHOLE	4.40	(W)=-0.19, (N)=-0.44	59+82.98, 20' LT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 4'x4'
19-72	TYPE "C" INLET	2.50	(W)=-0.16, (E)=-0.16	59+70.99, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-73	TYPE "C" INLET	3.15		59+18.04, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-74	TYPE "E" INLET	3.59	(W)=-2.24, (E)=-2.24	84+71.01, 20' RT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=3.01 (W)
19-75	TYPE "E" INLET	3.82	(W)=-2.32, (E)=-2.32	83+29.18, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-76	TYPE "H" INLET	2.55	(W)=-2.87, (E)=-2.37	82+45.73, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-77	TYPE "H" INLET	2.71	(W)=-2.97, (E)=-2.97	80+83.92, 20' RT	FDOT INDEX 232; CAST IRON GRATE
19-78	MANHOLE	3.70	(W)=-2.98, (E)=-2.98, (S)=-0.96	80+66.92, 20' RT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 4'x5.5'
19-79	TYPE "C" INLET	2.53	(N)=-0.91 (S)=-0.66	1010+3.00, 17' RT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=1.91 (S)
19-80	TYPE "C" INLET	2.40	(N)=-0.31	1008+48.03, 17' RT	FDOT INDEX 232; CAST IRON GRATE
19-81	MANHOLE	3.87	(W)=-3.00,(E)=-3.00, (S)=-1.98	80+32.92, 20' RT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 5'x6'
19-82	TYPE "E" INLET	2.78	(N)=-1.95, (S)=-1.95	1010+5.00, 17' LT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=1.91 (S)
19-83	TYPE "E" INLET	4.11	(N)=-1.13, (S)=-0.63	1008+17.00, 17' LT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=3.11 (N)
19-84	MANHOLE	4.10	(W)=-0.61, (N)=-0.61	55+32.73, 20' LT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 3.5'x3.5'
19-85	TYPE "C" INLET	2.92	(W)=-0.58, (E)=-0.58	55+10.80, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-86	TYPE "C" INLET	4.02	(W)=0.52, (E)=0.52	54+5.19, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-87	TYPE "C" INLET	4.09	(W)=1.08, (E)=0.58	53+52.25, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-88	TYPE "C" INLET	4.78	(W)=1.64, (E)=1.39	51+78.01, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-89	TYPE "C" INLET	4.84	(E)=1.72	51+42.70, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-90	TYPE "H" INLET	3.24	(W)=-3.49, (E)=-3.01	80+15.92, 20' RT	FDOT INDEX 232; CAST IRON GRATE 12" SLOT INV.=2.70 (W)
19-91	TYPE "C" INLET	3.55	(NW)=-3.72, (E)=-3.72	76+39.67, 20' RT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 6'x6'
19-92	TYPE "H" INLET	2.34	(W)=-3.47, (E)=-2.97, (N)=-1.47	80+32.91, 20' LT	FDOT INDEX 232; CAST IRON GRATE
19-93	TYPE "C" INLET	2.76	(N)=-1.32, (S)=-1.32	1011+76.94, 17' LT	FDOT INDEX 232; CAST IRON GRATE
19-94	TYPE "C" INLET	4.79	(W)=1.61, (E)=-3.76, (SE)=-3.76	76+00, 20' LT	FDOT INDEX 200 & 201; TYPE-P; ALT. B; 10'x12'; SEE DETAIL
19-95	ENDWALL	–	(E)=1.56	75+13.70, 5.63' LT	SEE DETAIL; FDOT INDEX 290

NOTE: ALL INLETS WITH SLOTS DEEPER THAN 6" SHALL BE CONSTRUCTED WITH HORIZONTAL BARS AT A MAXIMUM VERTICAL SPACING OF 6 INCHES. 1" DIA. GALVANIZED PIPE IMBEDDED 2" IN PRECAST STRUCTURE OR OTHER APPROVED METHOD.

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Connelly & Wicker Inc.
Consulting Engineers
1711 South 5th Street Jacksonville Beach, FL 32250-4040
904.249.7995 EB No. B: 30003650 Fax 904.241.1126
Engineer of Record: Richard C. Welch, P.E. FL PE No. 40279

ST. JOHNS COUNTY
NORTH BEACH DRAINAGE IMPROVEMENTS

DRAINAGE STRUCTURE TABLES
(19th STREET BASIN)

SHEET NO. 10

Appendix D: Coordination

Homeowner Input Survey

North Beach Public Comment

Submitted By: Anonymous user

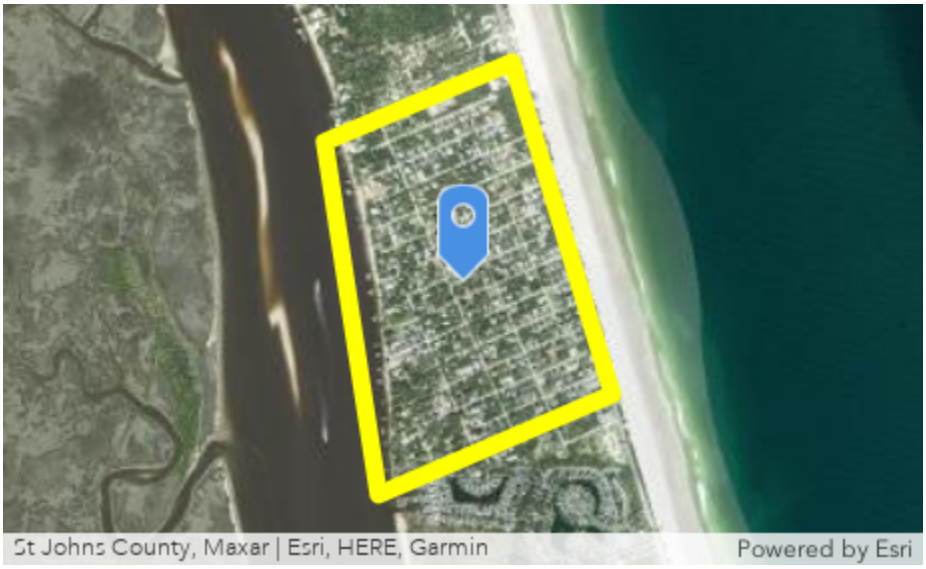
Submitted Time: August 16, 2023 6:48 PM

Your Name
Cynthia Newell

Address
305 22nd St

Email
Cynthiamgreen@hotmail.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
Last year, many of the drainage ditches were dug out on 22nd and 23rd streets. Ever since they dug the ditches, water is standing in the ditches they worked on for weeks but the ditches they didn’t touch are draining properly. Possibly the drainage pipes are blocked or the ditches are not pitched correctly to have the water flow down to the river.

North Beach Public Comment

Submitted By: Anonymous user

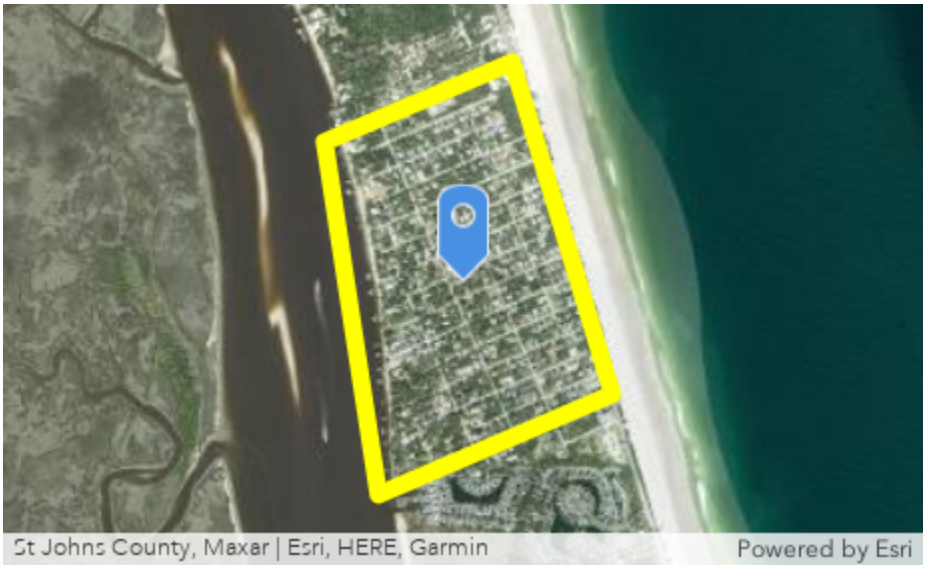
Submitted Time: August 17, 2023 10:13 AM

Your Name
Scott Stanley

Address
616 twentyfirst street

Email
stan658@bellsouth.net

Please describe a drainage issue in the study area that you have personally witnessed



Observations
I am on 21st 1 house in from ICW. I have 1 catch basin in my yard and 2 across the street and another 2 doors down. On very high tides water comes up through those and into the street and my yard. If it rains a lot and there is high tide the rain water also comes up through those basins. I have been here for 30 years and have seen the issue get worse over time. Ditches to the east now hold water for days sometimes and the small ditch to the south

is usually blocked. The flapper valve at the end of 21st has not worked in years . The flow of water from the A1A works well as it all ends up in the pipes on my street, but when tide is high it has no where to go.

Were you present at the address entered above during a significant flood event?

Yes

Please describe the storm event

As I said I have been here for 30 years. I have seen it all.

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

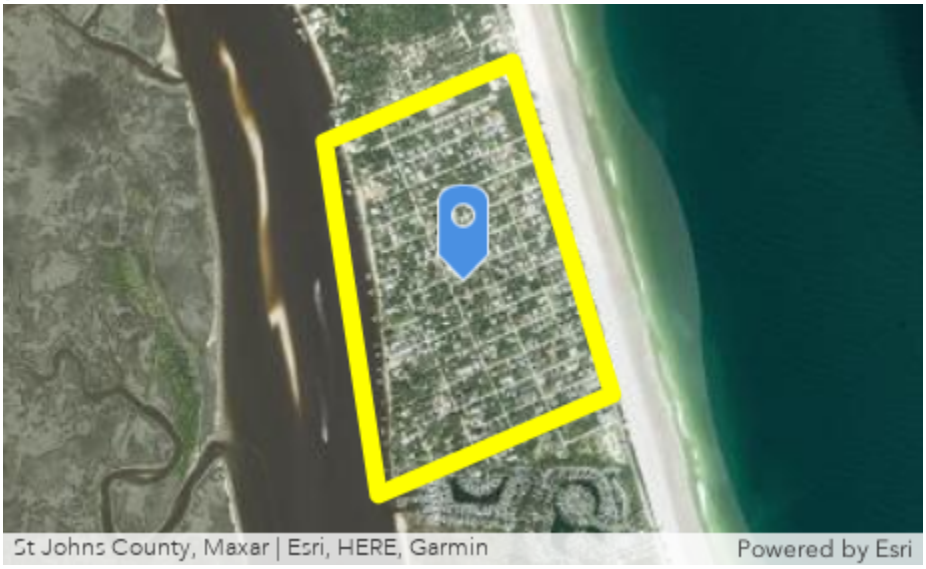
Submitted Time: August 20, 2023 8:37 AM

Your Name
William Trainer

Address
304 20th St, Saint Augustine, FL, 32084, USA

Email
Wctrainer@hotmail.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
Water comes all the way up 20th to the A1A from the Inter coastal during hurricanes. Possible to have a berm along the Inter coastal?

Were you present at the address entered above during a significant flood event?

No

Please describe the storm event

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

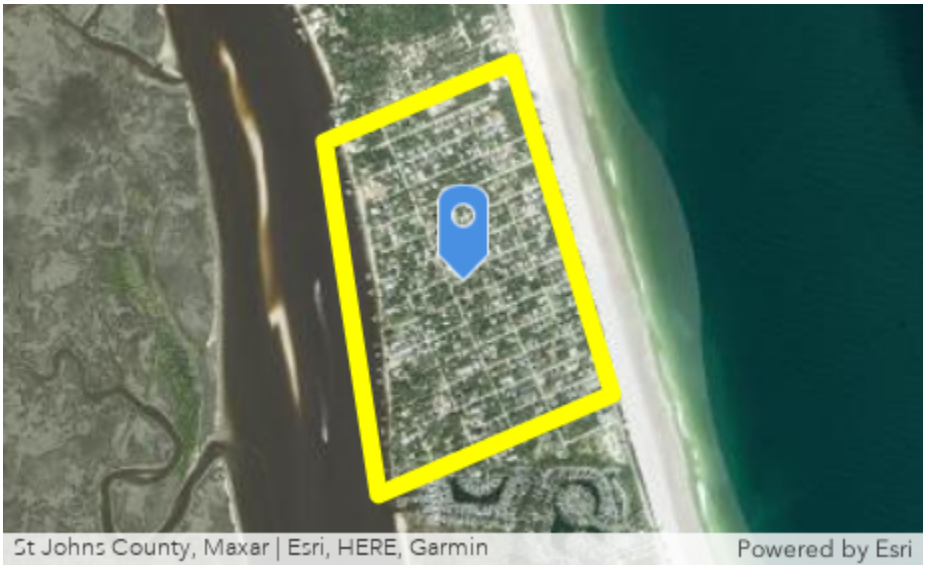
Submitted Time: August 20, 2023 4:25 PM

Your Name
Brian Martin

Address
511 15th St, Saint Augustine, FL, 32084, USA

Email
landscapecalculator@gmail.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
Street and yard flooded with approx 2’ of water from the ICW is Matthew, Irma, Nicole, and Ian. Flooding but less severe on one big king tide when we were experiencing a nor’easter. Water comes right up 15th street from the ICW and works it way east.

Were you present at the address entered above during a significant flood event?

Yes

Please describe the storm event

Covered above. All storms in the last 19 years.

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

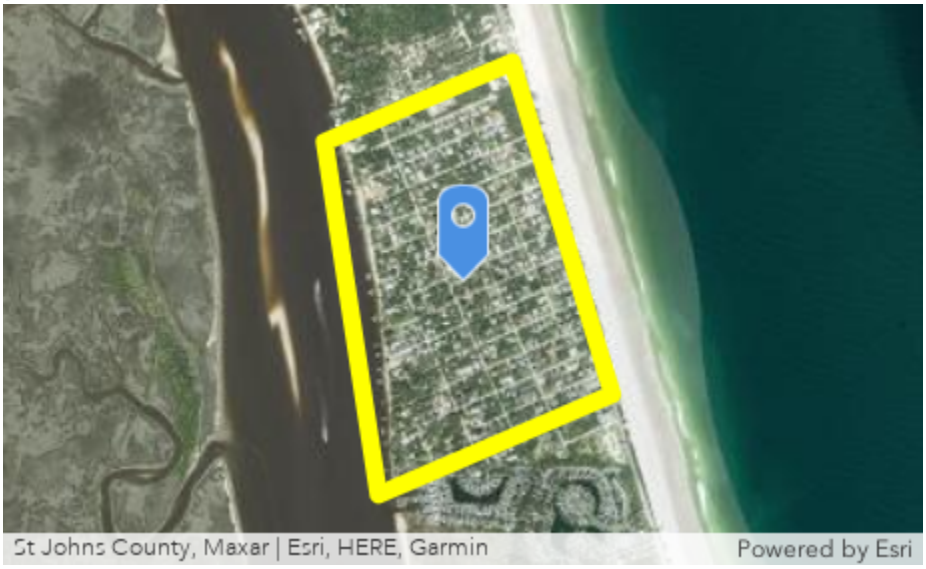
Submitted Time: August 21, 2023 2:40 PM

Your Name
John Garofalo

Address
602 23

Email
johngarofalo65@gmail.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
Flooding during storms. Occasional flooding during king tides. Ditches not functioning. There is a drain on the Villages of Vilano side of the wood fence at the southern end of Wahoo St. that seems to be malfunctioning resulting in flood waters backing up onto 23rd St. I can point this out in person if you would like.

Were you present at the address entered above during a significant flood event?

Yes

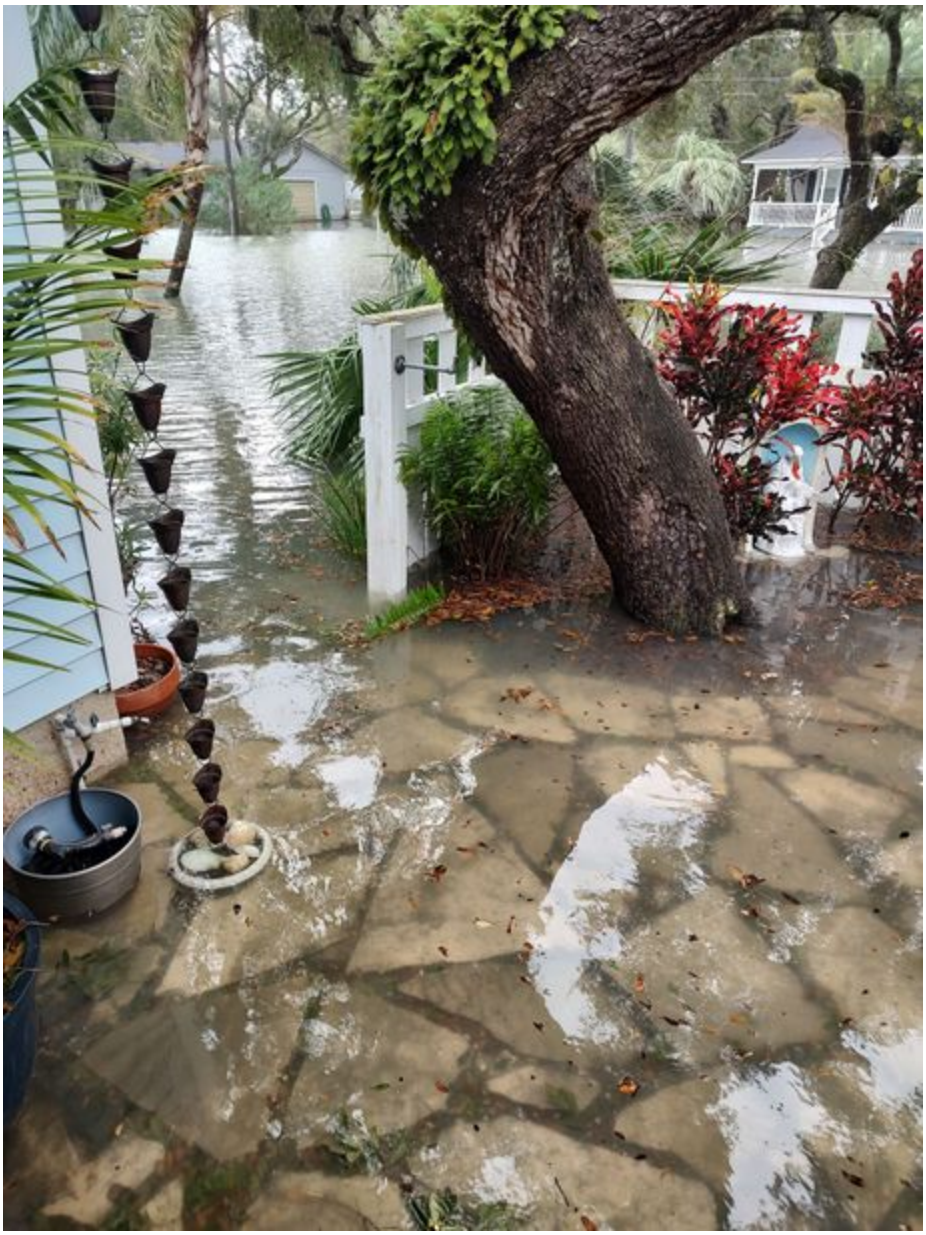
Please describe the storm event

Present for Ian and Nicole

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here



North Beach Public Comment

Submitted By: Anonymous user

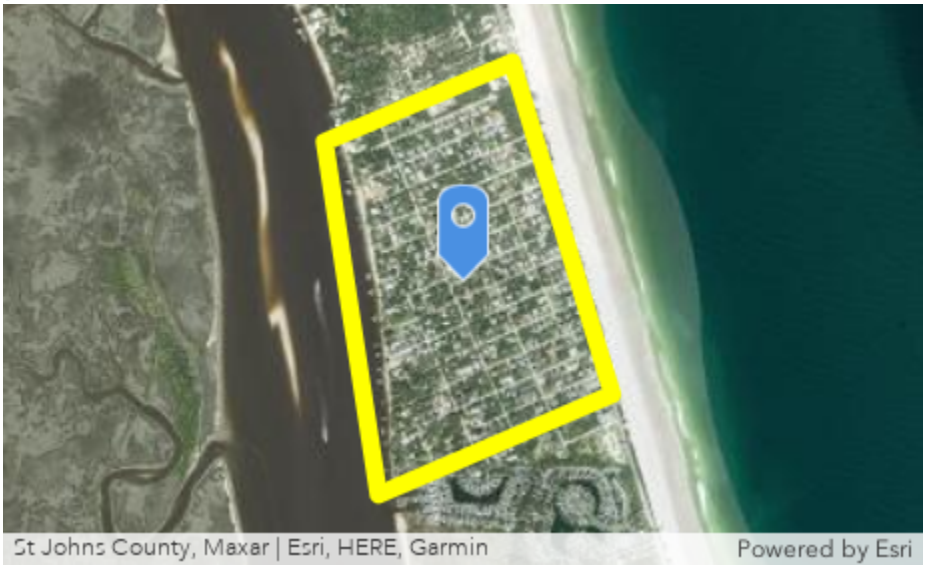
Submitted Time: August 21, 2023 3:33 PM

Your Name
Elizabeth Alexander

Address
302 Eleventh St, Saint Augustine, FL, 32084, USA

Email
BreauA@gmail.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
Flooding during storms around our house. Drainage ditch doesn’t drain.

Were you present at the address entered above during a significant flood event?
Yes

Please describe the storm event

I have been present for all events since Hurricane Matthew in 2016.

Do you have any photos identifying flooding issues within the study limits?

Choice 1

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

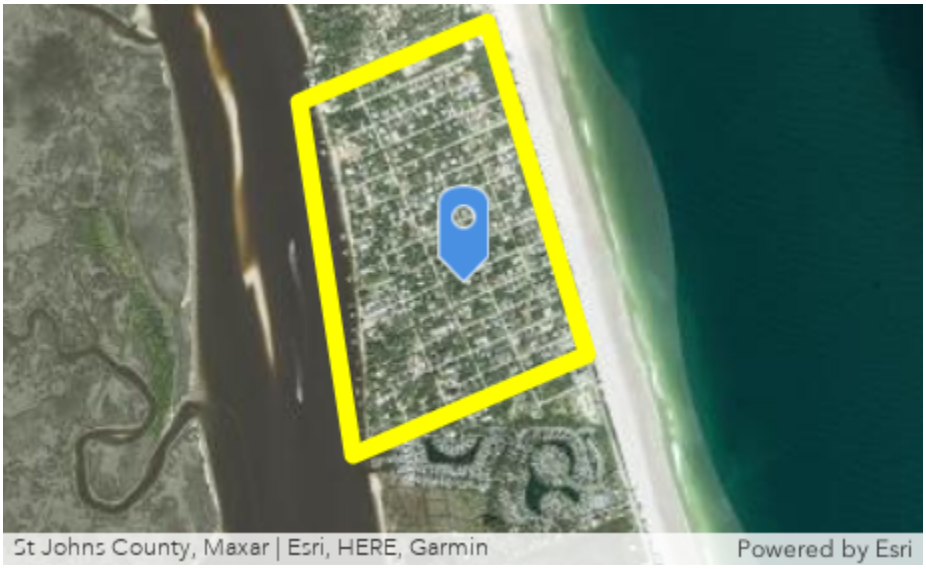
Submitted Time: August 21, 2023 3:50 PM

Your Name
Strange

Address
410 19th St, Saint Augustine, FL, 32084, USA

Email
tarponrun1@gmail.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
410 19TH ST ditches are dug to deep so water doesn't flow west to drain, then causes a mess and mosquitoes. Rather have a culvert and grass filled back like it was 25yrs ago.

Were you present at the address entered above during a significant flood event?

Yes

Please describe the storm event

Lived at this address since 2010, been thru last 4 storms.
Born n raised on 21st & wahoo, that home has been here for 65yrs and with all new homes built up , no drainage and home isn't liveable due to 4 floods.

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

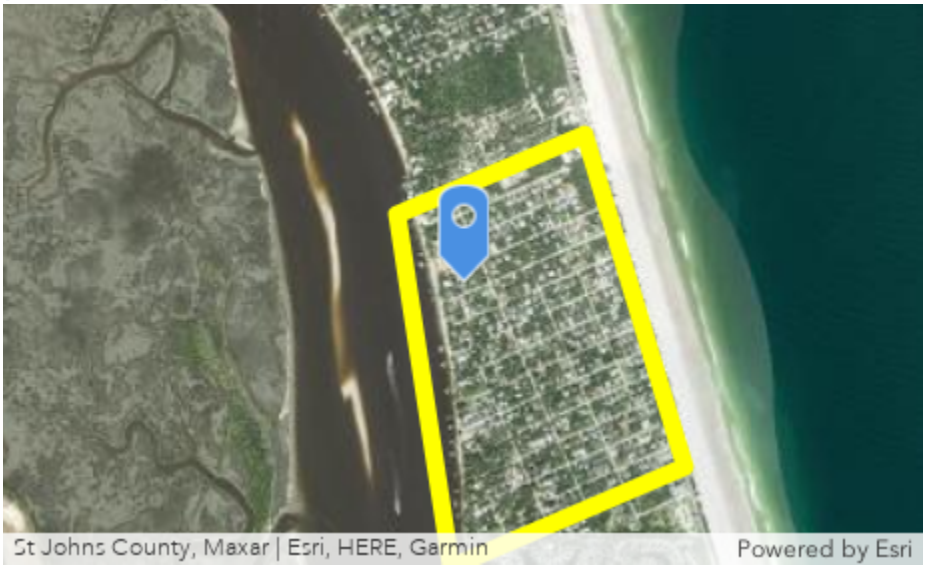
Submitted Time: August 21, 2023 5:18 PM

Your Name
Sam Tedesco

Address
510 13th St, Saint Augustine, FL, 32084, USA

Email
samtedesco1@icloud.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
In our section of 13 Street (one house off the river), there is nowhere for rain water to go except to fill the low spots in our and our neighbor's yards until it's right up to the house. We have no drains and the house across the street is much higher and the water sheets down their driveway right at our house. Is it not possible to create a drain that leads to the river since it's so close?

Were you present at the address entered above during a significant flood event?

Yes

Please describe the storm event

Last year Hurricane Ian and Nicole both caused storm surge flooding of river water that got in our house. Obviously a different problem than rain water drainage.

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

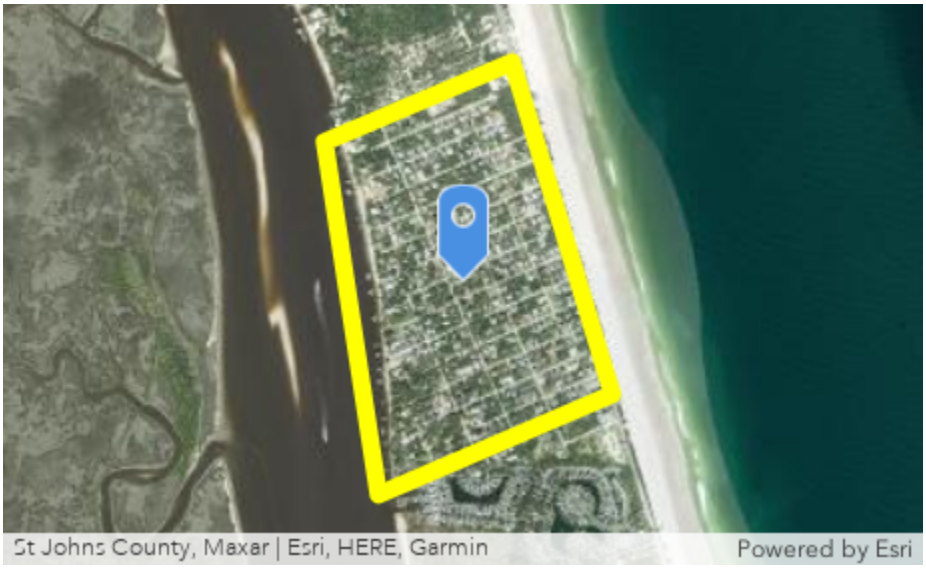
Submitted Time: August 22, 2023 9:00 AM

Your Name
Maureen O'Connor

Address
505 17th St, Saint Augustine, FL, 32084, USA

Email
oconnormaureen@mac.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
My property, both land and house were flooded from both Ian and Nicole. House had almost 2' of water and sustained $100K in damages. The surge came from the intercostal inlet on Boating Club Road. With all the new construction on higher elevation, older houses and properties become the drain for the area. Seventeenth Street has only a few drains which obviously could not handle the surge.

Were you present at the address entered above during a significant flood event?

No

Please describe the storm event

Do you have any photos identifying flooding issues within the study limits?

No

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

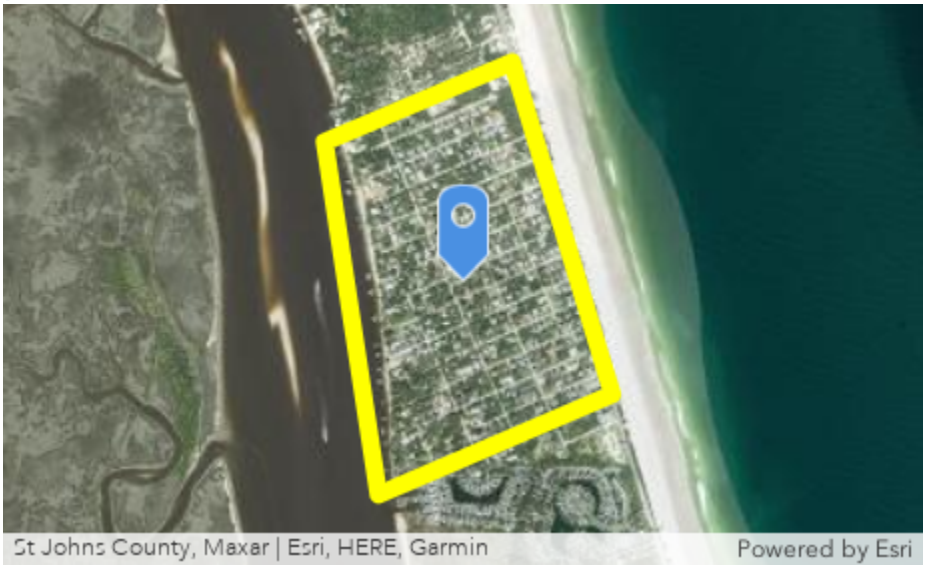
Submitted Time: August 22, 2023 2:25 PM

Your Name
elaine Kewin

Address
3970 Palm Street

Email
ekewin@brierrose.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations

Were you present at the address entered above during a significant flood event?
Yes

Please describe the storm event

2022 Ian and Nicole: I watched the water from the ICW rush eastwards on 14th street, turn south on Palm street, in front of my house and flow into the vacant lot on corner of 15th and Palm. It then backed up once the lot was full. My house is high enough that I did not receive flooding in the house just flooded my yard.

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here


STOP

North Beach Public Comment

Submitted By: Anonymous user

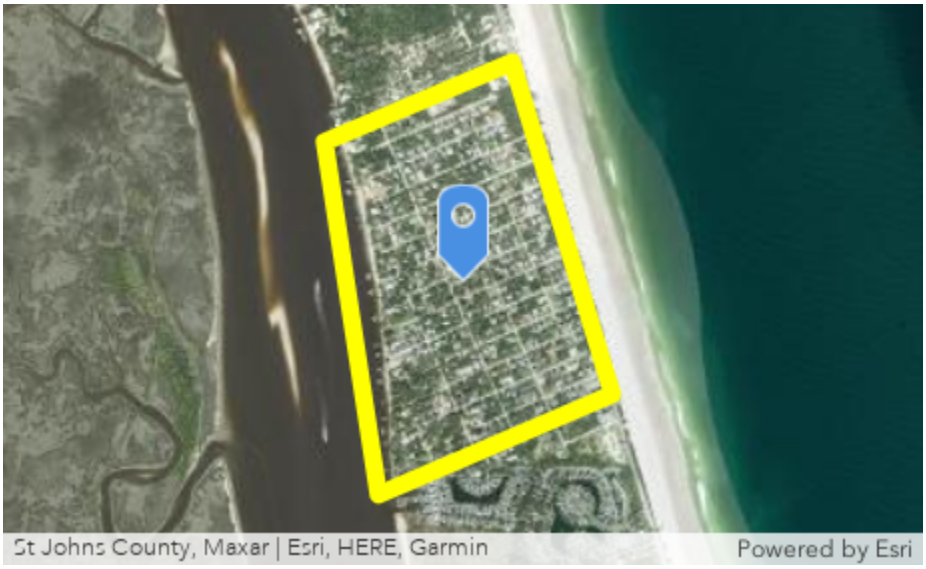
Submitted Time: August 22, 2023 4:17 PM

Your Name
Becky Sejeck

Address
4249 Myrtle St, Saint Augustine, FL, 32084, USA

Email
bearcot@bellsouth.net

Please describe a drainage issue in the study area that you have personally witnessed



Observations
I attended the meeting and was surprised that the campground through 1st street were not included in the study. We have had houses on third and fifth that totally flooded my home flooded in the garage and was within 1/4 of an i ch from flooding my house. The last two storms brought an incredible amount of water snd flooding to our part of the neighborhood. I have pictures and a video that show it from the last storm. The water breeches in the

campground and then rips down 5th and 4th streets. I think our part of the neighborhood show also be included in your study.

Were you present at the address entered above during a significant flood event?

Yes

Please describe the storm event

The tide ripped through the campground and came down Myrtle Street like a river, filling my yard and all the yards on fifth street as well as 3rd and 4th with substantial amount of water , my house was surrounded by water front and back yard and the water sat there for a solid week. I have a video and pictures but we ate not in the study atea.

Do you have any photos identifying flooding issues within the study limits?

No

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

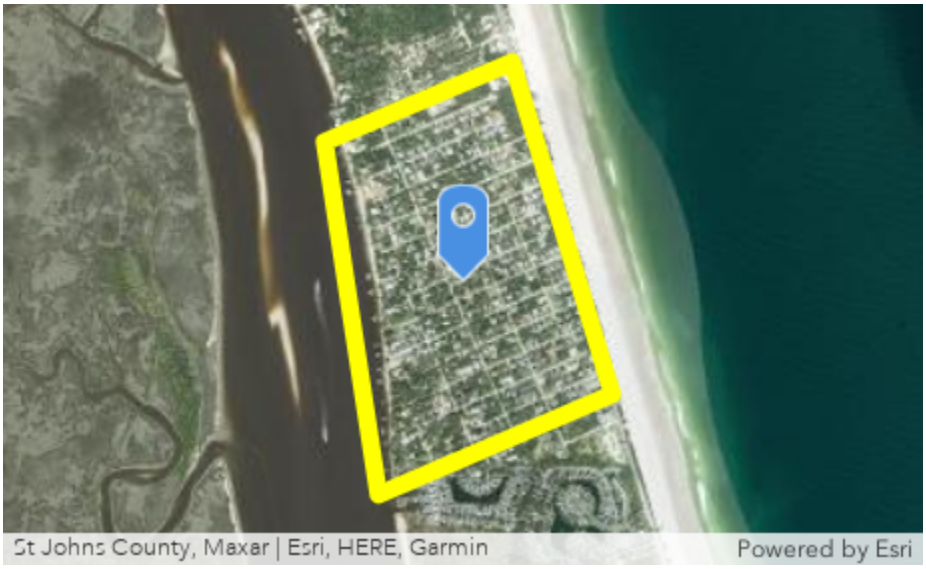
Submitted Time: August 22, 2023 5:30 PM

Your Name
Debbie Dickinson

Address
413 Sixteenth St.

Email
ddickinson06@gmail.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
Weeks & days prior to Hurricane Ian, ditches near our home were full and some over flowing from rainwater. The outflow drains built to help mitigate storm water are non functional. When the Hurricane hit, there was no where for the high tide waters to go.

Were you present at the address entered above during a significant flood event?

Yes

Please describe the storm event

Hurricane Ian September 28 2022
Hurricane Nicole approximately 6 weeks later.

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here


LOWE
413

North Beach Public Comment

Submitted By: Anonymous user

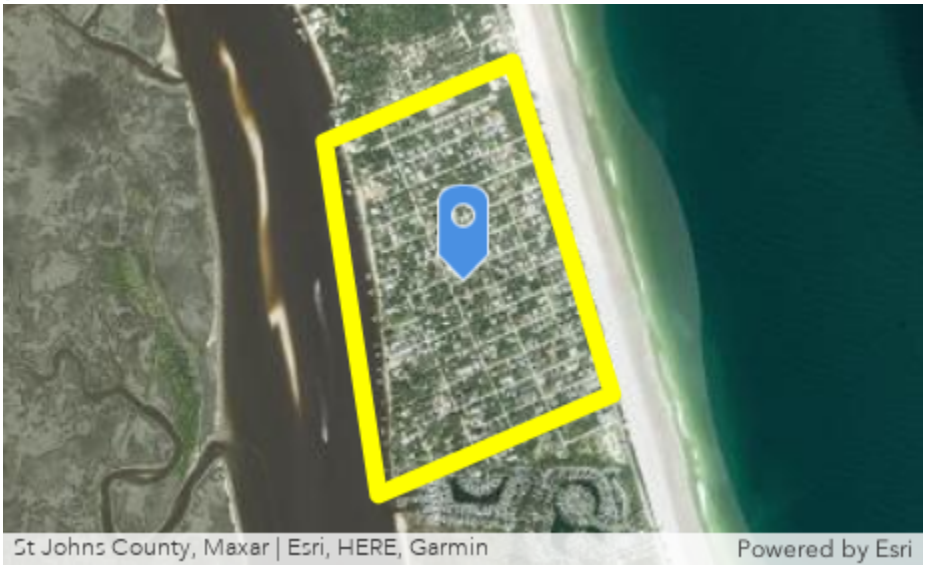
Submitted Time: August 22, 2023 6:22 PM

Your Name
KAREN PITTS

Address
407 14TH STREET

Email
ren.isme@yahoo.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
During Hurricane Ian of 2022, I personally witnessed water coming around the corner from 13th (dead end) to Myrtle and come up my street 14th Street. The water came halfway up my driveway (I have a 6yr old home that is 9ft above sea level). This has never happened before and I suspect the new home building going on removed the natural vegetation that previously kept the flooding at a minimum. In speaking with neighbors who have been

living there 20+ years had never seen anything like the flooding from Ian before in our neighborhood. There are no drainage ditches, no method of removing the water during these storms. Now that A1A continues to breach, that water will roll downwards to the Tolomato, of which, my home is located in between, leaving no place for this water to drain.

Were you present at the address entered above during a significant flood event?

Yes

Please describe the storm event

see above. I have a video but unable to upload on this survey. My email address is ren.isme@yahoo.com

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

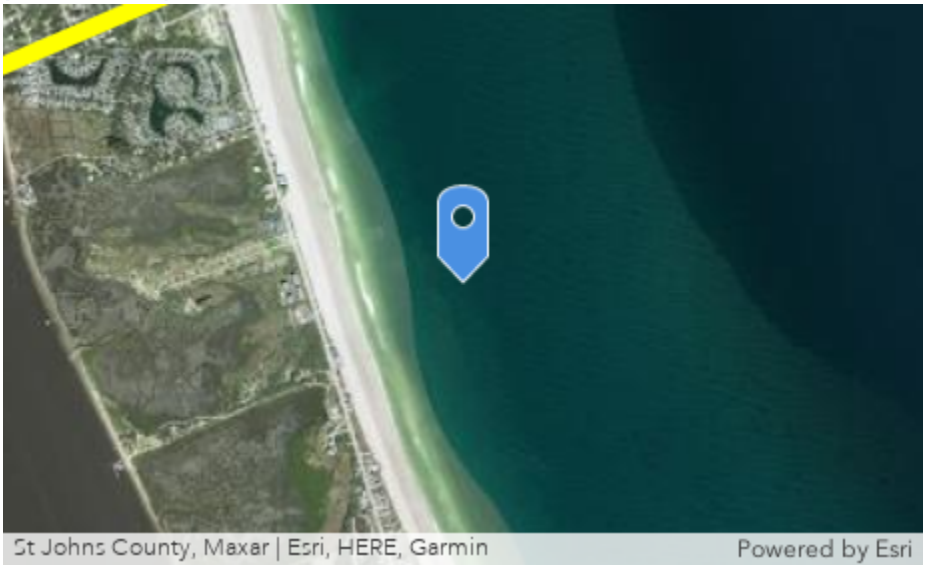
Submitted Time: August 22, 2023 6:38 PM

Your Name
Hilary Wojciechowicz

Address
315 22nd Street

Email
groovetime01@comcast.net

Please describe a drainage issue in the study area that you have personally witnessed



Observations
My home.is elevated but the street was flooded about 5 feet during Ian and Nicole in 2022. Also the beach was aroaded away

Were you present at the address entered above during a significant flood event?

No

Please describe the storm event

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here


12:23
88%
Front Door


12:22
88%
Front Door

North Beach Public Comment

Submitted By: Anonymous user

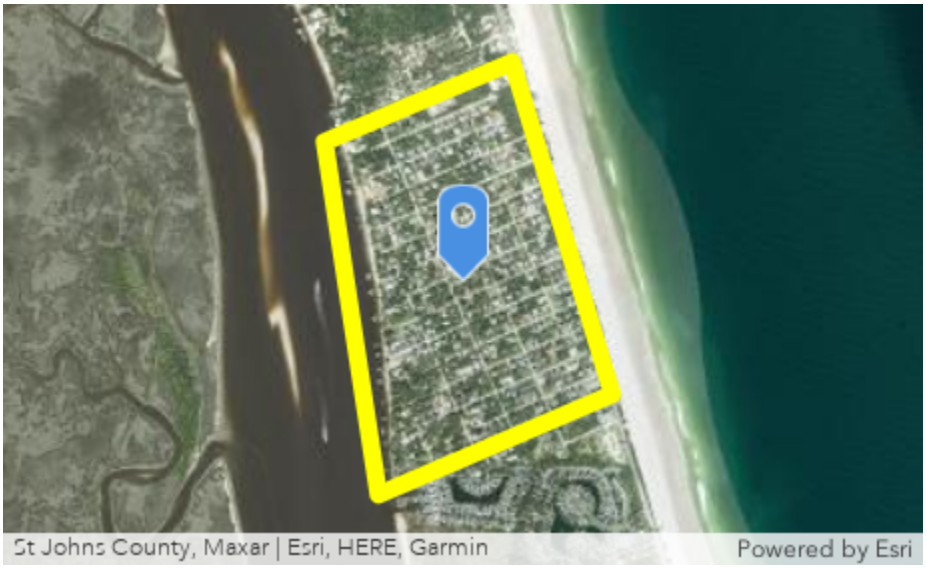
Submitted Time: August 23, 2023 4:55 PM

Your Name
Andrea Wagner

Address
505 Twelvth St, Saint Augustine, FL, 32084, USA

Email
Seagrits@bellsouth.net

Please describe a drainage issue in the study area that you have personally witnessed



Observations
Flood waters from intracoastal. On. 13 th and. 14 th. Street flowed into. 12 th. St property. Road. Has been. Paved. Several times. Raising. It. Above. Property.

Were you present at the address entered above during a significant flood event?
Yes

Please describe the storm event
See above

Do you have any photos identifying flooding issues within the study limits?
Yes

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

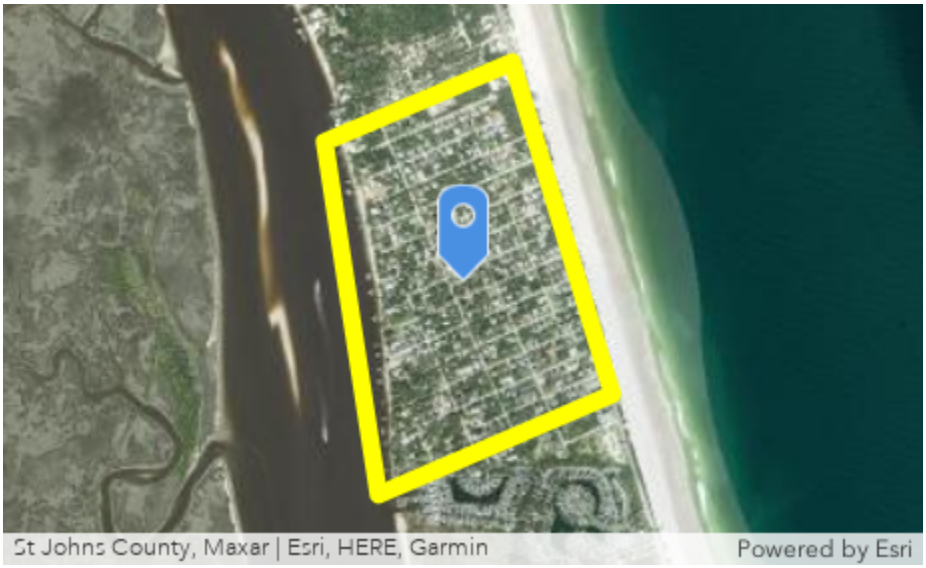
Submitted Time: August 23, 2023 5:03 PM

Your Name
Andrea Wagner

Address
505 Twelvth St, Saint Augustine, FL, 32084, USA

Email
Seagrits@bellsouth.net

Please describe a drainage issue in the study area that you have personally witnessed



Observations
County. Has. Raised. The flood. Elevation. Requirements. Since. We. Built. So. Surrounding. Properties. Are like dams. Forcing. Water. Towards. Older. Residences

Were you present at the address entered above during a significant flood event?
Yes

Please describe the storm event
See previous. Reply

Do you have any photos identifying flooding issues within the study limits?
Choice 1

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

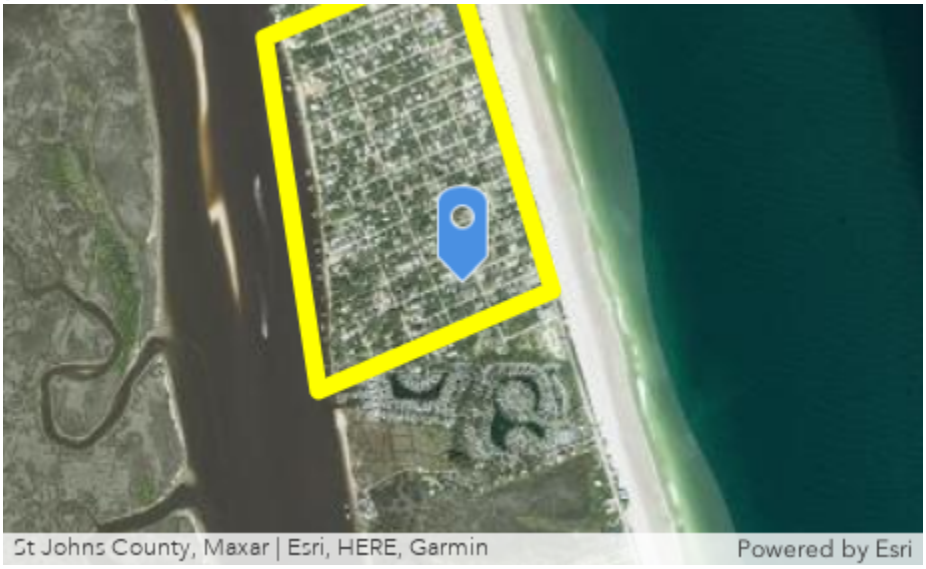
Submitted Time: August 24, 2023 5:40 PM

Your Name
Lawrence Snyder

Address
407 21st St.

Email
lwmasnyder@yahoo.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
407 21st Street

Were you present at the address entered above during a significant flood event?
Yes

Please describe the storm event

During most recent hurricanes and tropical depression last year we were surrounded by water up to and over our porches. Mathew was the worse. Water came within 1" of the threshold of our house. Water entered the garage and our shed. We sandbagged after Matthew and we were able to keep the water out of our garage. Last year the water was over our porches twice.

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

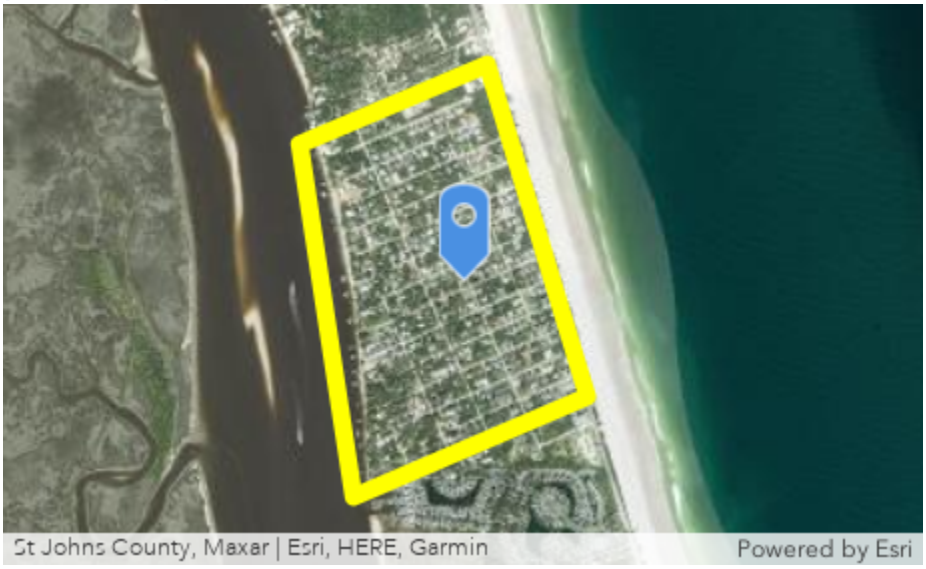
Submitted Time: August 28, 2023 12:05 PM

Your Name
Amy Schneider

Address
404 17th Street,

Email
suzchpstk@yahoo.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
Significant Flooding during Hurricanes, Matthew, Irma, Ian, Nicole. drainage ditches overfill with water during a rain event. They do not seem to handle the amount of water present and will fill/overfill with regular rain storms. There are very few areas between Euclid Ave and 23rd street that do not have overflowing ditches during rain events.

Were you present at the address entered above during a significant flood event?

No

Please describe the storm event

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

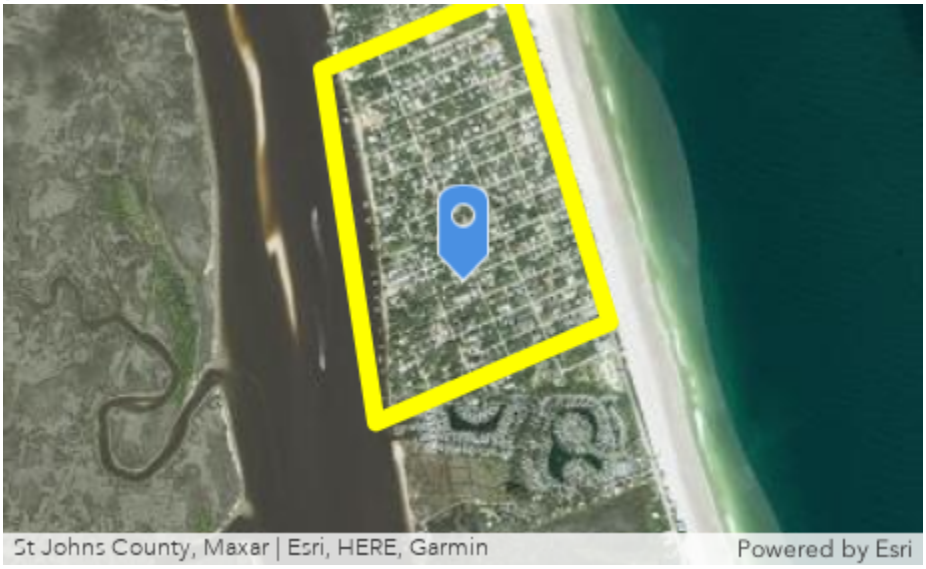
Submitted Time: September 1, 2023 8:59 PM

Your Name
Charlene

Address
505 19th St, Saint Augustine, FL, 32084, USA

Email
Ceralesmyth@gmail.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
Drainage not draining, flooding during king tides, and tropical storms. Sitting water causes mosquito issues.

Were you present at the address entered above during a significant flood event?

Yes

Please describe the storm event

Extreme flooding. Grass and plants destroyed. Significant yard erosion. Garage flooded.

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

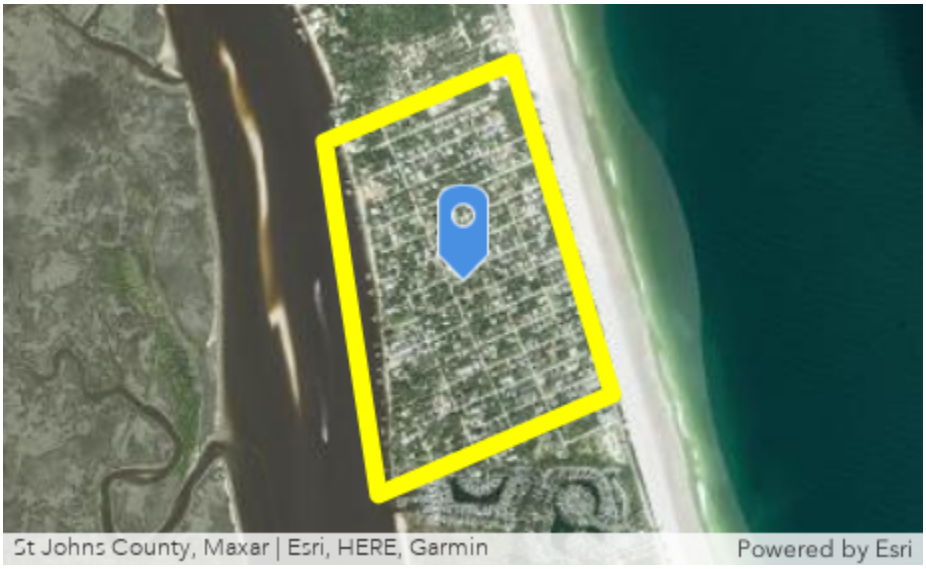
Submitted Time: September 7, 2023 8:12 AM

Your Name
Mel Longo

Address
133 Morgan Ave, Saint Augustine, FL, 32084, USA

Email
mellongo79@gmail.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
I just moved from the end of 21st on the river. Saltwater goes into the neighborhood two blocks from the river at king tides and new moon tides. During storms, the neighborhood floods from the outfalls before it floods from the river.

Were you present at the address entered above during a significant flood event?

Yes

Please describe the storm event

Had flooding at my present address in surfside neighborhood in early 80's and during Hurricane Mathew (2016).

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

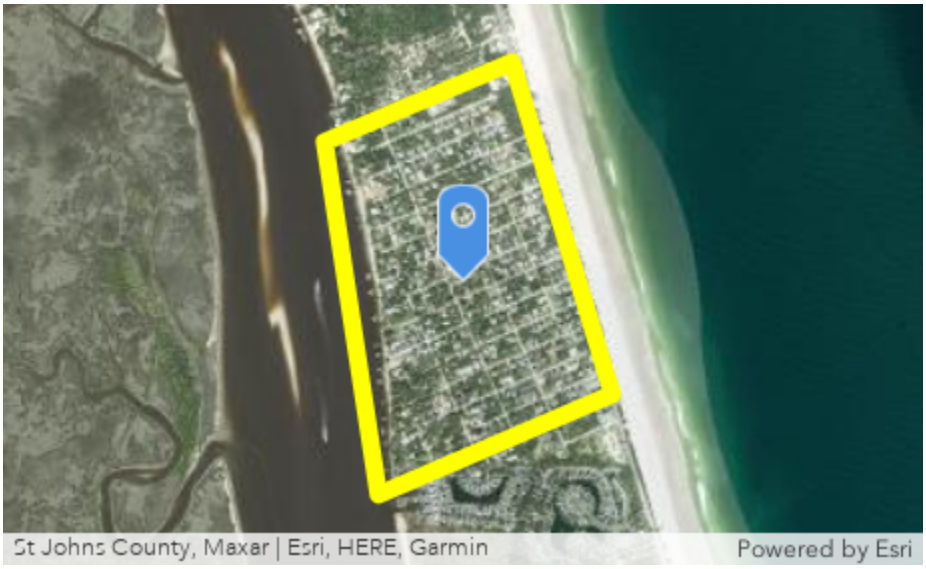
Submitted Time: September 7, 2023 8:19 AM

Your Name
Sallie O'Hara

Address
P.O. Box 6 St. Augustine, Fl. 32085

Email
tarahillspecialties@gmail.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
Please ensure study results integrate multi-use trail planning are shared with FDOT Dowd Tyler/ Avy Roberson Group.
Friends of A1A / UBms/ NBCA all working or trail details

Were you present at the address entered above during a significant flood event?

No

Please describe the storm event

Do you have any photos identifying flooding issues within the study limits?

No

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

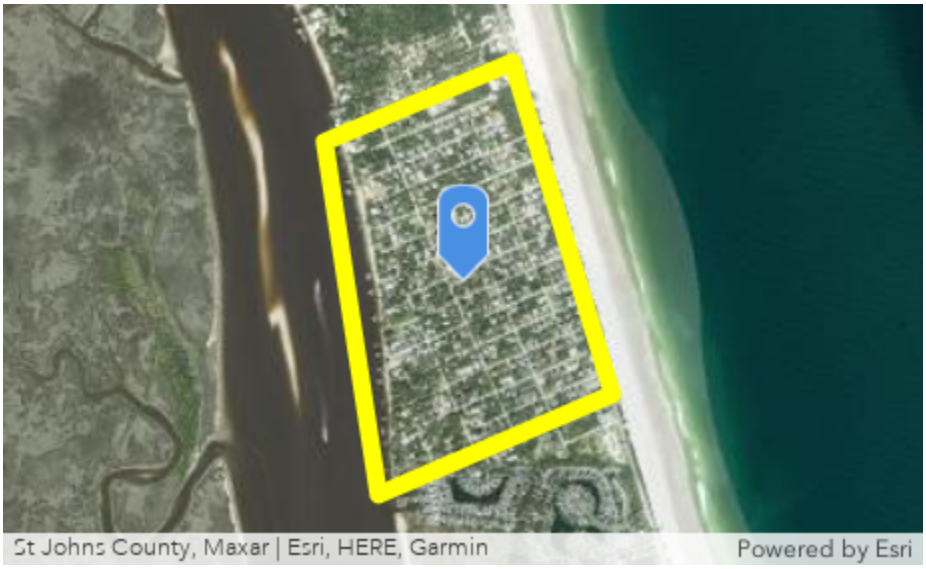
Submitted Time: September 7, 2023 8:24 AM

Your Name
Lisa Leighton

Address
211 17th St, Saint Augustine, FL, 32084, USA

Email
Txninuae@gmail.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
During hurricane with tides, water comes up the road from intercoastal towards A1A and stops at my driveway. It actually flows out of my drains at corner of 17th Oak.

Also, swales/drainage ditches do not discharge water.

Were you present at the address entered above during a significant flood event?

Yes

Please describe the storm event

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

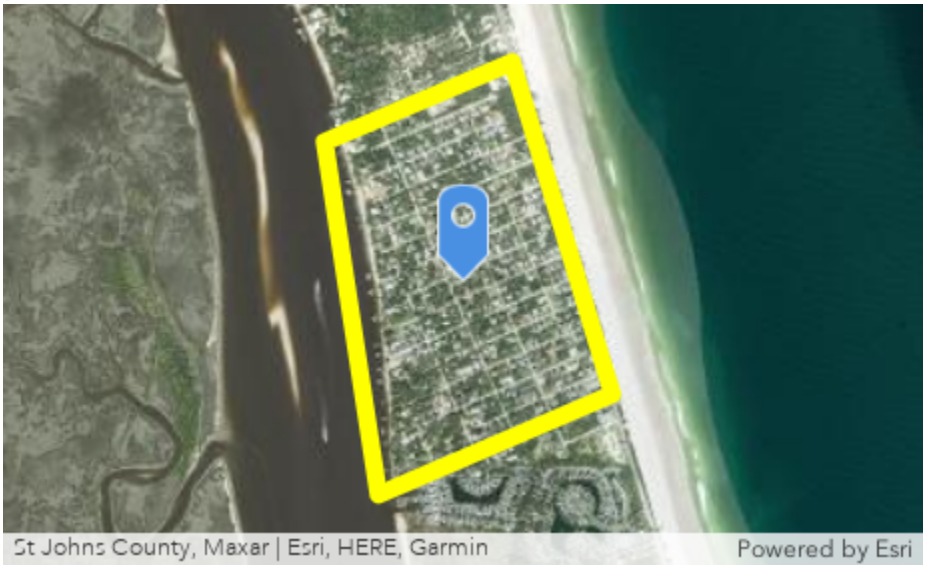
Submitted Time: September 7, 2023 8:28 AM

Your Name
Sacka Martin

Address
133 Coastal Hollow Cir, Saint Augustine, FL, 32084, USA

Email
Sackamartin@msn.com

Please describe a drainage issue in the study area that you have personally witnessed



Observations
make water flow sideways coming off A1A like a natural flow river.

Were you present at the address entered above during a significant flood event?
Yes

Please describe the storm event

Been here 26 years

Do you have any photos identifying flooding issues within the study limits?

No

Please upload any photos here

North Beach Public Comment

Submitted By: Anonymous user

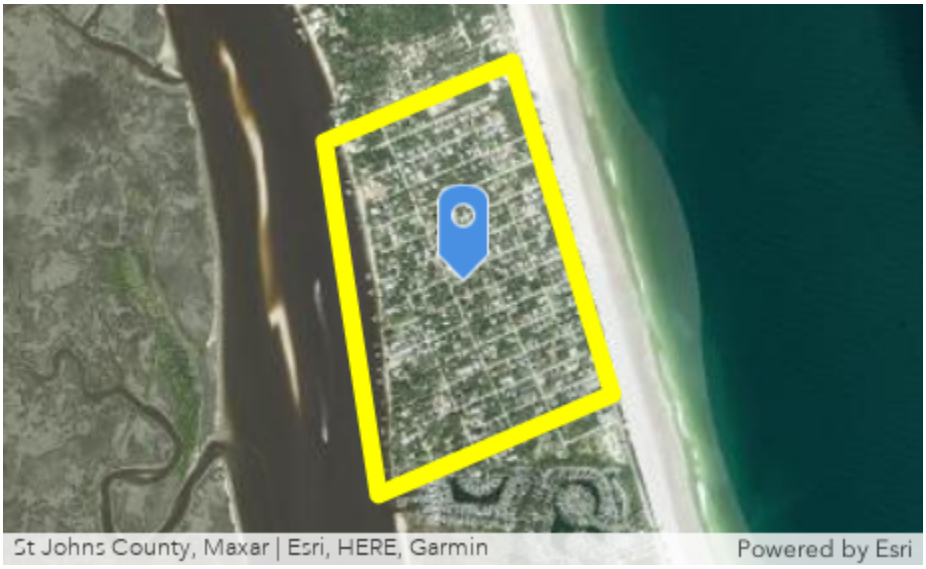
Submitted Time: September 7, 2023 8:34 AM

Your Name
Mary Sullivan

Address
405 15th St, Saint Augustine, FL, 32084, USA

Email
gwotraining@bellsouth.net

Please describe a drainage issue in the study area that you have personally witnessed



Observations
If contacted, will be happy to share pictures/videos.

Were you present at the address entered above during a significant flood event?
Yes

Please describe the storm event

Matthew (2016), Irma (2017), Ian (2022), Nicole (2022)

Do you have any photos identifying flooding issues within the study limits?

Yes

Please upload any photos here

Were you present at the address entered above during a significant flood event?

Yes

Please describe the storm event

The water has come up to our garage door and the top of the first step to our front door but didn’t enter the house or garage.

Do you have any photos identifying flooding issues within the study limits?

Please upload any photos here

From: Susan Ahl
To: Ravi Patel
Subject: 3870 Laurel Street, STA, FL 32084
Date: Thursday, September 7, 2023 11:46:31 AM

EXTERNAL SENDER - Use caution with links and attachments.

Ravi,

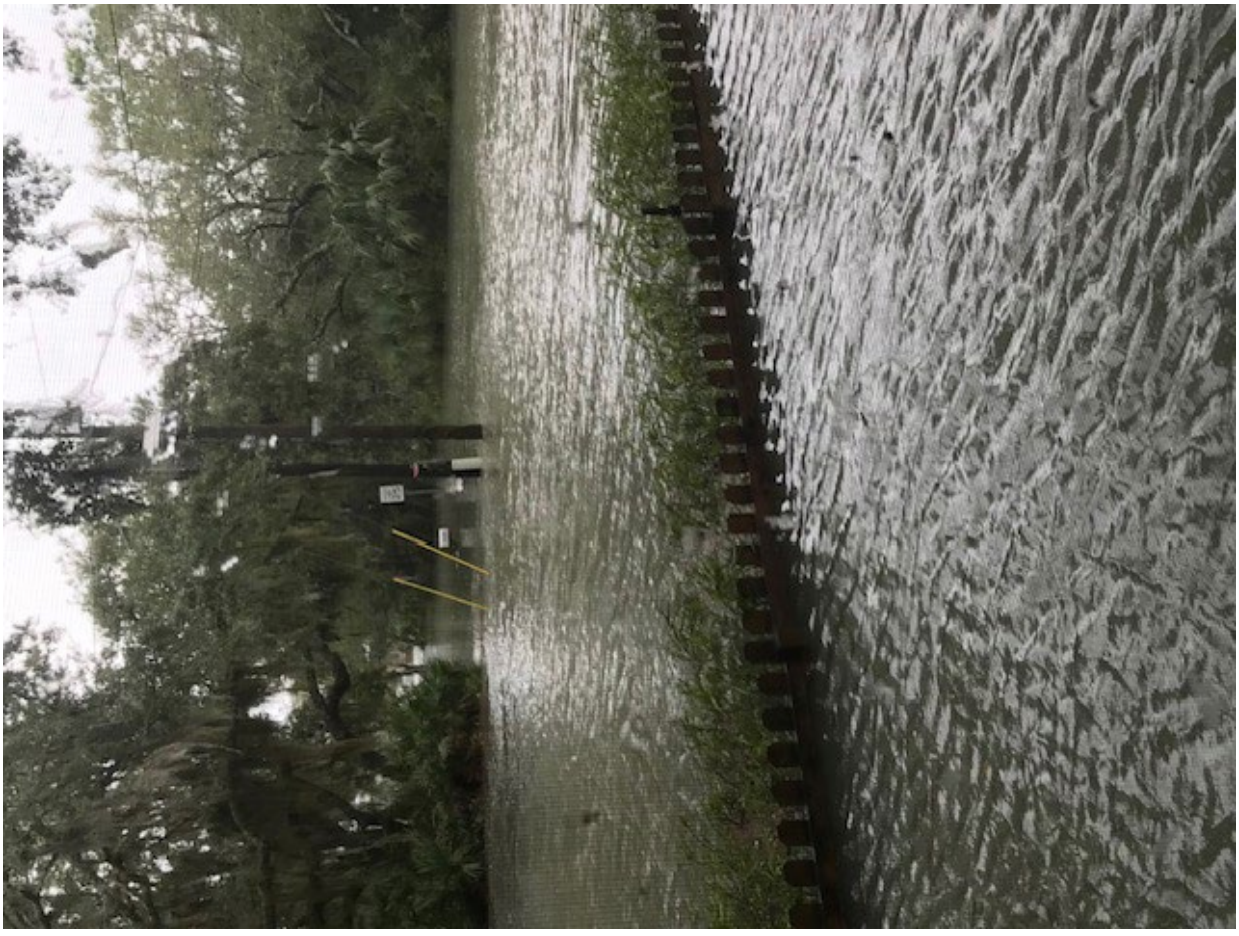
I was unable to get the Public Website to turn on for you and Christian to have access to all the pictures and videos of our house at 3870 Laurel Street. Attached, I'm only submitting the most recent pictures because the flooding was the same for Matthew, Irma, Ian and Nicole.

In one of the pictures you will see water being pumped out of our house through the window.

Thankfully, Idalia missed us.

Sorry about the delays in getting these photos due to my age and poor technical abilities.

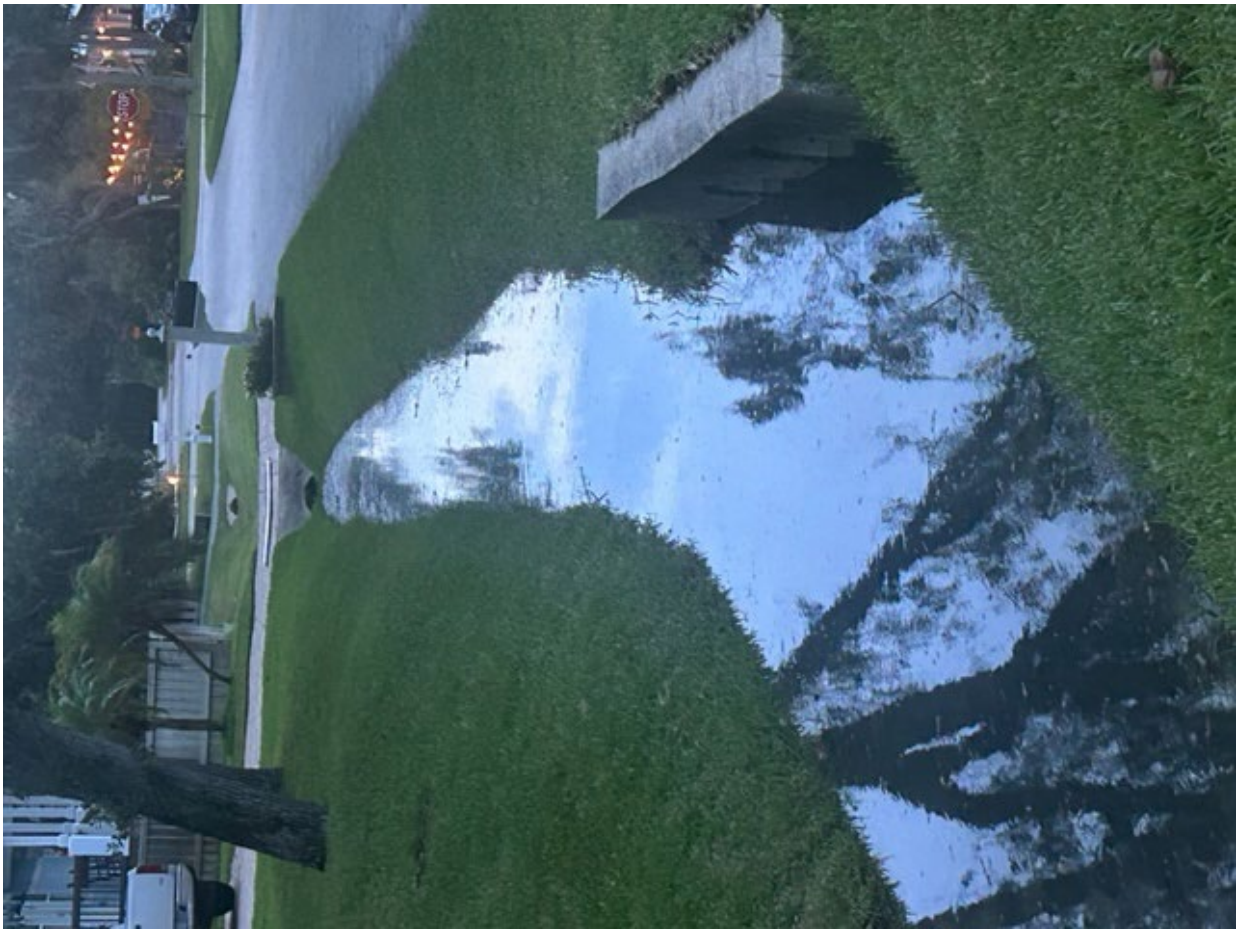
Susan Ahl
863-258-2536



STOP

Sent from my iPhone

From: Susan Ahl
To: Ravi Patel
Subject: 3879 Laurel Street, STA, FL 32084
Date: Thursday, September 7, 2023 11:59:01 AM



Ravi,

At the meeting at Guana it was discussed that the dampers were not working. Here is what happens with regular high tides from the damper not working at the end of 19th St. This causes residents around 19th St and Laurel having to replace their galvanized drains under our driveways more frequently due to salt water intrusion on a regular basis. We are also unable to maintain plantings within several feet of our drainage ditches. I don't know if others provided pictures regarding this issue which is separate from the flooding. However, the ditches are already full before the tidal surge comes over the bulk head and up boating club road.

I have a video I will try to send separately.

Thank you, for listening to us.

Susan Ahl
Sent from my iPhone

From: Christian Gyle
To: Ahl.Susan@mayo.edu; jahl3@msn.com
Cc: Ravi Patel; Nathan Gottschalk
Subject: FW: 3870 Laurel Street-Jeff and Susan Ahl
Date: Monday, August 21, 2023 2:22:10 PM

Susan and Jeff,

Thank you for sending your email. It is unfortunate that you are having issues with our online survey. We did try changing one of the settings if you would like to try again to upload pictures. Your eye-witness testimony is very valuable. If you would rather, you could text the pictures to my mobile phone 904-994-8171.

Regards,

Christian J. Gyle, PE, CFM
Senior Engineer, Osiris 9 Consulting

OSIRIS 9 CONSULTING

10199 Southside Boulevard, Suite 104
Jacksonville, FL 32256
(904) 994-8171(M)
Christian.Gyle@osiris9.com

From: Ravi Patel <ravi.patel@osiris9.com>
Sent: Monday, August 21, 2023 1:42 PM
To: Christian Gyle <christian.gyle@osiris9.com>
Subject: FW: 3870 Laurel Street-Jeff and Susan Ahl

From: Ahl, Susan G., R.N., CHPN <Ahl.Susan@mayo.edu>
Sent: Monday, August 21, 2023 11:19 AM
To: Ravi Patel <ravi.patel@osiris9.com>
Cc: 3 3 <jahl3@msn.com>
Subject: 3870 Laurel Street-Jeff and Susan Ahl

Hi Ravi,

This is Susan Ahl (susanahL8@gmail.com), my husband, Jeff and I live at 3870 Laurel Street, St. Augustine, FL 32084. We attended the residents of Vilano/North Beach last week at Guana. The lower level of our home and garage has flooded four (4)times. Starting with Matthew. It was during Matthew that the whole house flooded. Of course, the most expensive rooms are on the lower level

(kitchen, dining, laundry, pantries, water heater).

The reason I am contacting you via Email is because I have a lot of videos and pictures that I am unable to send via the QR code and by Email attachments because of its size. I tried to Email just one video and it was too large.

With the help of neighbors I have put all of the pictures/video' into a shared folder and added your Email to the shared folder. Do you know how I actually get these to you for review to better understand what we are experiencing for your study?

We would be happy to talk via Zoom or in person and tour the area to share with your group our observations of the flood waters. Basically, from our home's view the video shows the f flooding coming from:

- Flood waters coming from the ICW at the Boating Club Ramp located at the end of 18th street,
- Heading East to Laurel Street and beyond,
- From our view it makes a right hand turn and then meets up with waters already in our open storm ditches from the "flapper" is open at the end of 19th Street,
- It continues (South) down Laurel Street about one-two blocks where it has met up with other waters coming from the ICW.

The neighbors around Laurel Street and 19th, 20th , 21st and so on call this area the "fish bowl." It's the deepest water in the area.

There is also another matter which many residents discussed. It's the drainage system. Some homes have the open ditches and some have closed ditches (pipes underground, covered with dirt). None of them are properly being maintained, either by the County or by the residents. Some open ditches have been closed (filled in) either by the homeowner or by sides eroding from waters running off the street and from the hurricanes.

In our case, our open ditches were the deepest of the neighborhood. Making it very difficult for Jeff and I to get down to get all the leaves out. Plus, being at the bottom of the fish bowl, all the natural tree debris floats downhill to our corner. Now, the depth of the ditches along Laurel Street are not as deep anymore. I think its because the forces of the flood waters have pulled our ground from around the house down to the front ditches.

Because the "flapper" not working properly at the end of 19th street, we get "regular" high tide salt water in our ditches. This has killed so many trees/shrubs that were planted along our property line over the years. It has made our galvanized pipes under our drive ways to be replaced more often due to frequent water intrusion. For this reason, I think the County should be covering the cost of replacement. These are not "storm drains" when there is a routine back flow of tides.

We want to thank you and all involved in listening to our concerns. The fear and anxiety we have in the pits of our stomach every June through November is hard for others to understand. The mental,

physical and financial burdens of actually surviving these floods have become more than some can bear and long time residents are moving from the area.

I would like to make the following recommendations as you all continue your study:

1. Train local residents how to manually open/close these faulty “flapper” values. This would reduce the back flow of regular tides.
2. Manually dig and clean all ditches for continuity between homes, and street blocks. Clean doesn’t mean what we have witnessed in the past: a few men come out to rake the debris to the sides of the ditches so the residents then have to pick up and remove, while some just leave it to reenter the ditch with the next rainfall.
3. Plan and obtain funding to install large underground concrete storm water drainage ditches. This would eliminate the open ditch system and eliminate salt water intrusion into resident yards
4. Closing the Boating Club Road Ramp and putting up a sea wall. Boaters can use Aunt Kates and May Road boat ramps.
5. Obtain Federal Funding to install a SEA WALL along the ICW for the area in this study.

We are very appreciative that “someone is listening to us” and excited to hear what opportunities there may be for protecting our homes and our quality of life.

Please let me know if you have any recommendations on how I can get these videos/pictures to you.

Susan and Jeff Ahl
3870 Laurel Street
St. Augustine, FL 32084
Susan’s Cell 863-258-2526
Jeff’s Cell 863-258-3860

From: Ahl, Susan G., R.N., CHPN
To: Ravi Patel
Subject: RE: 3870 Laurel Street St. Augustine FL
Date: Wednesday, August 23, 2023 10:18:56 AM

Hi Ravi,

When I turn “on” the public website, it automatically turns off. Do you know what is causing that?

Susan

From: Ravi Patel <ravi.patel@osiris9.com>
Sent: Tuesday, August 22, 2023 4:44 PM
To: Ahl, Susan G., R.N., CHPN <Ahl.Susan@mayo.edu>
Cc: Christian Gyle <christian.gyle@osiris9.com>
Subject: [EXTERNAL] Re: 3870 Laurel Street St. Augustine FL

Ms. Susan,

I am assuming your neighbor created a "shared album" in your photos app.

1. If not already made, create a shared album in photos
2. Add your photos and videos into the shared album
3. Click the + button to share
4. On the next screen, you can turn on "public website" and share the link it creates
5. Or you can add my phone number 904-814-3171

The reason the message to Christian did not work is because he has an Android. My phone number 904-814-3171 is an iPhone so it should work

See the attached screenshots on how to share your album, let us know if there are any problems

Get Outlook for iOS

From: Christian Gyle <christian.gyle@osiris9.com>
Sent: Tuesday, August 22, 2023 3:48:03 PM
To: Ahl, Susan G., R.N., CHPN <Ahl.Susan@mayo.edu>
Cc: Ravi Patel <ravi.patel@osiris9.com>
Subject: RE: 3870 Laurel Street St. Augustine FL

Susan,

I am so sorry to hear that your phone is giving you so much grief. Let me talk to one of my colleagues who is very savvy. He might be able to come up with something simpler. I would hate for all your efforts to be wasted. While you are waiting for us to come up with a solution, could you answer a question for me?

About how long does the rising water stay at its highest level? How quickly does it recede?

I spoke with another resident who said the peak flood water stayed for no more than an hour before receding, but he lives near the ICW. I wonder if you area was different.

Regards,

Christian J. Gyle, PE, CFM
Senior Engineer, Osiris 9 Consulting

OSIRIS 9
CONSULTING

10199 Southside Boulevard, Suite 104
Jacksonville, FL 32256
(904) 994-8171(M)
Christian.Gyle@osiris9.com

From: Ahl, Susan G., R.N., CHPN <Ahl.Susan@mayo.edu>
Sent: Tuesday, August 22, 2023 3:32 PM
To: Christian Gyle <christian.gyle@osiris9.com>
Subject: RE: 3870 Laurel Street St. Augustine FL

Christian,

I hate to tell you, I'm 62 years old and a hospice nurse. This phone technology is beyond my mental capacity and has made me a raging lunatic. This project is so important not only to me, but to many other residents.

I see people taking videos and pictures. How are they able to send it everywhere and put onto social media?

The video was too large to send. A neighbor came over to our house and we put the videos and pictures in a "shared file." Problem, we don't know how to get that to you.

Last night I carefully picked out pictures with descriptions (time consuming) and sent them via text to 904-994-8171 and I received a "I message" wasn't on and lost the information. I looked under the setting and messages and it is was green "on," I don't even know what "I message" is. Let me tell you, I could have thrown my phone into the ICW or ocean or taken a sledge hammer to it.

I don't know what to do. Unfortunately, my husband is an android user.

I will put this aggravation aside and ask some other people to help unless you have any other recommendations.

Hopefully, I will be able to send something to you by the end of the week. If not, I hope other neighbors have been able to send their photos and videos.

Susan Ahl

From: Christian Gyle <christian.gyle@osiris9.com>
Sent: Monday, August 21, 2023 4:05 PM
To: Ahl, Susan G., R.N., CHPN <Ahl.Susan@mayo.edu>
Cc: 3 3 <jahl3@msn.com>; Nathan Gottschalk <ngottschalk@sjcfl.us>; Walter Nemecek <walter.nemecek@osiris9.com>
Subject: [EXTERNAL] RE: 3870 Laurel Street St. Augustine FL

Susan,

I hate to trouble you further, but if you could text any of the photos with your wooden fence to my cell phone, then I would have the timestamps for each photo. This could help me see how the water level changed in reference to the tide changes on that same day. Along that same train of thought, do you and your husband recall how long the water on 19th Street seemed to stay at peak level and how long it took to recede to the point where it was no longer in your yard?

Thank you,

Christian J. Gyle, PE, CFM
Senior Engineer, Osiris 9 Consulting

OSIRIS 9 CONSULTING

10199 Southside Boulevard, Suite 104
Jacksonville, FL 32256
(904) 994-8171(M)
Christian.Gyle@osiris9.com

From: Ahl, Susan G., R.N., CHPN <Ahl.Susan@mayo.edu>
Sent: Monday, August 21, 2023 3:27 PM
To: Christian Gyle <christian.gyle@osiris9.com>
Cc: 3 3 <jahl3@msn.com>
Subject: 3870 Laurel Street St. Augustine FL

Hi Christian,

I have provided you with pictures of various stages of the flooding. Some show how are ditches are full prior to the tidal surge that brings the water height of about I think 4 feet based on the redwood picket fence that you seen in our front yard.

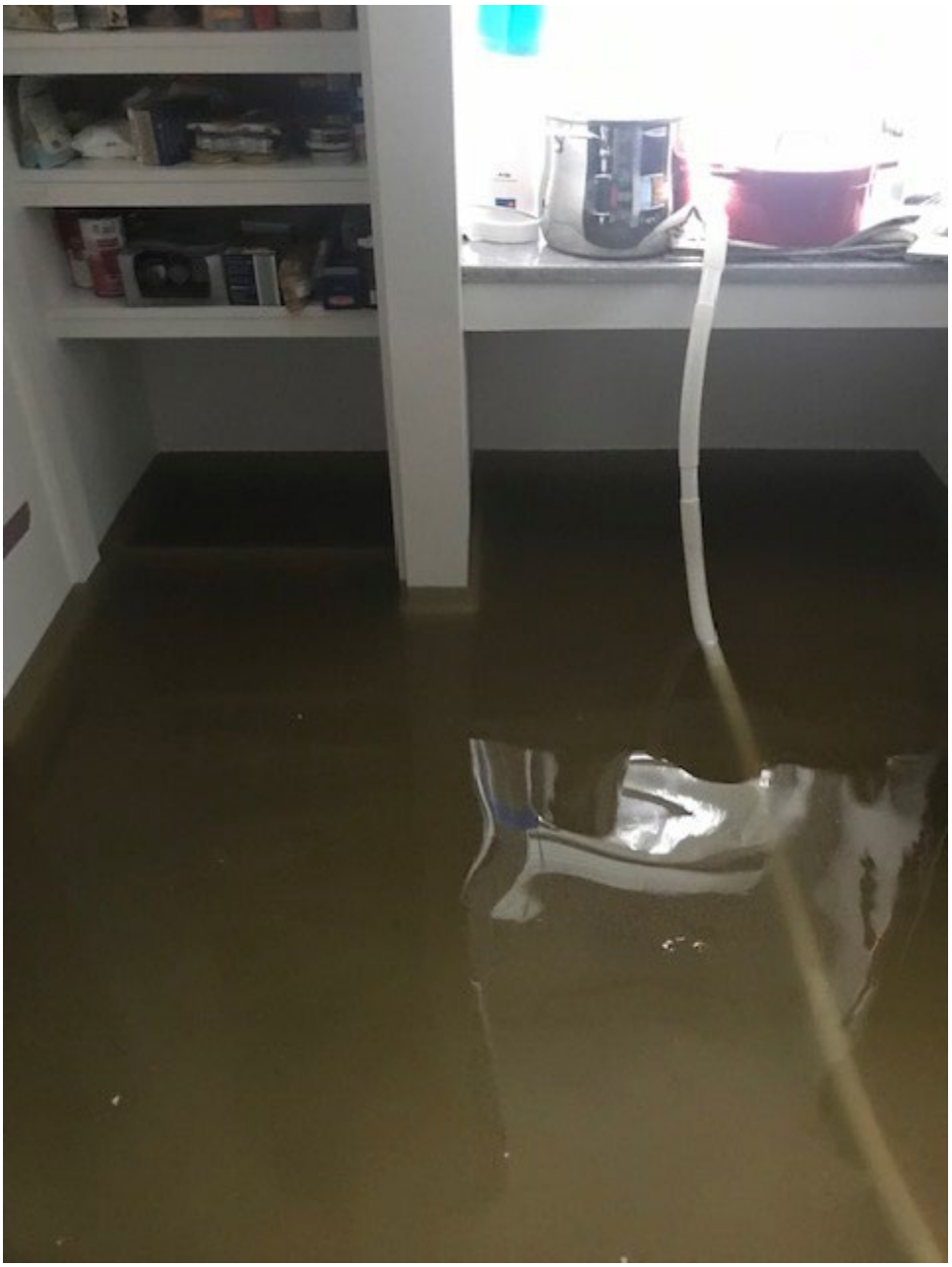
Any corner pictures are the corner of 19th and Laurel Street. I have included pictures of us sump pumping the water out of our kitchen and photos of our flooded kitchen.

If you learn (or know someone who is tech savvy) on how we can get the video's (from my I phone) to you all, let me know. The videos are great because they show the flow of the waters from the ICW.

I have also copied my husband, he may have some additional photos that would be helpful for your study.

Susan Ahl

From: Susan Ahl <susanahl8@gmail.com>
Sent: Monday, August 21, 2023 2:58 PM
To: Ahl, Susan G., R.N., CHPN <Ahl.Susan@mayo.edu>
Subject: [EXTERNAL]




STOP

Sent from my iPhone

Appendix E:
Cost Estimates

Solution 1: Full Length Bulkhead (FLB)

ICW Bulkhead					
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost
0104 11	FLOATING TURBIDITY BARRIER	LF	$ 17.69	3578	$ 63,294.82
0104 10 3	SEDIMENT BARRIER	LF	$ 2.30	3578	$ 8,229.40
0110 1 1	CLEARING & GRUBBING	AC	$ 44,763.67	0.88	$ 39,606.90
0120 6	EMBANKMENT	CY	$ 20.82	5303	$ 110,415.40
0400 2 8	CONCRETE CLASS II, BULKHEAD	CY	$ 1,683.59	573	$ 965,258.27
0415 1 8	REINFORCING STEEL- BULKHEAD	LB	$ 1.70	145646	$ 247,598.93
0455 14 4	CONCRETE SHEET PILING, 12"X30"	LF	$ 371.00	3870	$ 1,435,770.00
0570 1 1	PERFORMANCE TURF	SY	$ 2.34	6450	$ 15,093.00

23rd - Wahoo Berm					
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost
				See Solution 2	$ 24,277.43

23rd Raise					
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost
				See Solution 2	$ 1,430,271.60

Euclid Raise					
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost
				See Solution 2	$ 328,828.00

Subtotal	$	4,668,643.73
Over Water Installation Buffer		20%
Contingency		30%
Total	**$**	**7,283,084.22**

Solution 2: Raise Myrtle, Laurel, Wahoo (RMLW)

Myrtle Raise					
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost
0104 10 3	SEDIMENT BARRIER	LF	$ 2.30	3520	$ 8,096.00
0120 6	EMBANKMENT	CY	$ 20.82	3541	$ 73,724.39
0110 1 1	CLEARING & GRUBBING	AC	$ 44,763.67	0.92	$ 41,075.14
0285701	OPTIONAL BASE, BASE GROUP 01	SY	$ 21.45	4247	$ 91,091.00
0334 1 12	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	TN	$ 151.87	234	$ 35,471.77
0522 1	CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK	SY	$ 73.46	750	$ 55,095.00
0570 1 1	PERFORMANCE TURF	SY	$ 2.34	4441	$ 10,392.37
0430880 01	FLAP GATES, 0-24"	EA	$ 395.53	4	$ 1,582.12
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	EA	$ 3,251.75	14	$ 45,524.50
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$ 169.58	3958	$ 671,197.64
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	$ 47.21	3640	$ 171,844.40
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	$ 8,731.30	36	$ 317,819.32

Laurel Raise					
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost
0104 10 3	SEDIMENT BARRIER	LF	$ 2.30	2480	$ 5,704.00
0120 6	EMBANKMENT	CY	$ 20.82	4387	$ 91,335.03
0110 1 1	CLEARING & GRUBBING	AC	$ 44,763.67	0.69	$ 30,770.55
0285701	OPTIONAL BASE, BASE GROUP 01	SY	$ 21.45	3038	$ 65,165.10
0334 1 12	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	TN	$ 151.87	167	$ 25,375.96
0522 1	CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK	SY	$ 73.46	350	$ 25,711.00
0570 1 1	PERFORMANCE TURF	SY	$ 2.34	3327	$ 7,785.22
0430880 01	FLAP GATES, 0-24"	EA	$ 395.53	3	$ 1,186.59
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	EA	$ 3,251.75	8	$ 26,014.00
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$ 169.58	2721	$ 461,427.18
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	$ 47.21	2604	$ 122,934.84
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	$ 8,731.30	26	$ 227,363.05

16th Raise					
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost
0104 10 3	SEDIMENT BARRIER	LF	$ 2.30	836	$ 1,922.80
0120 6	EMBANKMENT	CY	$ 20.82	590	$ 12,277.63
0110 1 1	CLEARING & GRUBBING	AC	$ 44,763.67	0.35	$ 15,886.63
0285701	OPTIONAL BASE, BASE GROUP 01	SY	$ 21.45	1029	$ 22,072.05
0334 1 12	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	TN	$ 151.87	57	$ 8,595.08
0522 1	CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK	SY	$ 73.46	250	$ 18,365.00
0570 1 1	PERFORMANCE TURF	SY	$ 2.34	1718	$ 4,019.46
0430880 01	FLAP GATES, 0-24"	EA	$ 395.53		$ -
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	EA	$ 3,251.75		$ -
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$ 169.58	882	$ 149,569.56
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	$ 47.21	882	$ 41,639.22
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	$ 8,731.30	9	$ 77,010.07

21st Raise					
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost
0104 10 3	SEDIMENT BARRIER	LF	$ 2.30	884	$ 2,033.20
0120 6	EMBANKMENT	CY	$ 20.82	1938	$ 40,349.16
0110 1 1	CLEARING & GRUBBING	AC	$ 44,763.67	0.34	$ 15,045.07
0285701	OPTIONAL BASE, BASE GROUP 01	SY	$ 21.45	1045	$ 22,422.40
0334 1 12	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	TN	$ 151.87	57	$ 8,731.51
0522 1	CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK	SY	$ 73.46	450	$ 33,057.00
0570 1 1	PERFORMANCE TURF	SY	$ 2.34	1627	$ 3,806.53
0430880 01	FLAP GATES, 0-24"	EA	$ 395.53		$ -
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	EA	$ 3,251.75		$ -
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$ 169.58	896	$ 151,943.68
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	$ 47.21	896	$ 42,300.16
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	$ 8,731.30	9	$ 78,232.45

Solution 2: Raise Myrtle, Laurel, and Wahoo (RMLW) Cont.

Wahoo Raise					
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost
0104 10 3	SEDIMENT BARRIER	LF	$ 2.30	896	$ 2,060.80
0120 6	EMBANKMENT	CY	$ 20.82	645	$ 13,420.42
0110 1 1	CLEARING & GRUBBING	AC	$ 44,763.67	0.17	$ 7,735.16
0285701	OPTIONAL BASE, BASE GROUP 01	SY	$ 21.45	1069	$ 22,922.90
0334 1 12	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	TN	$ 151.87	59	$ 8,926.41
0522 1	CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK	SY	$ 73.46	350	$ 25,711.00
0570 1 1	PERFORMANCE TURF	SY	$ 2.34	836	$ 1,957.06
0430880 01	FLAP GATES, 0-24"	EA	$ 395.53	1	$ 395.53
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	EA	$ 3,251.75	2	$ 6,503.50
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$ 169.58	993	$ 168,392.94
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	$ 47.21	916	$ 43,244.36
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	$ 8,731.30	9	$ 79,978.71

23rd - Wahoo Berm					
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost
0104 10 3	SEDIMENT BARRIER	LF	$ 2.30	470	$ 1,081.00
0120 6	EMBANKMENT	CY	$ 20.82	200	$ 4,164.00
0110 1 1	CLEARING & GRUBBING	AC	$ 44,763.67	0.07	$ 3,187.17
0522 1	CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK	SY	$ 73.46	0	$ -
0570 1 1	PERFORMANCE TURF	SY	$ 2.34	345	$ 806.38
0430880 01	FLAP GATES, 0-24"	EA	$ 395.53	1	$ 395.53
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	EA	$ 3,251.75	2	$ 6,503.50
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$ 169.58	48	$ 8,139.84

23rd Raise					
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost
0104 10 3	SEDIMENT BARRIER	LF	$ 2.30	3060	$ 7,038.00
0120 6	EMBANKMENT	CY	$ 20.82	5362	$ 111,641.47
0110 1 1	CLEARING & GRUBBING	AC	$ 44,763.67	1.31	$ 58,846.32
0285701	OPTIONAL BASE, BASE GROUP 01	SY	$ 21.45	3906	$ 83,783.70
0334 1 12	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	TN	$ 151.87	215	$ 32,626.23
0522 1	CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK	SY	$ 73.46	1050	$ 77,133.00
0570 1 1	PERFORMANCE TURF	SY	$ 2.34	6363	$ 14,888.63
0430880 01	FLAP GATES, 0-24"	EA	$ 395.53	2	$ 791.06
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	EA	$ 3,251.75	4	$ 13,007.00
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$ 169.58	3421	$ 580,133.18
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	$ 47.21	3348	$ 158,059.08
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	$ 8,731.30	33	$ 292,323.92

Euclid Raise					
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost
0104 10 3	SEDIMENT BARRIER	LF	$ 2.30	880	$ 2,024.00
0120 6	EMBANKMENT	CY	$ 20.82	674	$ 14,035.76
0110 1 1	CLEARING & GRUBBING	AC	$ 44,763.67	0.36	$ 16,034.35
0285701	OPTIONAL BASE, BASE GROUP 01	SY	$ 21.45	982	$ 21,071.05
0334 1 12	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	TN	$ 151.87	54	$ 8,205.28
0522 1	CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK	SY	$ 73.46	100	$ 7,346.00
0570 1 1	PERFORMANCE TURF	SY	$ 2.34	1734	$ 4,056.83
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	EA	$ 3,251.75		$ -
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$ 169.58	842	$ 142,786.36
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	$ 47.21	842	$ 39,750.82
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	$ 8,731.30	8	$ 73,517.55

Subtotal	$ 5,527,590.64
Contingency	30%
Total	**$ 7,185,867.83**

Solution 3: Raise Road Ends (RRE)

Euclid Road End								
FDOT Pay Item	Description	Unit		Unit Cost		Quantity		Total Cost
0104 11	FLOATING TURBIDITY BARRIER	LF	$	17.69		233	$	4,121.77
0104 10 3	SEDIMENT BARRIER	LF	$	2.30		233	$	535.90
0110 1 1	CLEARING & GRUBBING	AC	$	44,763.67		0.11	$	4,788.77
0120 6	EMBANKMENT	CY	$	20.82		63	$	1,317.06
0400 2 8	CONCRETE CLASS II, BULKHEAD	CY	$	1,683.59		35	$	58,115.03
0415 1 8	REINFORCING STEEL- BULKHEAD	LB	$	1.70		8769	$	14,907.12
0455 14 4	CONCRETE SHEET PILING, 12"X30"	LF	$	371.00		93	$	34,577.20
0570 1 1	PERFORMANCE TURF	SY	$	2.34		518	$	1,211.60

11th Road End								
FDOT Pay Item	Description	Unit		Unit Cost		Quantity		Total Cost
0104 10 3	SEDIMENT BARRIER	LF	$	2.30		122	$	280.60
0120 6	EMBANKMENT	CY	$	20.82		63	$	1,317.06
0120 72	GRAVEL FILL	CY	$	43,834.52			$	-
0110 1 1	CLEARING & GRUBBING	AC	$	44,763.67		0.03	$	1,253.71
0570 1 1	PERFORMANCE TURF	SY	$	2.34		136	$	317.20
0430880 01	FLAP GATES, 0-24"	EA	$	395.53		1	$	395.53
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	EA	$	3,251.75		2	$	6,503.50
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$	169.58		25	$	4,239.50

12th Road End								
FDOT Pay Item	Description	Unit		Unit Cost		Quantity		Total Cost
0104 10 3	SEDIMENT BARRIER	LF	$	47.21		122	$	5,759.62
0120 6	EMBANKMENT	LF	$	47.21		75	$	3,519.77
0120 72	GRAVEL FILL	LF	$	47.21			$	-
0110 1 1	CLEARING & GRUBBING	LF	$	47.21		0.03	$	1.32
0570 1 1	PERFORMANCE TURF	LF	$	47.21		136	$	6,399.58
0430880 01	FLAP GATES, 0-24"	LF	$	47.21		1	$	47.21
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	LF	$	47.21		2	$	94.42
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$	47.21		25	$	1,180.25

13th Road End								
FDOT Pay Item	Description	Unit		Unit Cost		Quantity		Total Cost
0104 10 3	SEDIMENT BARRIER	LF	$	47.21		122	$	5,759.62
0120 6	EMBANKMENT	LF	$	47.21		32	$	1,493.23
0120 72	GRAVEL FILL	LF	$	47.21			$	-
0110 1 1	CLEARING & GRUBBING	LF	$	47.21		0.03	$	1.32
0570 1 1	PERFORMANCE TURF	LF	$	47.21		136	$	6,399.58
0430880 01	FLAP GATES, 0-24"	LF	$	47.21		1	$	47.21
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	LF	$	47.21		2	$	94.42
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$	47.21		25	$	1,180.25

14th Road End								
FDOT Pay Item	Description	Unit		Unit Cost		Quantity		Total Cost
0104 10 3	SEDIMENT BARRIER	LF	$	47.21		122	$	5,759.62
0120 6	EMBANKMENT	LF	$	47.21		68	$	3,199.79
0120 72	GRAVEL FILL	LF	$	47.21			$	-
0110 1 1	CLEARING & GRUBBING	LF	$	47.21		0.03	$	1.32
0570 1 1	PERFORMANCE TURF	LF	$	47.21		136	$	6,399.58
0430880 01	FLAP GATES, 0-24"	LF	$	47.21		1	$	47.21
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	LF	$	47.21		2	$	94.42
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$	47.21		25	$	1,180.25

Solution 3: Raise Road Ends (RRE) Cont.

15th Road End						
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost	
0104 10 3	SEDIMENT BARRIER	LF	$ 47.21	122	$	5,759.62
0120 6	EMBANKMENT	LF	$ 47.21	133	$	6,292.92
0120 72	GRAVEL FILL	LF	$ 47.21		$	-
0110 1 1	CLEARING & GRUBBING	LF	$ 47.21	0.03	$	1.32
0570 1 1	PERFORMANCE TURF	LF	$ 47.21	136	$	6,399.58
0430880 01	FLAP GATES, 0-24"	LF	$ 47.21	1	$	47.21
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	LF	$ 47.21	2	$	94.42
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$ 47.21	25	$	1,180.25

Boating Club Road End						
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost	
0104 10 3	SEDIMENT BARRIER	LF	$ 47.21	126	$	5,948.46
0120 6	EMBANKMENT	LF	$ 47.21	93	$	4,406.27
0120 72	GRAVEL FILL	LF	$ 47.21		$	-
0110 1 1	CLEARING & GRUBBING	LF	$ 47.21	0.03	$	1.37
0570 1 1	PERFORMANCE TURF	LF	$ 47.21	140	$	6,609.40
0430880 01	FLAP GATES, 0-24"	LF	$ 47.21		$	-
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	LF	$ 47.21		$	-
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$ 47.21		$	-

20th Road End						
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost	
0104 10 3	SEDIMENT BARRIER	LF	$ 47.21	126	$	5,948.46
0120 6	EMBANKMENT	LF	$ 47.21	14	$	660.94
0120 72	GRAVEL FILL	LF	$ 47.21		$	-
0110 1 1	CLEARING & GRUBBING	LF	$ 47.21	0.03	$	1.37
0570 1 1	PERFORMANCE TURF	LF	$ 47.21	140	$	6,609.40
0430880 01	FLAP GATES, 0-24"	LF	$ 47.21	1	$	47.21
0430984125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	LF	$ 47.21	2	$	94.42
0430174118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"SD	LF	$ 47.21	25	$	1,180.25

23rd - Wahoo Berm						
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost	
				See Solution 2	$	24,277.43

23rd Raise						
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost	
				See Solution 2	$	1,430,271.60

Euclid Raise						
FDOT Pay Item	Description	Unit	Unit Cost	Quantity	Total Cost	
				See Solution 2	$	328,828.00

Subtotal	$	2,017,201.42
Contingency		30%
Total Cost	**$**	**2,622,361.84**