

Stormwater Management Plan

Norton Street Stormwater Improvements

November 2024

Prepared For:



The Town of Longboat Key Public Works
600 General Harris St
Longboat Key, FL 34228

Prepared By:

Kimley»Horn

Registry No. 35106
© Kimley-Horn and Associates, Inc.
1800 2nd Street, Suite 900
Sarasota, FL 34236
(941) 379-7600

KH Project No. 148800021

Professional Engineer Certification

STORMWATER MANAGEMENT PLAN

Project: Norton Street Stormwater Improvement

Limits: From General Harris Street to the end of Norton Street

I hereby certify that I am a registered professional engineer in the State of Florida practicing with Kimley-Horn and Associates Inc., and that I have prepared or approved the evaluation, findings, opinions, conclusions, or technical advice for this project.

MOLLY CHARLENE WILLIAMS, P.E.

STATE OF FLORIDA
PROFESSIONAL ENGINEER,
LICENSE NO. 54281

THIS ITEM HAS BEEN DIGITALLY
SIGNED AND SEALED BY
MOLLY CHARLENE WILLIAMS, P.E.
ON THE DATE INDICATED HERE USING A
DIGITAL SIGNATURE.

PRINTED COPIES OF THIS DOCUMENT ARE
NOT CONSIDERED SIGNED AND SEALED
AND THE SIGNATURE MUST BE VERIFIED
ON ANY ELECTRONIC COPIES.

11/27/2024 3:02:09 PM

MOLLY CHARLENE WILLIAMS, P.E. # 54281

Kimley-Horn and Associates, Inc.

1800 2nd Street, Suite 900

Sarasota, Florida 34236

Registry No. 35106

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE SPECIFIC PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OR ANY IMPROPER RELIANCE ON THE DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY KIMLEY-HORN AND ASSOCIATES, INC., SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.

The entirety of this report, including text and images, is the property of Kimley-Horn and Associates, Inc. and is protected under U.S. copyright law. Copyright © 2024, Kimley-Horn and Associates, Inc.

Contents

Professional Engineer Certification.....	1
1.0 Background.....	3
1.1 Existing Conditions	3
1.2 Topography	4
1.3 Existing Drainage Patterns.....	4
1.4 Soils.....	4
1.5 Federal Emergency Management Agency (FEMA) Floodplain	4
2.0 Proposed Conditions.....	4
3.0 Internal Storm Sewer.....	5
4.0 Maintenance Obligations	5
Appendix A Property Information	
Appendix B Tide and Sea Level Rise Information	
Appendix C Internal Storm Sewer Analysis	

1.0 Background

In the Sleepy Lagoon Stormwater Analysis Report, completed by Kimley-Horn and Associates Inc. in October of 2022, Norton Street was identified as the street within the community with the lowest elevation and highest susceptibility to sea level rise (SLR), King Tide flooding, and standing water during rainfall events that are concurrent with a high tide. This report concluded that Norton would be the highest priority and the first phase of the recommended projects for stormwater improvements.

This report addresses the stormwater management system associated with the Norton Street Stormwater Improvement project on the behalf of the Town of Longboat Key. Norton Street is an existing residential roadway that is from General Harris Street to the street's terminus, approximately 2000 LF. The existing roadway is a 2-way street with 18 feet of pavement within a 25-foot right-of-way. Along Norton Street there is minimal drainage infrastructure and no existing curb or shoulder.

The proposed improvements for Norton Street include elevating the roadway, adding valley gutter, adding 16 total inlets, and implementing appropriate sized outfalls. The project includes a pump station as an extra measure of resiliency for the community. Infrastructure for the pump station will be constructed with the project. The pumps may be install in the future to improve flood recovery.

The purpose of this project is to reduce flooding on Norton Street during regular storm events and sunny day flooding by elevating the road and installing additional stormwater infrastructure. This project will improve safety, decrease standing water on the road, and add resiliency for the residences on Norton Street.

Please refer to **A-1 Aerial Location Map** in **Appendix A**, for the location of the project.

1.1 Existing Conditions

In its existing condition, Norton Street is a two-way residential street with 18 feet of pavement within a 25-foot right-of-way. The existing road is sloped toward the low point located perpendicular to the existing outfall location, approximately 1400 feet from the intersection with General Harris Street. The existing stormwater infrastructure on the street consists of two roadside inlets, 12" PVC outfall, and a check valve. The street is bordered by man-made canals that provide access to the intercoastal. The street is currently inundated by frequent flooding and has a considerable amount of resident concern stemming from the flooding issues.

Please refer to the **A-3 Existing Land Use Map** provided in **Appendix A** for the land use around the site.

1.2 Topography

The topography of the roadway corridor generally ranges from 1 foot to 3 feet, per the North American Vertical Datum of 1988 (NAVD88). Please refer to **A-2 Topography Map** in **Appendix A** for the onsite topography.

1.3 Existing Drainage Patterns

In the existing conditions, the stormwater runoff from Norton Street is generally conveyed northeast and southwest toward the two grate inlets which outfall to a 12" PVC pipe that has a check valve. The front half of the residential lots drain toward the roadway and the back half of the properties drain back toward the existing sea walls. Limited capacity of the 12" pipe causes the runoff to stack up in the roadway and has an adverse impact on the adjacent properties.

1.4 Soils

According to the Natural Resources Conservation Service (NRCS) on-site soils are Canaveral fine sand, 0 to 5 percent slopes and Canaveral sand, organic substratum. Hydrologic soil groups range from A to B/D.

1.5 Federal Emergency Management Agency (FEMA) Floodplain

Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) number 12081C0291F, effective on 08/10/2021, the project is located in a FEMA Flood Zone designated AE. Please refer to **A-4 FEMA FIRM Flood Map** in **Appendix A**.

2.0 Proposed Conditions

This project proposes the elevation of Norton Street with the addition of a valley gutter and stormwater infrastructure. The Norton Street roadway is to be elevated a maximum of one foot. The elevated roadway will reduce sunny day flooding and also increase the pressure head between the roadway and tide levels, making the stormwater system more efficient. The proposed drainage system consists of 16 inlets, pipes, and two new outfalls with check valves discharging to existing man-made canals at the rear of the residential lots. The additional structures and storm pipes will create a more efficient drainage system that is currently in place on the road. Offsite flows from rear yards will continue to runoff to the man-made canals. In addition to these improvements, a wet well and trash rack will be installed at the northeast outfall which is the location of the pumpstation / wet well.

It is proposed to add two additional outfalls in conjunction with the existing 12" outfall. These pipes will be installed as 24" polyvinyl chloride (PVC). The addition of outfalls will provide a positive flow path for the drainage system and the roadway runoff during rainfall events. These outfalls will both be fitted with check valves to prevent tidal waters from flowing back onto the roadway. Future considerations of the addition of a pump to the second outfall of the stormwater conveyance system are included as a part of this project. Pumps will improve recovery, reduce flood duration, and allow the stormwater system to drain during high tides. Pumps will not be effective while high tides breach the seawalls.

3.0 Internal Storm Sewer

The internal storm sewer system for Norton Street was designed for the proposed improvements detailed above. The system was hydraulically modeled using a spreadsheet analysis and StormCAD software to ensure the system operates effectively. Basins were delineated for each proposed inlet. From the StormCAD model and spreadsheet analysis, inlet spread and storm sewer hydraulic grade lines (HGL) were calculated. All inlets and stormwater pipes were designed in compliance with the Florida Department of Transportation (FDOT) criteria for allowable inlet spread, HGL, minimum pipe slope, and minimum pipe clearance. The tailwater used within the StormCAD model was based upon the mean high-water level (0.32 ft NAVD88) of the previously mentioned NOAA tide gauge with an additional factor of 0.60 ft added based upon the sea level rise guidance provided in the 2024 FDOT Drainage Manual Section 3.4.1. The additional 0.60 ft added represents the amount of sea level rise expected by 2050.

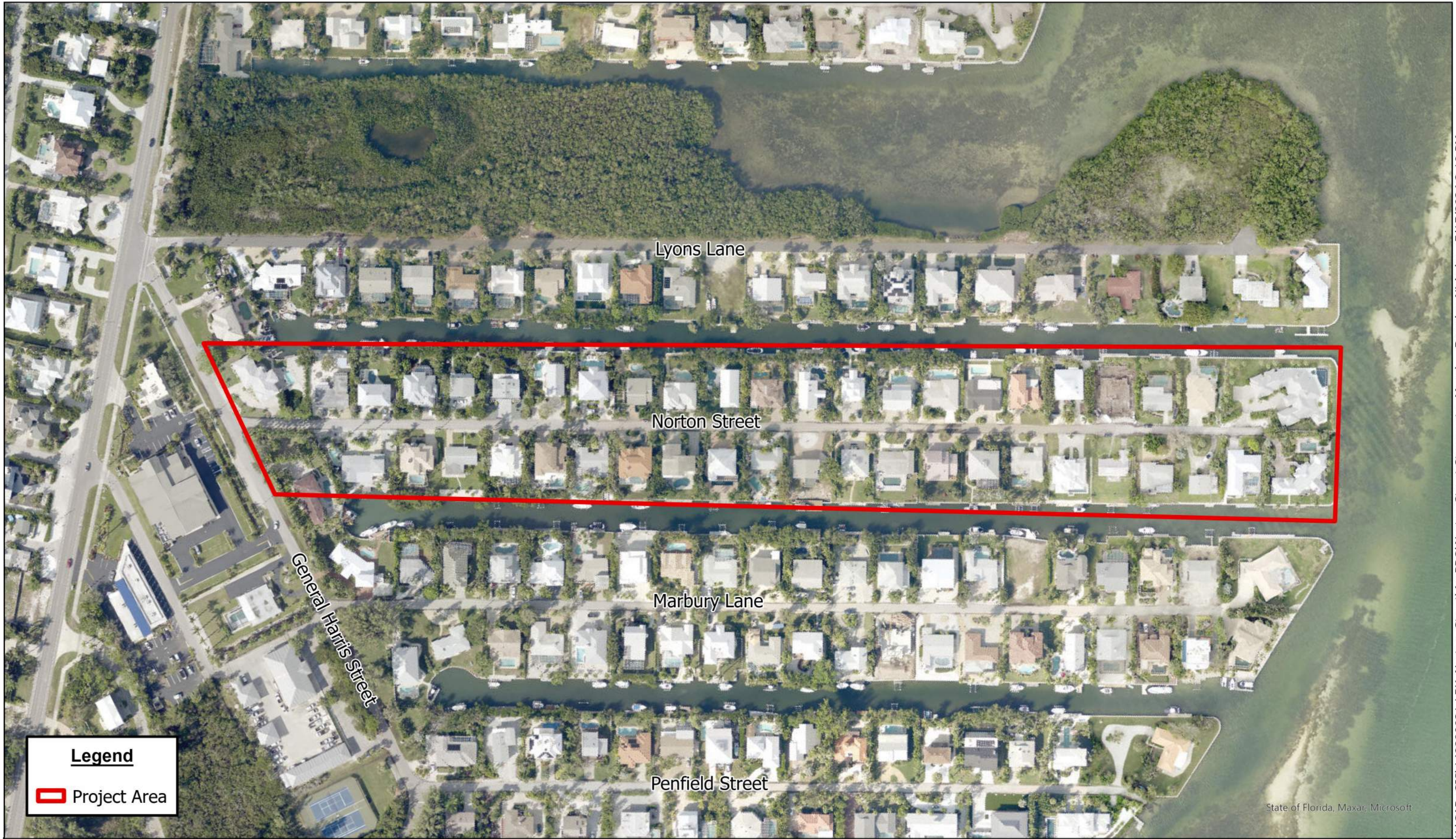
Please refer to **Appendix I** for spread and HGL calculations for this project.

4.0 Maintenance Obligations

The maintenance of stormwater management facilities associated with this project will be the responsibility of the Town of Longboat Key Public Works.

- A-1 Aerial Location Map
- A-2 Existing Land Use Map
- A-3 Topography Map
- A-4 FEMA FIRM Flood Map (Map Number 12081C0291F)

Appendix A – Property Information



Project Location
Norton Street Stormwater Improvement

Longboat Key, FL
Manatee County
May 2024

0 200 400
Feet
Map Scale: 1:2,000



Kimley»Horn | A-1

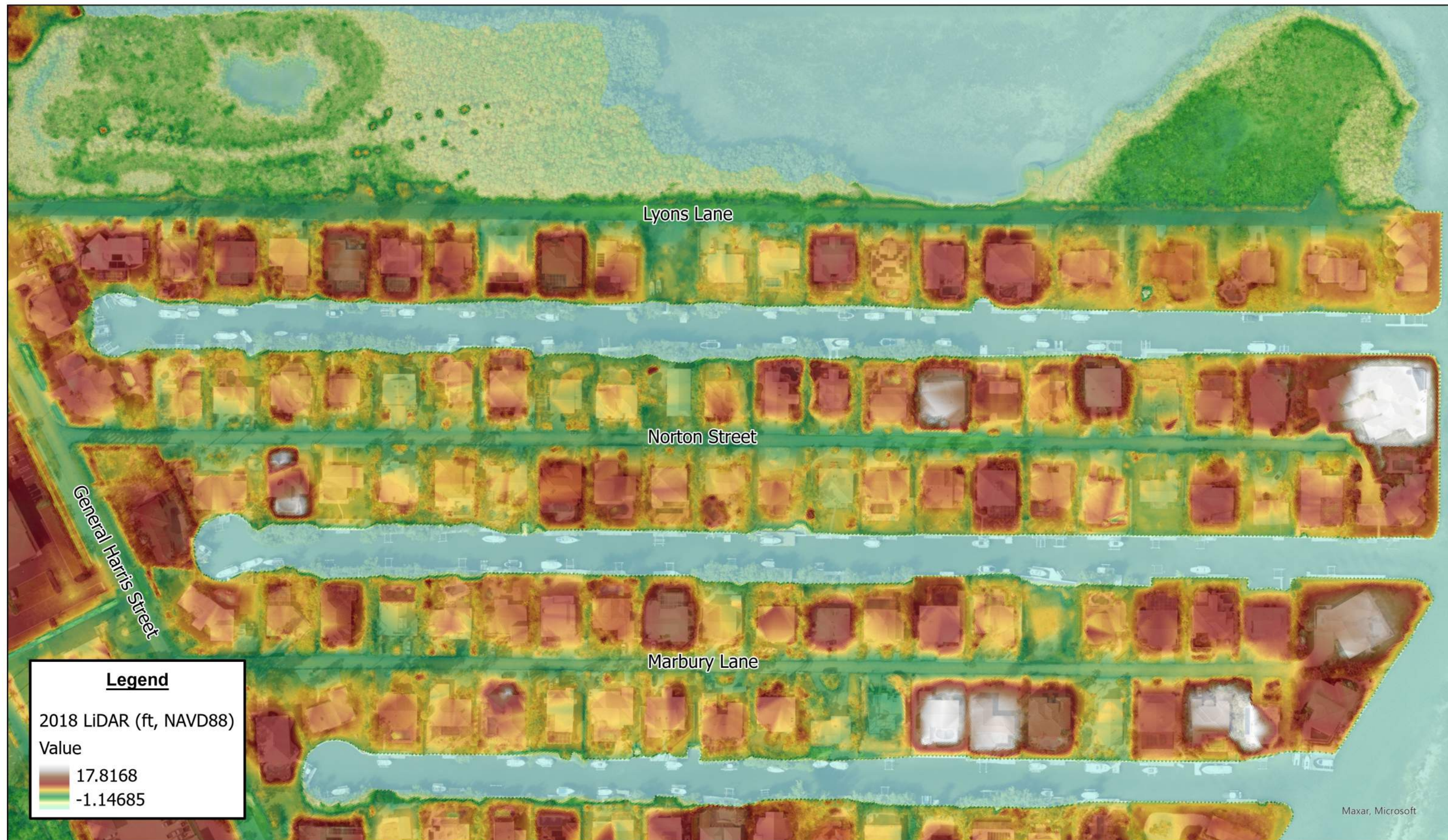


Legend

Existing Landuse

- Building
- Impervious
- Impervious (DCIA)
- Pervious
- Surface Water

K:\SAR_GIS\148800021-LBK_Norton_Street\ArcPRO\Norton Street Stormwater Maps\ - Brandon.Nichols - 5/15/2024 3:11 PM



Legend

2018 LiDAR (ft, NAVD88)

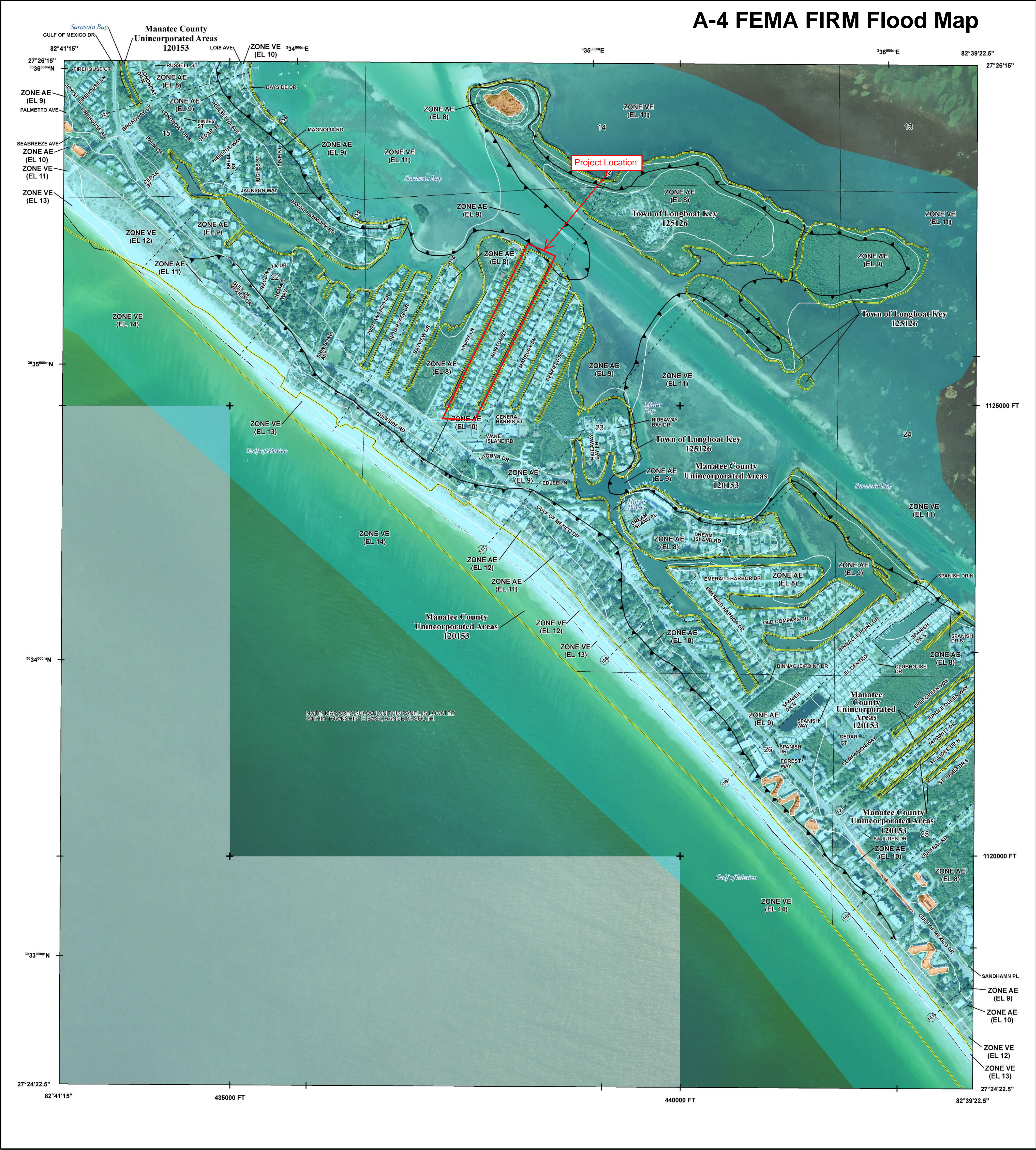
Value

17.8168

-1.14685

K:\SAR_GIS\148800021-LBK_Norton_Street\ArcPRO\Norton Street Stormwater Maps\ - Brandon.Nichols - 5/15/2024 3:11 PM

A-4 FEMA FIRM Flood Map



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTPS://MSC.FEMA.GOV](https://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A,V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes. Zone X
OTHER AREAS		Area with Flood Risk due to Levee Zone D
		Area of Minimal Flood Hazard Zone X
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
	Limit of Study	
	Jurisdiction Boundary	

NOTES TO USERS

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

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

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

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-636-6620.

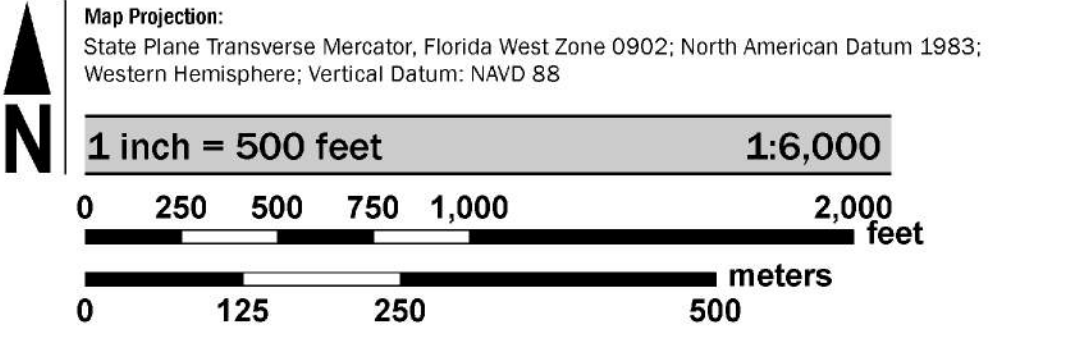
Base map information shown on this FIRM was provided in digital format by Manatee County, dated 2010 and 2017; the Southwest Florida Water Management District, dated 2010 and 2012; the Florida Department of Transportation, dated 2017; and the U.S. Department of Agriculture, dated 2016.

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

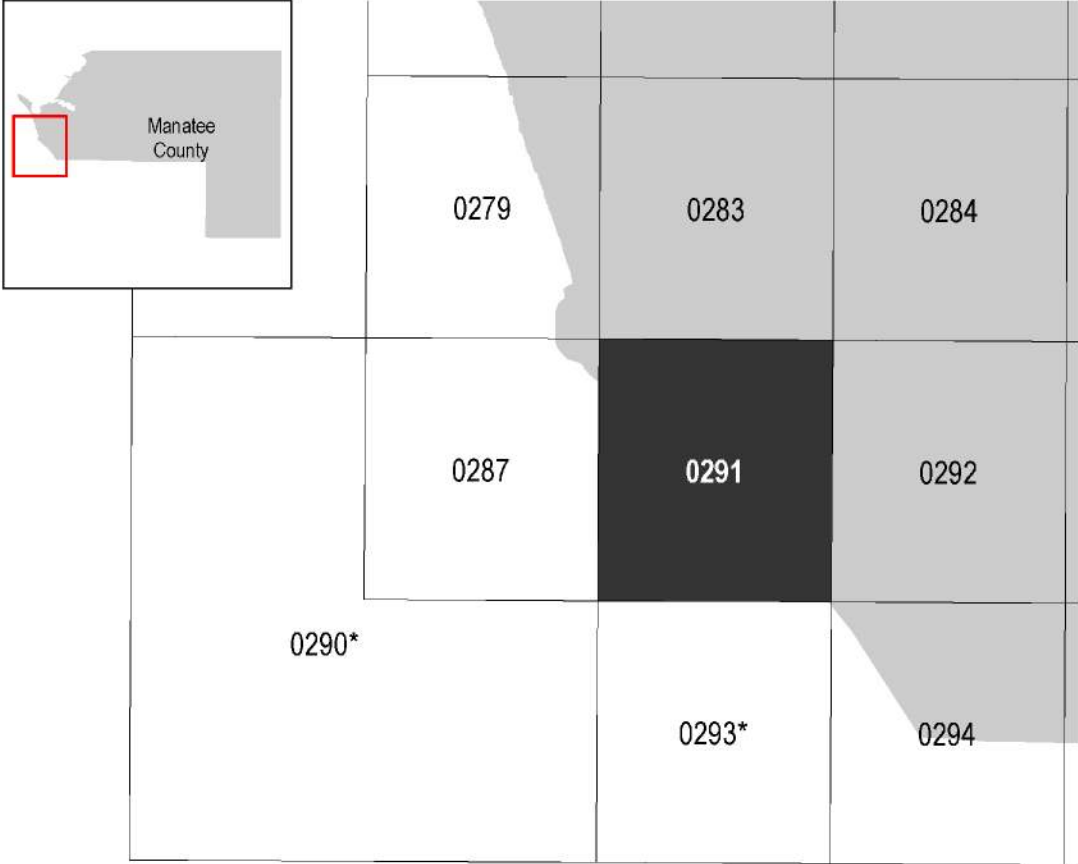
Limit of Moderate Wave Action (LIMWA)

Coastal Barrier Resources System (CBRS) areas and "otherwise protected areas" (OPAs) are no longer shown on this map panel, but still may be present in this community. Current information on these areas is provided by the U.S. Fish & Wildlife Service (FWS). NFIP flood insurance is not available within CBRS areas for structures that are built or substantially improved on or after the dates indicated by FWS. Users should reference the most up-to-date information provided by FWS to determine NFIP insurance eligibility. The official maps and additional information regarding CBRS areas are provided on the FWS website at: www.fws.gov/cbrs. FEMA also includes the official boundaries from FWS on our interactive and dynamic flood maps available through the FEMA Map Service Center.

SCALE



PANEL LOCATOR



*PANEL NOT PRINTED

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

MANATEE COUNTY, FLORIDA
 and Incorporated Areas

PANEL 291 OF 575

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LONGBOAT KEY, TOWN OF	125126	0291	F
MANATEE COUNTY	120153	0291	F

VERSION NUMBER 2.4.3.2

MAP NUMBER 12081C0291F

MAP REVISED AUGUST 10, 2021

- NOAA Port Manatee Gauge Tide Levels
- Sea Level Rise Predictions for FDOT Tailwater Conditions
- NOAA Sea Level Rise Information

Appendix B – Tide and Sea Level Rise Information

NOAA-Port Manatee Gauge Tide Levels

Elevations on NAVD88

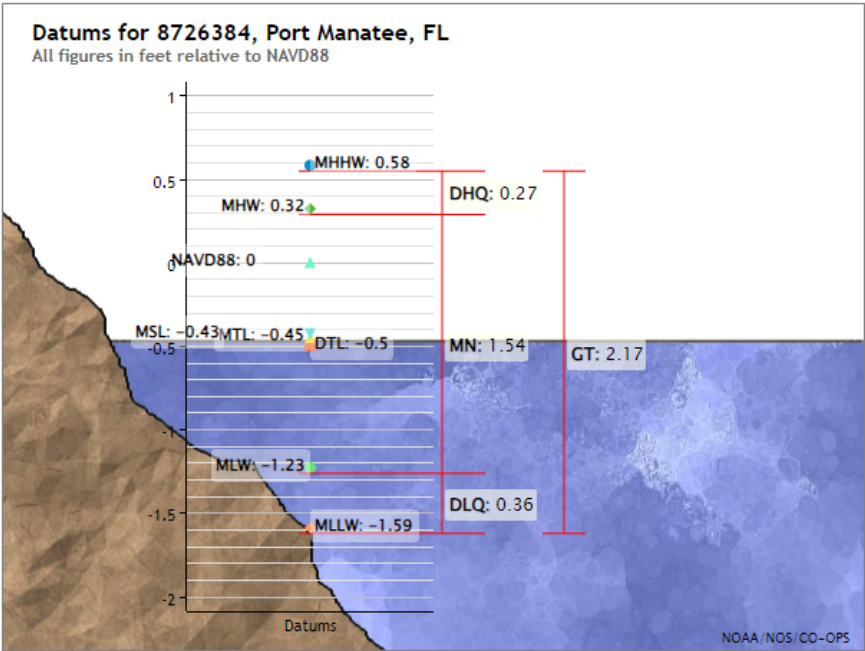
Station: 8726384, Port Manatee, FL
Status: Accepted (Sep 14 2020)
Units: Feet
Control Station: 8726520 St. Petersburg, FL

T.M.: 0
Epoch: 1983-2001
Datum: NAVD88

Datum	Value	Description
MHHW	0.58	Mean Higher-High Water
MHW	0.32	Mean High Water
MTL	-0.45	Mean Tide Level
MSL	-0.43	Mean Sea Level
DTL	-0.50	Mean Diurnal Tide Level
MLW	-1.23	Mean Low Water
MLLW	-1.59	Mean Lower-Low Water
NAVD88	0.00	North American Vertical Datum of 1988
STND	-1.80	Station Datum
GT	2.17	Great Diurnal Range
MN	1.54	Mean Range of Tide
DHQ	0.27	Mean Diurnal High Water Inequality
DLQ	0.36	Mean Diurnal Low Water Inequality
HWI	6.27	Greenwich High Water Interval (in hours)
LWI	12.23	Greenwich Low Water Interval (in hours)
Max Tide	4.16	Highest Observed Tide
Max Tide Date & Time	08/30/2023 16:42	Highest Observed Tide Date & Time
Min Tide	-3.83	Lowest Observed Tide
Min Tide Date & Time	09/28/2022 19:24	Lowest Observed Tide Date & Time
HAT	1.36	Highest Astronomical Tide
HAT Date & Time	07/21/2005 17:06	HAT Date and Time
LAT	-2.71	Lowest Astronomical Tide
LAT Date & Time	01/21/2023 12:30	LAT Date and Time

Tidal Datum Analysis Periods

12/01/1999 - 11/30/2008



Showing datums for

8726384 Port Manatee, FL

Datum

NAVD88

Data Units ☒ Feet

☐ Meters

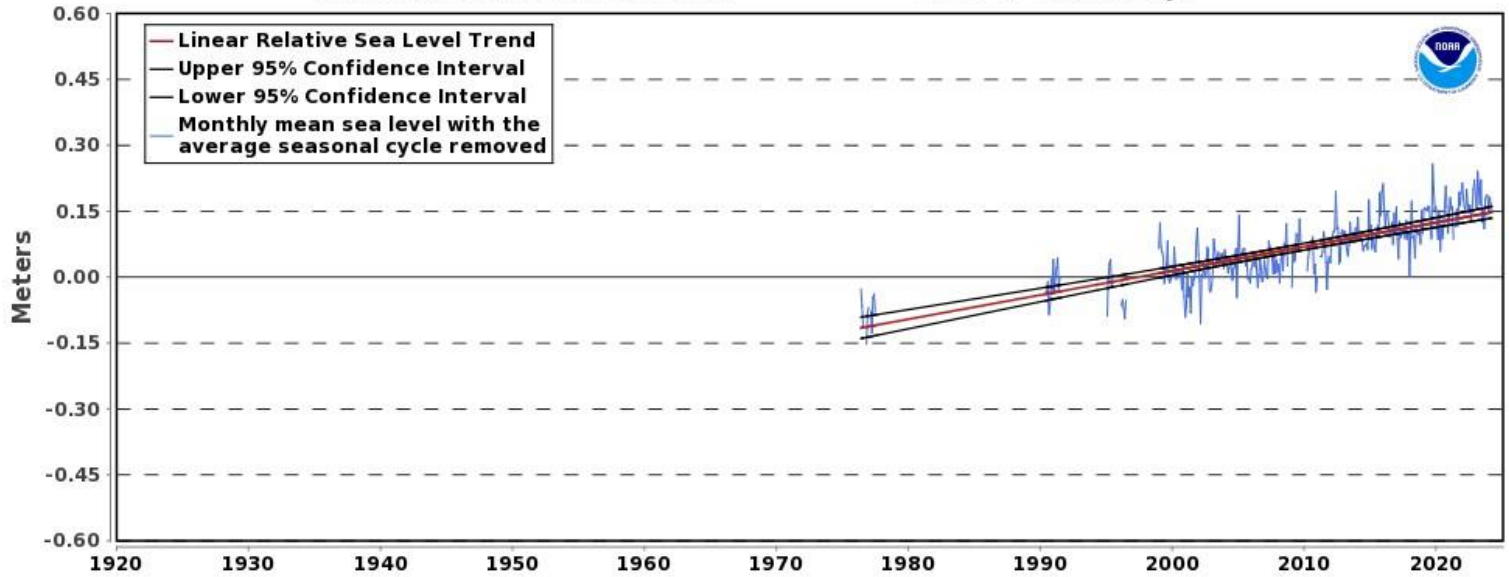
Epoch ☒ Present (1983-2001)

☐ Superseded (1960-1978)

Submit

8726384 Port Manatee, Florida

5.50 +/- 0.68 mm/yr



USACE Sea Level Change Curve Calculator (2021.12)

Project Name:

Select Gauge:

Scenarios Source:

Output Units: ☒ Feet ☐ Meters

Output Datum: ☐ LMSL ☒ NAVD88

Critical Elevation #1 (ft): NAVD88 - Description:

Critical Elevation #2 (ft): NAVD88 - Description:

NOAA et al. 2017 options

Show Grid Points ☐

Show USACE 2013 Curves ☐

Show 2100 to 2200 ☐

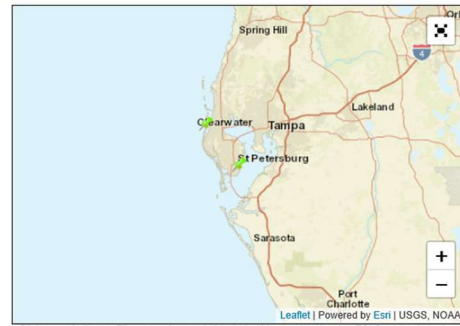
Adjust to MSL(83-01) Datum: ? ☒ adjustment to MSL Datum: 0.082 feet applied

Lines Type: ☒ None ☐ Interpolated ☐ Polynomial Trend

Point Shape: ☒ Circle ☐ Square ☐ Triangle

Vertical Land Movement (ft/yr):

Plot 66 Percentile Confidence Band:



Clicked 35 miles from closest gauge: ST. PETERSBURG
 *** note - there may be factors other than proximity to consider when selecting a gauge ***
 NOAA2017 Gauges:
 Interpolated Grid Point:

Project: Town of Longboat Key
 Gauge/Grid Selected: ST. PETERSBURG
 NOAA2017 VLM: 0.00285 feet/yr
 Adjustment to MSL(83-01) Datum: 0.082 feet applied
 Adjustment to NAVD88 Datum: -0.28 feet applied
 66 Percentile Confidence Range for the Intermediate High Scenario is shown
 All values expressed in feet

Figure 1: US Army Corps of Engineers data inputs.

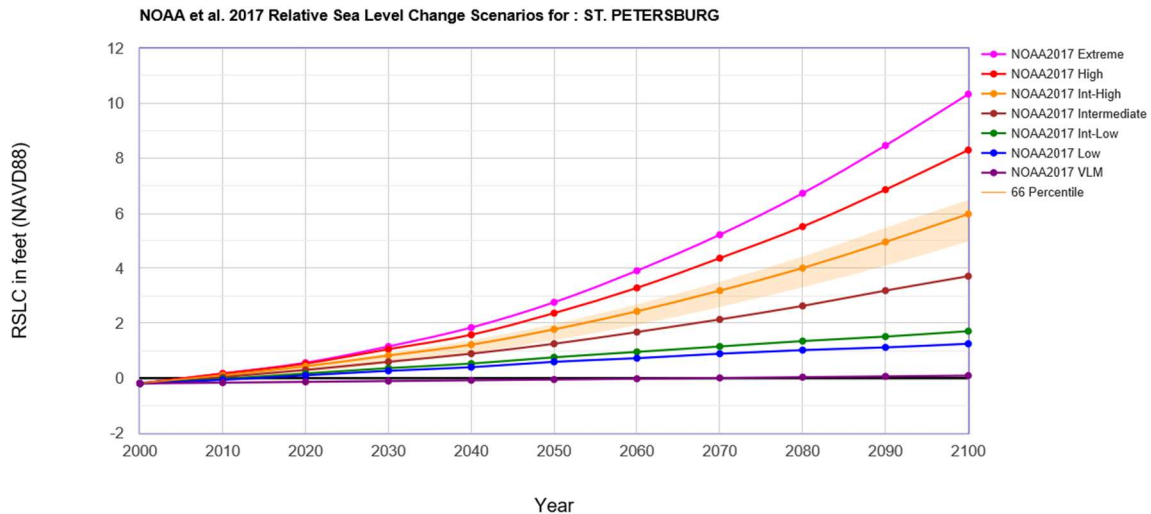


Figure 2: NOAA 2017 Relative Sea Level Change data.

Table 1: NOAA 2017 Sea Level Change Data

Town of Longboat Key
 Scenarios for ST. PETERSBURG
 NOAA2017 VLM: 0.00285 feet/yr
 All values are expressed in feet

Year	NOAA2017 VLM	NOAA2017 Low	NOAA2017 Int-Low	NOAA2017 Intermediate	NOAA2017 Int-High	NOAA2017 High	NOAA2017 Extreme
2000	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19
2010	-0.16	-0.06	-0.03	0.04	0.10	0.17	0.17
2020	-0.14	0.10	0.17	0.30	0.43	0.53	0.56
2030	-0.11	0.27	0.36	0.59	0.82	1.05	1.15
2040	-0.08	0.40	0.53	0.89	1.22	1.58	1.84
2050	-0.05	0.59	0.76	1.25	1.78	2.37	2.76
2060	-0.02	0.73	0.95	1.68	2.43	3.28	3.91
2070	0.01	0.89	1.15	2.14	3.19	4.37	5.22
2080	0.03	1.02	1.35	2.63	4.01	5.52	6.73
2090	0.06	1.12	1.51	3.19	4.96	6.86	8.47
2100	0.09	1.25	1.71	3.71	5.97	8.30	10.34

- Inlet Spread Calculations
- Storm Sewer Hydraulic Grade Line (HGL) Calculations

Appendix C – Internal Storm Sewer Analysis

Norton Street

Gutter Spread Calculations

$$Q \text{ (cfs)} = (0.56/n) * S_x^{(1.67)} * S^{(0.5)} * T^{(2.67)}$$

Speed limit 20 mph

Structure No.	Station (ft)	Side	Type	Sag Bk/Ah or On Grade	Total Area (Ac)	Basin Area C=0.95 (ac)	Basin Area C=0.2 (ac) front lot	Composite Runoff Coefficient	Rainfall Intensity (in/hr)	Overland Runoff (cfs)	Inlet Capacity (cfs)	Inlet Bypass (cfs)	Bypass To	Flow W/ Bypass (cfs)	S _x Cross Slope (ft/ft)	S Longitudinal Slope (ft/ft)	Manning's "n"	Tcalc Spread (ft)	Tallowable Spread (ft)	Status	Remarks
S-100	10+22.35	LT	Type V GI	Sag Bk	0.04	0.01	0.02	0.62	4.00	0.000	0.000	0.000	--	--	2.000%	0.443%	0.016	0.00	6.50	OK	1/2 Lane + C&G = 6.5'
S-100	10+22.35	LT	Type V GI	Sag Ah	0.19	0.02	0.17	0.62	4.00	0.260	0.260	0.000	--	--	2.000%	0.443%	0.016	5.07	6.50	OK	1/2 Lane + C&G = 6.5'
S-101	10+31.83	RT	Type V GI	Sag Bk	0.03	0.01	0.02	0.49	4.00	0.046	0.046	0.000	--	--	2.000%	0.443%	0.016	2.65	6.50	OK	1/2 Lane + C&G = 6.5'
S-101	10+31.83	RT	Type V GI	Sag Ah	0.22	0.03	0.19	0.49	4.00	0.260	0.260	0.000	--	--	2.000%	0.443%	0.016	5.07	6.50	OK	1/2 Lane + C&G = 6.5'
S-102	12+20.00	RT	Type V GI	Sag Bk	0.15	0.03	0.12	0.74	4.00	0.203	0.203	0.000	--	--	2.000%	0.304%	0.016	4.96	6.50	OK	1/2 Lane + C&G = 6.5'
S-102	12+20.00	LT	Type V GI	Sag Ah	0.19	0.03	0.16	0.74	4.00	0.254	0.254	0.000	--	--	2.000%	0.378%	0.016	5.18	6.50	OK	1/2 Lane + C&G = 6.5'
S-103	12+20.00	LT	Type V GI	Sag Bk	0.24	0.03	0.21	0.78	4.00	0.276	0.276	0.000	--	--	2.000%	0.304%	0.016	5.56	6.50	OK	1/2 Lane + C&G = 6.5'
S-103	12+20.00	RT	Type V GI	Sag Ah	0.20	0.03	0.17	0.78	4.00	0.265	0.265	0.000	--	--	2.000%	0.378%	0.016	5.26	6.50	OK	1/2 Lane + C&G = 6.5'
S-104	15+35.00	LT	Type V GI	Sag Bk	0.23	0.03	0.20	0.72	4.00	0.271	0.271	0.000	--	--	2.000%	0.352%	0.016	5.37	6.50	OK	1/2 Lane + C&G = 6.5'
S-104	15+35.00	LT	Type V GI	Sag Ah	0.23	0.04	0.19	0.72	4.00	0.299	0.299	0.000	--	--	2.000%	0.360%	0.016	5.55	6.50	OK	1/2 Lane + C&G = 6.5'
S-105	15+35.00	RT	Type V GI	Sag Bk	0.21	0.04	0.17	0.68	4.00	0.275	0.275	0.000	--	--	2.000%	0.352%	0.016	5.40	6.50	OK	1/2 Lane + C&G = 6.5'
S-105	15+35.00	RT	Type V GI	Sag Ah	0.18	0.03	0.15	0.68	4.00	0.239	0.239	0.000	--	--	2.000%	0.360%	0.016	5.10	6.50	OK	1/2 Lane + C&G = 6.5'
S-200	17+47.00	LT	Type V GI	Sag Bk	0.14	0.02	0.12	0.74	4.00	0.177	0.177	0.000	--	--	2.000%	0.517%	0.016	4.26	6.50	OK	1/2 Lane + C&G = 6.5'
S-200	17+47.00	LT	Type V GI	Sag Ah	0.12	0.02	0.10	0.74	4.00	0.162	0.162	0.000	--	--	2.000%	0.301%	0.016	4.56	6.50	OK	1/2 Lane + C&G = 6.5'
S-201	17+47.00	RT	Type V GI	Sag Bk	0.13	0.03	0.10	0.74	4.00	0.182	0.182	0.000	--	--	2.000%	0.517%	0.016	4.30	6.50	OK	1/2 Lane + C&G = 6.5'
S-201	17+47.00	RT	Type V GI	Sag Ah	0.12	0.02	0.10	0.74	4.00	0.143	0.143	0.000	--	--	2.000%	0.301%	0.016	4.35	6.50	OK	1/2 Lane + C&G = 6.5'
S-202	19+05.00	LT	Type V GI	Sag Bk	0.10	0.02	0.08	0.75	4.00	0.136	0.136	0.000	--	--	2.000%	0.309%	0.016	4.25	6.50	OK	1/2 Lane + C&G = 6.5'
S-202	19+05.00	LT	Type V GI	Sag Ah	0.28	0.06	0.22	0.75	4.00	0.404	0.404	0.000	--	--	2.000%	0.301%	0.016	6.42	6.50	OK	1/2 Lane + C&G = 6.5'
S-203	19+05.00	RT	Type V GI	Sag Bk	0.10	0.01	0.09	0.83	4.00	0.122	0.122	0.000	--	--	2.000%	0.309%	0.016	4.08	6.50	OK	1/2 Lane + C&G = 6.5'
S-203	19+05.00	RT	Type V GI	Sag Ah	0.27	0.04	0.23	0.83	4.00	0.339	0.339	0.000	--	--	2.000%	0.301%	0.016	6.02	6.50	OK	1/2 Lane + C&G = 6.5'
S-204	22+80.00	LT	Type V GI	Sag Bk	0.28	0.05	0.24	0.74	4.00	0.375	0.375	0.000	--	--	2.000%	0.303%	0.016	6.24	6.50	OK	1/2 Lane + C&G = 6.5'
S-204	22+80.00	LT	Type V GI	Sag Ah	0.31	0.06	0.25	0.74	4.00	0.415	0.415	0.000	--	--	2.000%	0.300%	0.016	6.49	6.50	OK	1/2 Lane + C&G = 6.5'
S-205	22+80.00	RT	Type V GI	Sag Bk	0.28	0.05	0.23	0.72	4.00	0.374	0.374	0.000	--	--	2.000%	0.303%	0.016	6.23	6.50	OK	1/2 Lane + C&G = 6.5'
S-205	22+80.00	RT	Type V GI	Sag Ah	0.31	0.06	0.26	0.72	4.00	0.416	0.416	0.000	--	--	2.000%	0.300%	0.016	6.50	6.50	OK	1/2 Lane + C&G = 6.5'
S-207	26+90.00	LT	Type V GI	Sag Bk	0.31	0.05	0.26	0.72	4.00	0.391	0.391	0.000	--	--	2.000%	0.347%	0.016	6.18	6.50	OK	1/2 Lane + C&G = 6.5'
S-207	26+90.00	LT	Type V GI	Sag Ah	0.16	0.03	0.13	0.72	4.00	0.211	0.211	0.000	--	--	2.000%	0.340%	0.016	4.92	6.50	OK	1/2 Lane + C&G = 6.5'
S-208	26+90.00	RT	Type V GI	Sag Bk	0.30	0.05	0.25	0.66	4.00	0.385	0.385	0.000	--	--	2.000%	0.347%	0.016	6.15	6.50	OK	1/2 Lane + C&G = 6.5'
S-208	26+90.00	RT	Type V GI	Sag Ah	0.22	0.03	0.19	0.66	4.00	0.256	0.256	0.000	--	--	2.000%	0.340%	0.016	5.30	6.50	OK	1/2 Lane + C&G = 6.5'
S-210	29+00.00	LT	Type V GI	Sag Bk	0.19	0.03	0.16	0.60	4.00	0.223	0.223	0.000	--	--	2.000%	0.430%	0.016	4.81	6.50	OK	1/2 Lane + C&G = 6.5'
S-210	29+00.00	LT	Type V GI	Sag Ah	0.17	0.00	0.17	0.60	4.00	0.140	0.140	0.000	--	--	2.000%	0.430%	0.016	4.03	6.50	OK	1/2 Lane + C&G = 6.5'
S-211	29+03.85	RT	DBI Type C	On Grade	0.33	0.02	0.31	0.72	4.00	0.324	0.324	0.000	--	--	2.000%	0.430%	0.016	5.53	6.50	OK	1/2 Lane + C&G = 6.5'

FLORIDA DEPARTMENT OF TRANSPORTATION
STORM SEWER TABULATION FORM

Financial Project ID:
Description:

County: Manatee
Organization: Kimley-Horn

Network: Outfall 1
Norton Street, Longboat Key

Sheet: 1 of 2
Prepared by: KC
Checked by:
Date: 6/20/2024
Date:

LOCATION OF UPPER END			STRUCTURE NO.			DRAINAGE AREA (ac. or ha.)		TIME OF CONCENTRATION (min)	TIME OF FLOW IN SECTION (min)	INTENSITY (in/hr)	TOTAL (C*A)	BASE FLOW (cfs)	TOTAL FLOW (cfs)	MINOR LOSSES (ft)	INLET ELEVATION (ft)	HGL CLEARANCE (ft)	HYDRAULIC GRADIENT			NUMBER OF BARRELS	PIPE SIZE (in)		SLOPE (%)	ACTUAL VELOCITY (fps)	FULL FLOW CAPACITY (cfs)	NOTES AND REMARKS		
						INCREMENTAL	SUB-TOTAL (C*A)										CROWN				RISE	HYD. GRAD.				PHYSICAL VELOCITY (fps)	ZONE: Zone 6	
ALIGNMENT NAME			UPPER LOWER	TYPE OF STRUCTURE	LENGTH (ft)	COMPOSITE C VALUE		AREA	TIME OF CONCENTRATION (min)	TIME OF FLOW IN SECTION (min)	INTENSITY (in/hr)	TOTAL (C*A)	BASE FLOW (cfs)	TOTAL FLOW (cfs)	MINOR LOSSES (ft)	INLET ELEVATION (ft)	HGL CLEARANCE (ft)	UPPER END ELEVATION (ft)	LOWER END ELEVATION (ft)	FALL (ft)			NUMBER OF BARRELS	SPAN	PHYSICAL			MIN. PHYSICAL
NORTON STREET							S-100														INLET GRATE	18				0.620	0.230	
10+22.35	11.30	LT	S-301	0.715	0.200	0.143	-0.62	-0.64	0.02	2.17	0.11%																	
						-2.12	-2.14	0.02																				
NORTON STREET			S-101	INLET GRATE	8	0.490	0.250	0.123	10.00	0.29	7.51	0.123	0.000	0.93	0.00	1.87	0.61	1.26	1.25	0.01	1	18	0.119%	0.52	5.56			
10+31.83	12.80	RT	S-301			0.410	0.30	0.123										-0.62	-0.64	0.02			3.15	0.24%				
								-2.12										-2.14	0.02									
NORTON STREET			S-301	MANHOLE	225	(N/A)	(N/A)	0.000	10.46	3.54	7.38	0.265	0.000	1.97	0.00	1.87	0.62	1.25	1.19	0.06	1	18	0.027%	1.12	4.92			
10+30.33	4.50	RT	S-302			0.530	0.50	0.265										-0.64	-1.06	0.42			2.78	0.19%				
								-2.14										-2.56	0.42									
NORTON STREET			S-102	INLET GRATE	15	0.740	0.340	0.252	10.00	0.22	7.51	0.252	0.000	1.90	0.01	1.64	0.45	1.19	1.19	0.00	1	18	0.000%	1.08	5.63			
12+55.00	10.00	LT	S-302			0.840	0.30	0.252										-0.54	-0.56	0.02			3.19	0.14%				
								-2.04										-2.06	0.02									
NORTON STREET			S-103	INLET GRATE	6	0.780	0.440	0.343	10.00	0.06	7.51	0.343	0.000	2.60	0.02	1.67	0.48	1.19	1.19	0.00	1	18	0.000%	1.47	6.86			
12+55.00	10.00	RT	S-302			0.858	0.40	0.343										-0.54	-0.56	0.02			3.88	0.36%				
								-2.04										-2.06	0.02									
NORTON STREET			S-302	MANHOLE	213	(N/A)	(N/A)	0.000	13.85	1.91	6.43	0.860	0.000	5.84	0.00	1.94	0.75	1.19	1.07	0.12	1	24	0.056%	1.86	8.88			
12+54.94	4.50	RT	S-106			0.662	1.30	0.860										-0.56	-0.84	0.28			2.83	0.13%				
								-2.56										-2.84	0.28									
NORTON STREET			S-200	INLET GRATE	15	0.740	0.260	0.192	10.00	0.29	7.51	0.192	0.000	1.46	0.01	1.64	0.49	1.15	1.15	0.00	1	18	0.000%	0.82	5.18			
17+47.00	10.00	LT	S-304			0.640	0.30	0.192										-0.50	-0.53	0.03			2.93	0.21%				
								-2.00										-2.03	0.03									
NORTON STREET			S-201	INLET GRATE	6	0.740	0.250	0.185	10.00	0.12	7.51	0.185	0.000	1.40	0.01	1.67	0.52	1.15	1.15	0.00	1	18	0.000%	0.79	8.40			
17+47.00	10.00	RT	S-304			0.617	0.300	0.185										-0.50	-0.53	0.03			4.76	0.55%				
								-2.00										-2.03	0.03									
NORTON STREET			S-304	MANHOLE	212	(N/A)	(N/A)	0.000	10.29	4.14	7.43	0.377	0.000	2.83	0.00	1.97	0.82	1.15	1.12	0.03	1	24	0.014%	0.90	7.71			
17+47.06	4.50	RT	S-303			0.754	0.500	0.377										-0.53	-0.74	0.21			2.46	0.10%				
								-2.53										-2.74	0.21									
NORTON STREET			S-104	INLET GRATE	15	0.720	0.460	0.331	10.00	0.17	7.51	0.331	0.000	2.51	0.02	1.66	0.53	1.13	1.12	0.01	1	18	0.069%	1.42	4.23			
15+35.00	10.00	LT	S-303			0.662	0.500	0.331										-0.43	-0.45	0.02			2.39	0.14%				
								-1.93										-1.95	0.02									
NORTON STREET			S-105	INLET GRATE	6	0.680	0.390	0.265	10.00	0.08	7.51	0.265	0.000	2.01	0.01	1.69	0.57	1.12	1.12	0.00	1	18	0.000%	1.14	6.86			
15+35.00	10.00	RT	S-303			0.663	0.400	0.265										-0.43	-0.45	0.02			3.88	0.36%				
								-1.93										-1.95	0.02									
NORTON STREET			S-303	MANHOLE	67	(N/A)	(N/A)	0.000	14.22	0.52	6.32	0.974	0.000	6.82	0.00	2.05	0.93	1.12	1.07	0.05	1	24	0.075%	2.17	9.46			
15+35.05	4.50	RT	S-106			0.696	1.400	0.974										-0.74	-0.84	0.10			3.01	0.15%				
								-2.74										-2.84	0.10									
NORTON STREET			S-106	MANHOLE	130	(N/A)	(N/A)	0.000	15.76	0.61	6.03	1.834	0.000	11.14	0.00	2.10	1.03	1.07	0.92	0.15	1	24	0.115%	3.55	11.47			
14+68.00	5.50	RT	S-107			0.705	2.600	1.834										-0.84	-1.00	0.16			3.65	0.12%				
								-2.84										-3.00	0.16									
							</																					

Financial Project ID:
Description:

Network: Outfall 2
Norton Street, Longboat Key

Sheet: 2 of 2
Prepared by: KC Date: 8/20/2024
Checked by: _____

LOCATION OF UPPER END			STRUCTURE NO.		TYPE OF STRUCTURE	LENGTH (ft)	DRAINAGE AREA (ac. or ha.)		TIME OF CONCENTRATION (min)	TIME OF FLOW IN SECTION (min)	INTENSITY (in/hr)	TOTAL (C'A)	BASE FLOW (cfs)	TOTAL FLOW (cfs)	MINOR LOSSES (ft)	INLET ELEVATION (ft)	HGL CLEARANCE (ft)	HYDRAULIC GRADIENT			NUMBER OF BARRELS	PIPE SIZE (in)	SLOPE (%)	ACTUAL VELOCITY (fps)	FULL FLOW CAPACITY (cfs)	NOTES AND REMARKS	
							INCREMENTAL	SUB-TOTAL (C'A)										CROWN				RISE				HYD. GRAD.	PHYSICAL VELOCITY (fps)
CUMULATIVE		FLOWLINE ELEVATION																SPAN	MIN. PHYSICAL	FREQUENCY (yrs): 25.00 Year							
STATION	OFFSET DISTANCE (ft.)	SIDE																	UPPER	LOWER			COMPOSITE C VALUE	AREA		UPPER END ELEVATION (ft)	
NORTON STREET			S-202		INLET GRATE	15	0.750	0.380	0.285	10.00	0.20	7.51	0.285	0.000	2.16	0.01	1.68	0.24	1.44	1.44	0.00	1	18	0.000%	1.22	4.23	
19+05.00	10.00	LT	S-305				0.713	0.400	0.285										-1.03	-1.05	0.02			0.14%	2.39		
NORTON STREET			S-203				0.830	0.370	0.307										-2.53	-2.55	0.02						
19+05.00	10.00	RT	S-305		INLET GRATE	6	0.768	0.40	0.307	10.00	0.07	7.51	0.307	0.000	2.32	0.02	1.71	0.27	1.44	1.44	0.00	1	18	0.000%	1.32	6.86	
NORTON STREET			S-305				0.768	0.40	0.307										-1.03	-1.05	0.02			0.36%	3.88		
NORTON STREET			S-305				(N/A)	(N/A)	0.000										-2.53	-2.55	0.02						
19+05.18	4.50	RT	S-306		MANHOLE	375	0.740	0.800	0.592	10.20	4.84	7.45	0.592	0.000	4.45	0.00	1.95	0.51	1.44	1.33	0.11	1	24	0.029%	1.42	7.80	
NORTON STREET			S-306				0.740	0.800	0.592										-0.55	-0.93	0.38			0.10%	2.48		
NORTON STREET			S-204				(N/A)	(N/A)	0.000										-2.55	-2.93	0.38						
22+80.00	10.00	LT	S-306		INLET GRATE	15	0.740	0.590	0.437	10.00	0.13	7.51	0.437	0.000	3.31	0.03	1.64	0.29	1.35	1.33	0.02	1	18	0.138%	1.87	4.23	
NORTON STREET			S-306				0.728	0.60	0.437										-1.07	-1.09	0.02			0.14%	2.39		
NORTON STREET			S-205				(N/A)	(N/A)	0.000										-2.57	-2.59	0.02						
22+80.00	10.00	RT	S-306		INLET GRATE	6	0.718	0.60	0.431	10.00	0.05	7.51	0.431	0.000	3.26	0.04	1.67	0.33	1.34	1.33	0.01	1	18	0.181%	1.85	6.86	
NORTON STREET			S-306				0.718	0.60	0.431										-1.07	-1.09	0.02			0.36%	3.88		
NORTON STREET			S-306				(N/A)	(N/A)	0.000										-2.57	-2.59	0.02						
22+80.05	4.50	RT	S-206		MANHOLE	72	0.768	1.90	1.459	14.61	0.38	6.21	1.459	0.000	9.84	0.00	1.91	0.58	1.33	1.22	0.11	1	24	0.153%	3.13	7.66	
NORTON STREET			S-206				0.768	1.90	1.459										-0.93	-1.00	0.07			0.10%	2.44		
NORTON STREET			S-308				(N/A)	(N/A)	0.000										-2.93	-3.00	0.07						
29+03.85	6.50	LT	S-308		INLET GRATE	11	0.720	0.360	0.259	10.00	0.17	7.51	0.259	0.000	1.96	0.01	1.85	0.26	1.59	1.59	0.00	1	18	0.000%	1.11	4.77	
NORTON STREET			S-210				0.648	0.40	0.259										-0.66	-0.68	0.02			0.18%	2.70		
NORTON STREET			S-308				0.600	0.330	0.198										-2.16	-2.18	0.02						
29+00.01	10.00	RT	S-308		INLET GRATE	6	0.660	0.330	0.198	10.00	0.11	7.51	0.198	0.000	1.50	0.00	1.59	0.00	1.59	1.59	0.00	1	18	0.000%	0.85	6.81	
NORTON STREET			S-211				0.660	0.30	0.198										-0.66	-0.68	0.02			0.36%	3.85		
NORTON STREET			S-308				(N/A)	(N/A)	0.000										-2.16	-2.18	0.02						
29+01.00	4.50	RT	S-307		MANHOLE	211	0.653	0.70	0.457	10.17	3.35	7.46	0.457	0.000	3.44	0.00	1.82	0.23	1.59	1.55	0.04	1	24	0.019%	1.09	10.53	
NORTON STREET			S-307				0.653	0.70	0.457										-0.18	-0.57	0.39			0.18%	3.35		
NORTON STREET			S-207				0.720	0.470	0.338										-2.18	-2.57	0.39						
26+90.01	10.00	LT	S-307		INLET GRATE	14	0.676	0.500	0.338	10.00	0.17	7.51	0.338	0.000	2.56	0.02	1.66	0.10	1.56	1.55	0.01	1	18	0.069%	1.45	4.23	
NORTON STREET			S-208				0.660	0.520	0.343										-0.55	-0.57	0.02			0.14%	2.40		
NORTON STREET			S-307				0.686	0.500	0.343										-2.05	-2.07	0.02						
26+90.01	10.00	RT	S-307		INLET GRATE	6	0.686	0.500	0.343	10.00	0.06	7.51	0.343	0.000	2.60	0.02	1.69	0.14	1.55	1.55	0.00	1	18	0.000%	1.47	6.83	
NORTON STREET			S-307				0.660	0.520	0.343										-0.55	-0.57	0.02			0.36%	3.87		
NORTON STREET			S-307				(N/A)	(N/A)	0.000										-2.05	-2.07	0.02						
26+89.91	4.50	RT	S-206		MANHOLE	338	0.670	1.700	1.139	13.39	2.32	6.56	1.139	0.000	7.64	0.00	1.93	0.38	1.55	1.22	0.33	1	24	0.098%	2.43	8.74	
NORTON STREET			S-206				0.670	1.700	1.139										-0.57	-1.00	0.43			0.13%	2.78		
NORTON STREET			S-209				(N/A)	(N/A)	0.000										-2.57	-3.00	0.43						
23+51.73	7.30	RT	S-209		MANHOLE	128	0.722	3.600	2.598	15.70	0.42	6.03	2.598	0.000	15.80	0.00	1.90	0.68	1.22	0.92	0.30	1	24	0.235%	5.03	10.42	
NORTON STREET			S-209				0.722	3.600	2.598										-1.00	-1.13	0.13			0.10%	3.32		
NORTON STREET			S-209				0.722	3.600	2.598										-3.00	-3.13	0.13						