STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

TECHNICAL REPORT COVERSHEET

650-050-38
ENVIRONMENTAL
MANAGEMENT
06/17

DRAINAGE TECHNICAL MEMORANDUM

Florida Department of Transportation

District One

Big Carlos Pass Bridge Replacement

Limits of Project: From Estrellita Drive to south of the Lovers Key State Park Entrance

Lee County, Florida

Financial Management Number: 445323-1-22-01

ETDM Number: 14301

Date: December 2017

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 and executed by FHWA and FDOT.

DRAFT

Drainage Technical Memorandum

BIG CARLOS PASS PROJECT DEVELOPMENT & ENVIRONMENTAL STUDY

December 12, 2017

Prepared for:

Lee County Board of County Commissioners
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Contents

1. PURPOSE

The purpose of this report is to perform a preliminary drainage analysis for the Big Carlos Pass Project in order to determine potential outfall locations and preliminary sizes (volume and area) of required detention or retention facilities for stormwater treatment, attenuation, and floodplain compensation.

2. PROJECT LOCATION

The project site is located on County Road 865 (Estero Boulevard) within the waterway known as Big Carlos Pass in Lee County, Florida. The overpass is listed as bridge 120028 and was built in 1965. The bridge connects the Town of Fort Myers Beach and Lovers Key State Park in the City of Bonita Springs and is owned by the County Highway Agency. The project lies within Sections 2 and 3, Township 47 South, Range 24 East. Since the project is located in Lee County, any proposed stormwater management system will need to be approved by the South Florida Water Management District (SFWMD).

3. PROJECT BACKGROUND

3.1. Existing Condition

The site currently contains the 1,688-linear foot Big Carlos Pass Bridge, which is a two-lane bridge. The existing structure has a drawbridge over the main channel of Big Carlos Pass. The roadway widens for left-turn lanes in various locations throughout the project.

The western-most bridge abutment on Fort Myers Beach has private resorts and beach on both sides. The project site lies within the Estero Bay Aquatic Preserve. The width of that part of the right-of-way is 100 feet.

The eastern-most bridge abutment is located on Lovers Key State Park and is surrounded by mangrove wetlands and beach to the south and a private resort to the north. The width of that part of the right-of-way is 250 feet.

Based on the existing Federal Emergency Management Agency (FEMA) maps, the majority of the project is located in floodzone VE, with known elevations of 14, 17 and 20 feet NAVD 88. This is shown on Flood Insurance Rate Map (FIRM) Community Panel Number 12071C0 569 F, as prepared by FEMA, dated August 28, 2008. The FIRM is shown in Appendix 5.

The project lies within the Estero Bay waterbody (WBID 3258I) with no site-specific impairment to that waterbody. The site however is listed impaired due to mercury as part of a statewide BMAP to reduce the mercury levels in water bodies. No TMDL is required on the site.

Currently, there are no ponds providing treatment or attenuation for the existing bridge structure.

Since the project is in a tidal zone, construction within the floodplain is not considered an encroachment.

3.2. Agency Input

3.2.1. EDTM Process

SFWMD provided some comments through the ETDM process, under project number 14301. The link to the ETDM website is: https://etdmpub.fla-etat.org/est/#. Following are the entries from the website that are pertinent to this project:

(06/06/2017) Natural – Wetlands and Surface Waters

Any stormwater management system for the project will meet the design and performance criteria established in the SFWMD Environmental Resource Permit Applicant's Handbook Volumes I and II for the treatment and attenuation of discharges to nearby waterbodies. The design will also make every effort to maximize the treatment of stormwater runoff from the proposed project. The FDOT will, in accordance with permit criteria, also mark adjacent seagrass areas with buoys to prevent incidental damage during construction.

(06/06/2017) Natural – Water Quality and Quantity

SFWMD stated the project must meet the criteria in SFWMD Environmental Resource Permit Applicant's Handbook Volumes I and II, including an additional 50% of water quality treatment volume prior to discharge due to the project's location immediately adjacent to a designated

OFW. SFWMD also stated that an Environmental Resource Permit (ERP) is required and that existing permits 36-02058-S and 36-07650-P may need to be modified for the project. **Coordination Document:** Permit Required.

Existing stormwater treatment south of Big Carlos Pass consists of overland sheet flow across the vegetated right-of-way. The existing stormwater treatment/conveyance system north of the bridge consists of a series of swales and buried pipe with drop inlets. Untreated runoff from the existing bridge is directly discharged to Big Carlos Pass through scuppers in the bridge deck. Alternative 1 is located within 200 feet of Lovers Key State Park and Estero Bay Aquatic Preserve, both of which are classified as OFWs. Stormwater discharges to these waters from future projects are subject to additional treatment permitting criteria. The project will be developed to meet the design and performance criteria established in the SFWMD Environmental Resource Permit Applicant's Handbook Volumes I and II for the treatment and attenuation of discharges to nearby waterbodies. *The design will also make every effort to maximize the treatment of stormwater runoff from the proposed project.* Due to the limited existing right-of-way and proximity of wetland habitats, options for providing stormwater treatment may be limited. For these reasons, and the agency concerns noted above, a Summary Degree of Effect of Moderate has been assigned to the Water Quality and Quantity issue.

<u>(06/06/2017) Floodplains – Project Effect Comments</u>

SFWMD stated that the project is within Digital Flood Insurance Rate Map (DFIRM) Flood Zone VE; however, due to the project's location within a coastal area, floodplain compensation is not required.

<u>(06/06/2017) ETAT REVIEWS: SPECIAL DESIGNATIONS – Project Effect Comments</u>

SFWMD stated the project is located within and adjacent to the Estero Bay Aquatic Preserve, that a portion of the project may be located within Lovers Key State Park, and the project is located within sovereign submerged lands. SFWMD stated the presence of these designated lands subject the project to additional permitting criteria contained in Chapter 18-20 and 18-21, F.A.C.

The project is located adjacent to Estero Bay Aquatic Preserve and Lovers Key State Park, both of which are designated OFWs. The project is not a capacity improvement project and will not result

in additional travel lanes. The project will be developed to meet the design and performance criteria established in the SFWMD Environmental Resource Permit Applicant's Handbook Volumes I and II for the treatment and attenuation of discharges to nearby waterbodies, including the more stringent requirements for discharges to OFWs. The design will also make every effort to maximize the treatment of stormwater runoff from the proposed project. The project will be evaluated for its ability to be "clearly in the public interest" as required of projects located in or over OFWs. Due to the potential involvement with OFWs and Lovers Key State Park and the noted agency comments, a Summary Degree of Effect of Moderate has been assigned to the Special Designations issue. It should be noted that FDOT coordinated with USEPA regarding the assigned Summary Degree of Effect. While USEPA understands that FDOT will assign a Summary Degree of Effect of Moderate, USEPA will maintain the assigned Degree of Effect of Substantial to reflect concerns regarding potential project impacts to special designated features in the project area.

3.2.2. SFWMD Pre-application Meetings

Staff at the Lower West Coast Service Center of the SFWMD provided input in informal pre-application meetings that served to capture the previous highlights of the previously completed ETDM process. Also, it was discussed the general approach to address water quality treatment regardless of the actual type of permit application to the submitted.

4. PROPOSED CONDITION

The proposed project consists of the replacement of the existing bridge with a new bridge with a parallel alignment. The approach roadway will be realigned accordingly. Once the new bridge is completed, the existing bridge and roadway will be demolished. As part of the proposed improvements, pedestrian features will be added. Four bridge alternatives were reviewed, with each alternative discussed in the flowing paragraphs.

4.1. Alternatives

The alternatives are designated “BAY” or “GULF” depending on their horizontal alignment towards Estero Bay or towards the Gulf of Mexico. A second designation of “HLF” or “LLB” is listed and depends on whether the alternative is a high-level fixed bridge or a low-level bascule

bridge, respectively. The HLF (Bay or Gulf) options will require re-aligning and a longer overall span along Estero Blvd. to transition the existing roadway to the new bridge. This option will result in higher impervious cover areas. The four alternatives, illustrating the overpass and potential pond sites, are shown in Appendix 4.

The height of the high-level fixed bridge alternatives is still in flux pending US Coast Guard review, but the HLF concepts shown in Appendix 2 provide a general idea (the typical section, 5% grades on the bridge, and horizontal alignment will not change). Regardless of the four options proposed for the project, no scenario is expected to negatively influence channel hydraulics.

4.2. Environmental Resource Permitting Analysis

The two permit numbers cited by the SFWMD during the ETDM process were 36-02058-S and 36-07650-P. A detailed review of these permits was performed and it was determined that 36-07650-P has more direct connection to the site as it approved the construction of bridge pier scour remediation works. The other permit mentioned (36-02058-S) corresponds to approval of construction of streetscape mostly to the north end of the Estero Boulevard and with only a few components to the south end of Estero Boulevard that may be affected under the HLF alternatives. It is anticipated that a new individual ERP for the proposed bridge will be pursued by the Lee County BOCC and minor modifications if necessary for any overlap with the existing permits.

4.3. Design Criteria

A SFWMD ERP is required for this project. Stormwater management systems are required to provide water quality and peak discharge attenuation for the stormwater runoff in accordance with the requirements set forth by SFWMD. For this project, providing water quality is the critical factor. Water quantity is not a factor, because the project discharges to a tidal body of water and there is no limitation as to the discharge rate. However, the discharge from the surface water management system and/or other project areas, must be through facilities that will protect the receiving ecosystem from erosion. Also, the proposed ponds and discharge structures need to provide flood protection to the pavement at the abutments up to the design storm (at a minimum 5 year – 24 hours per SFWMD, but could be up to 25 year – 3 day given the level of service of the road).

Regarding Water Quality, the project will need to treat the runoff volume produced by 2.5 inches over the additional impervious area. If retention is provided, the computed volume can be reduced by 50%. Since the project discharges into an impaired water body, an additional 50% of the required treatment volume will be required. A 15-foot-wide increase in impervious area was assumed to account for the wider typical section that includes paved shoulders and sidewalks. The estimated required treatment volume will be different for the Low and High Alternatives, given the difference in length of both alternatives.

For coastal projects, located on sandy soils, it is not uncommon to use ground infiltration for recovering the required treatment volume within 12 days or less and will be the recommended method for this project. See Appendix 3 for a custom Soil Survey of the project site. Wet ponds were not considered for this analysis, because they require a minimum size of 0.5 acres and a minimum width that cannot be accommodated within the available right-of-way.

Since the spans over the Big Carlos Pass are scuppered, the central portions of the proposed bridge will not be routed to the treatment areas, but the approaches and some portions of the slopes could be. The exact length of bridge routed to retention areas will depend on the spread calculations. In previous discussions with SFWMD they indicated compensating treatment would be allowable. Compensatory treatment will be provided for the portions of the bridge that will not be routed to treatment facilities. This compensatory approach will also be used to provide the volume at the westerly end of the project, where there is limited room for stormwater facilities.

In order for the system to provide recovery, the treatment volume should be provided with a treatment depth generally no greater than one foot. The grading around the ponds will have to take into account ensuring all discharge occurs through hardened facilities and 0.3 feet of freeboard for construction tolerance for unhardened facilities. Soil borings with infiltration rates will need to be provided to support the required mounding and recovery analysis to be submitted to the SFWMD. In the unlikely event the soils are not conducive to recovery, the ponds would need to be enlarged in order to decrease the recovery depth.

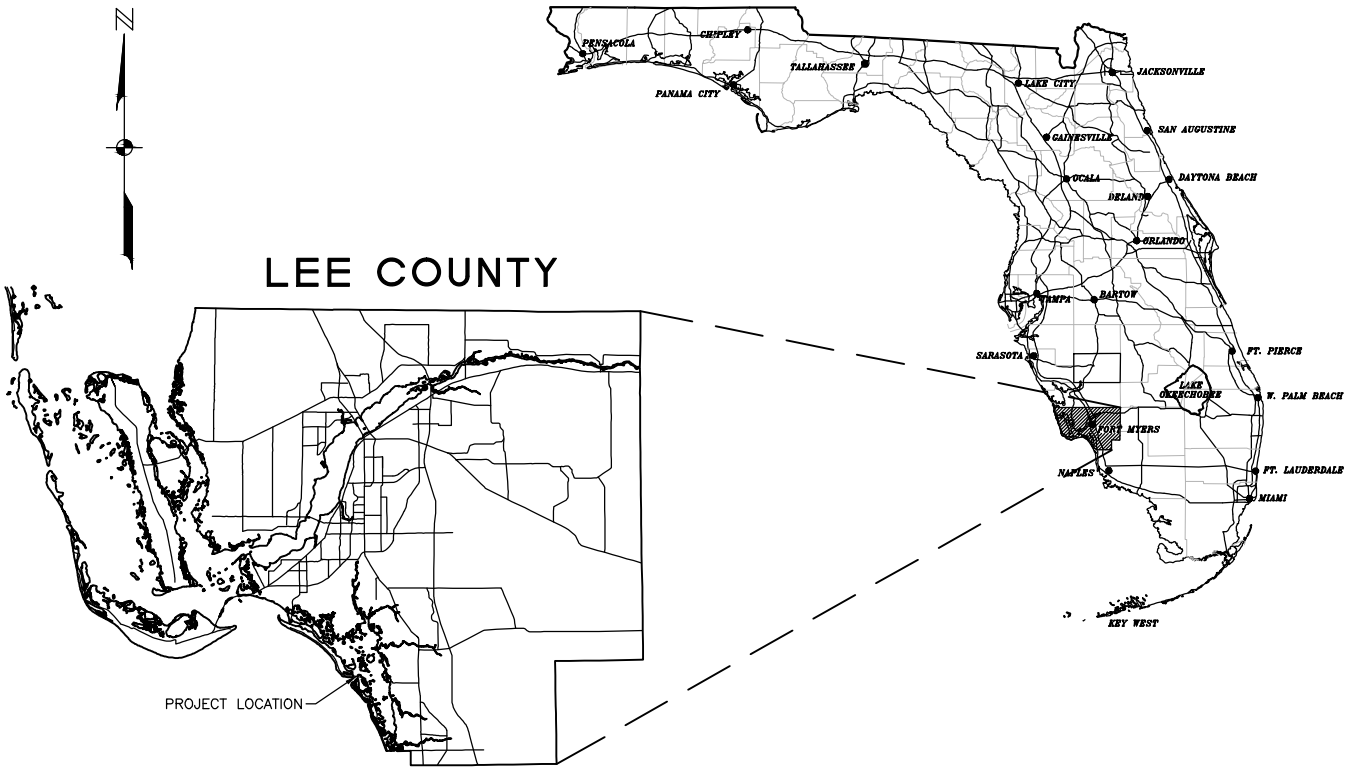
A closed system of inlets and pipes is proposed to collect and convey the stormwater runoff generated by the roadway improvements to the stormwater management facilities. This type of system will serve the roadway improvements best because of the right-of-way constraints. Inlet placement will meet or exceed FDOT spread standards.

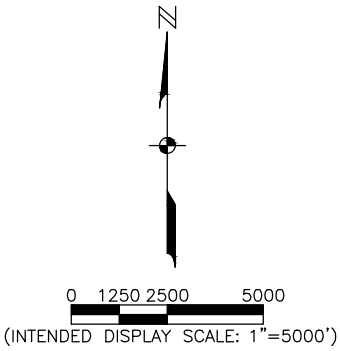
Following are estimated water treatment volumes and total required pond footprints for the proposed bridge structures. The high-level alternatives nearly double the requirements of the low level alternatives. Appendix 4 illustrates approximate potential pond configurations that exceed the total required treatment volume. It is important to emphasize during the ERP review the need to use the compensatory approach given the limited space at the west approach.

The square footage of each retention pond shown in Appendix 4 is estimated below:

- Bay HLF – 1,500 ft^2 (west approach) and 25,000 ft^2 (east approach)
- Bay LLB - 1,500 ft^2 (west approach) and 15,000 ft^2 (east approach)
- Gulf HLF - 1,500 ft^2 (west approach) and 25,000 ft^2 (east approach)
- Gulf LLB - 3,000 ft^2 (west approach) and 20,000 ft^2 (east approach)

Appendix 1 – Location Map





O:\2016\20160355-000\Engineering\Location Map.dwg (Cover) ra Dec 12, 2017 - 9:12am

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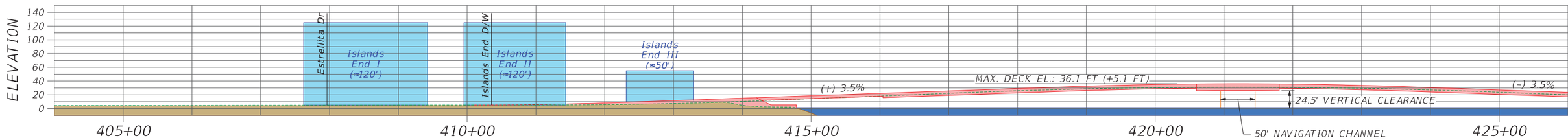
LOCATION MAP
BIG CARLOS PASS PROJECT

DATE	PROJECT NO.	FILE NO.	SCALE	SHEET
Dec. 2017	20160355-000	2-47-24	As Shown	1 of 1

Appendix 2 – High and Low Profiles



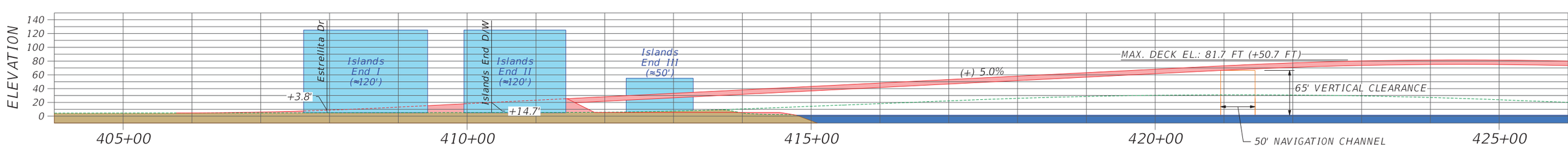
EXISTING BRIDGE PROFILE

PROPOSED BRIDGE PROFILE

APPROXIMATE PROJECTION OF ADJACENT BUILDINGS

LOW-LEVEL
VERTICAL CLEAR
3.5% G

PRELIMINARY - SU



EXISTING BRIDGE PROFILE

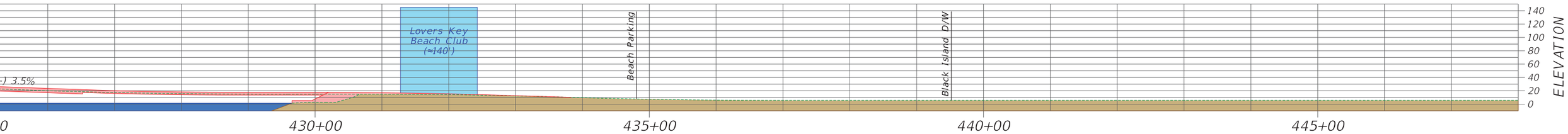
PROPOSED BRIDGE PROFILE

APPROXIMATE PROJECTION OF ADJACENT BUILDINGS

HIGH-LEVEL
VERTICAL CLEA
5% GR

PRELIMINARY - SU

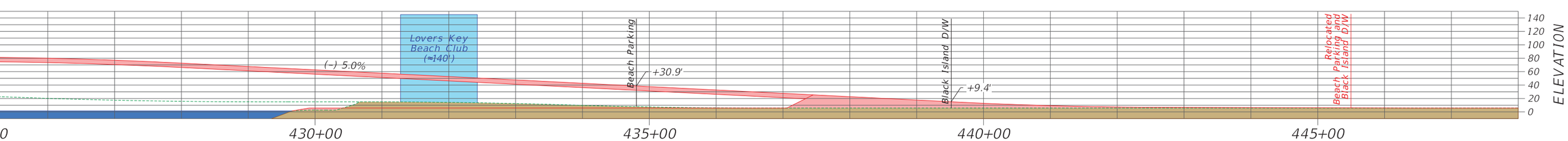
Big Carlos Pass B



/EL DRAWBRIDGE
LEARANCE = 24.5 FT
5% GRADES

– SUBJECT TO CHANGE

SCALE
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 50'



/EL FIXED BRIDGE
CLEARANCE = 65 FT
% GRADES

– SUBJECT TO CHANGE

SCALE
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 50'

Bridge PD&E Study

Appendix 3– Soil Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Lee County, Florida

December 11, 2017

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:12,500 if printed on A landscape (11" x 8.5") 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

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: Lee County, Florida
Survey Area Data: Version 14, Oct 6, 2017

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

Date(s) aerial images were photographed: Dec 16, 2010—Apr 2, 2014

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
2	Canaveral fine sand	17.8	3.2%
4	Canaveral-Urban land complex	48.8	8.7%
22	Beaches	2.7	0.5%
23	Wulfert muck	5.6	1.0%
24	Kesson fine sand	17.1	3.0%
48	St. Augustine sand	65.1	11.6%
99	Water	11.1	2.0%
100	Waters of the Gulf of Mexico	395.1	70.1%
Totals for Area of Interest		**563.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lee County, Florida

2—Canaveral fine sand

Map Unit Setting

National map unit symbol: 1lsm5
Elevation: 10 to 20 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Canaveral and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canaveral

Setting

Landform: Ridges on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A11 - 0 to 7 inches: fine sand
A12 - 7 to 15 inches: fine sand
C - 15 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 39.96 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 6.0
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A/D
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

Minor Components

Captiva

Percent of map unit: 3 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Kesson, tidal

Percent of map unit: 2 percent
Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Yes

4—Canaveral-Urban land complex

Map Unit Setting

National map unit symbol: 1lsmq
Elevation: 10 to 20 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Canaveral and similar soils: 60 percent
Urban land: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canaveral

Setting

Landform: Ridges on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 15 inches: fine sand
C - 15 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 39.96 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 6.0
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A/D
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: No parent material

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Unranked

Minor Components

Captiva

Percent of map unit: 10 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Slough (R155XY011FL), Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Yes

22—Beaches

Map Unit Setting

National map unit symbol: 1lsm7
Elevation: 0 to 20 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 52 to 77 degrees F
Frost-free period: 190 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Beaches: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Beaches

Setting

Landform: Beaches on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear

Properties and qualities

Slope: 1 to 3 percent
Natural drainage class: Poorly drained
Runoff class: Very high
Depth to water table: About 0 to 72 inches
Frequency of flooding: Very frequent

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Unranked

Minor Components

Canaveral

Percent of map unit: 5 percent
Landform: Ridges on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

23—Wulfert muck

Map Unit Setting

National map unit symbol: 1lsm8
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Wulfert, tidal, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wulfert, Tidal

Setting

Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Organic material over sandy marine deposits

Typical profile

Oa1 - 0 to 12 inches: muck
Oa2 - 12 to 36 inches: muck
C - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: None
Salinity, maximum in profile: Strongly saline (16.0 to 32.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 80.0
Available water storage in profile: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A/D
Other vegetative classification: Salt Marsh (R155XY009FL), Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Yes

Minor Components

Kesson, tidal

Percent of map unit: 10 percent
Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Yes

24—Kesson fine sand

Map Unit Setting

National map unit symbol: 1lsm9
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Kesson, tidal, and similar soils: 88 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kesson, Tidal

Setting

Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits with shells

Typical profile

A - 0 to 6 inches: fine sand
C1 - 6 to 23 inches: fine sand
C2 - 23 to 38 inches: fine sand
C3 - 38 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent

Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Strongly saline (16.0 to 32.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 30.0
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A/D
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Yes

Minor Components

Captiva

Percent of map unit: 6 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Wulfert, tidal

Percent of map unit: 6 percent
Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Salt Marsh (R155XY009FL), Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Yes

48—St. Augustine sand

Map Unit Setting

National map unit symbol: 1lsmy
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

St. augustine and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of St. Augustine

Setting

Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy mine spoil or earthy fill

Typical profile

C1 - 0 to 30 inches: sand
C2 - 30 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A/D
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

Minor Components

St. augustine, organic substratum

Percent of map unit: 5 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Unranked

100—Waters of the Gulf of Mexico

Map Unit Composition

Water of the gulf of mexico: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water Of The Gulf Of Mexico

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Unranked

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Appendix 4– Bridge Alternatives

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BIG CARLOS PASS PROJECT DEVELOPMENT & ENVIRONMENTAL STUDY	SECTIONS 2 & 3, TOWNSHIP 47 SOUTH, RANGE 24 EAST LEE COUNTY, FLORIDA	JOHNSON ENGINEERING	JOHNSON ENGINEERING, INC. 2122 JOHNSON STREET P.O. BOX 1550 FORT MYERS, FLORIDA 33902-1550 PHONE: (239) 334-0046 FAX: (239) 334-3661 E.B. #642 & L.B. #642	BAY HLF				
				DATE Dec. 2017	PROJECT NO. 20160355-000	FILE NO. 2-47-24	SCALE As Shown	SHEET 1 of 1

\\ftms01\Drawings\2016\20160355-000\Surveying\From Rick Acosta WM Sites\DSGNEM_BAY_LLB_WITH_RW.dwg ((1)) AP Dec 11, 2017 - 4:34pm

BIG CARLOS PASS PROJECT DEVELOPMENT & ENVIRONMENTAL STUDY	SECTIONS 2 & 3, TOWNSHIP 47 SOUTH, RANGE 24 EAST LEE COUNTY, FLORIDA	JOHNSON ENGINEERING	JOHNSON ENGINEERING, INC. 2122 JOHNSON STREET P.O. BOX 1550 FORT MYERS, FLORIDA 33902-1550 PHONE: (239) 334-0046 FAX: (239) 334-3661 E.B. #642 & L.B. #642	BAY LLB				
				DATE Dec. 2017	PROJECT NO. 20160355-000	FILE NO. 2-47-24	SCALE As Shown	SHEET 1 of 1

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BIG CARLOS PASS PROJECT DEVELOPMENT & ENVIRONMENTAL STUDY	SECTIONS 2 & 3, TOWNSHIP 47 SOUTH, RANGE 24 EAST LEE COUNTY, FLORIDA	JOHNSON ENGINEERING	JOHNSON ENGINEERING, INC. 2122 JOHNSON STREET P.O. BOX 1550 FORT MYERS, FLORIDA 33902-1550 PHONE: (239) 334-0046 FAX: (239) 334-3661 E.B. #642 & L.B. #642	GULF HLF				
				DATE Dec. 2017	PROJECT NO. 20160355-000	FILE NO. 2-47-24	SCALE As Shown	SHEET 1 of 1

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BIG CARLOS PASS PROJECT DEVELOPMENT & ENVIRONMENTAL STUDY	SECTIONS 2 & 3, TOWNSHIP 47 SOUTH, RANGE 24 EAST LEE COUNTY, FLORIDA	JOHNSON ENGINEERING	JOHNSON ENGINEERING, INC. 2122 JOHNSON STREET P.O. BOX 1550 FORT MYERS, FLORIDA 33902-1550 PHONE: (239) 334-0046 FAX: (239) 334-3661 E.B. #642 & L.B. #642	GULF LLB				
				DATE Dec. 2017	PROJECT NO. 20160355-000	FILE NO. 2-47-24	SCALE As Shown	SHEET 1 of 1

Appendix 5 – FEMA Flood Insurance Rate Map

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

The **projection** used in the preparation of this map was Florida State Plane west zone (FIPSZONE 902). The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

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

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

Base map information shown on this FIRM was provided in digital format by the Lee County GIS Department. The road centerline information was constructed based on orthophotography produced at a scale of 1"=100' from aerial imagery flown in 1998 and updated using orthophotography dated 2002 and 2005. The surface water features were also constructed based on orthophotography produced at a scale of 1"=100' from aerial imagery flown in 1998.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to confirm to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) LEGEND

10-01-1983 CBRS Area

FLOOD INSURANCE NOT AVAILABLE FOR STRUCTURES NEWLY BUILT OR SUBSTANTIALLY IMPROVED ON OR AFTER OCTOBER 1, 1983, IN DESIGNATED CBRS AREAS.

11-16-1990 CBRS Area

FLOOD INSURANCE NOT AVAILABLE FOR STRUCTURES NEWLY BUILT OR SUBSTANTIALLY IMPROVED ON OR AFTER NOVEMBER 16, 1990, IN DESIGNATED CBRS AREAS.

11-16-1991 Otherwise Protected Area (OPA)

FLOOD INSURANCE NOT AVAILABLE FOR STRUCTURES NEWLY BUILT OR SUBSTANTIALLY IMPROVED ON OR AFTER NOVEMBER 16, 1991, IN DESIGNATED OPAs WITHIN THE CBRS.

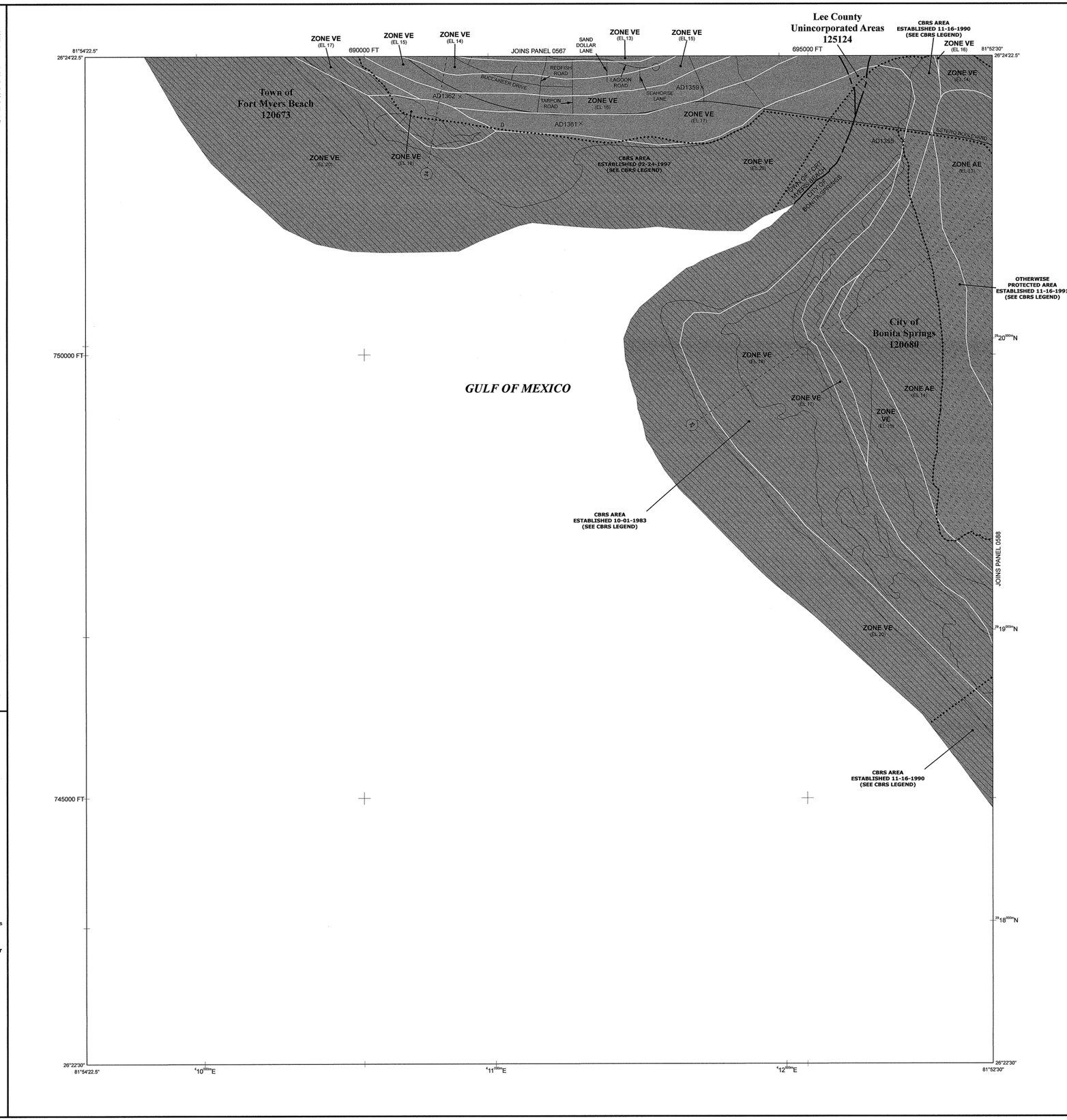
2-24-1997 CBRS Area

FLOOD INSURANCE NOT AVAILABLE FOR STRUCTURES NEWLY BUILT OR SUBSTANTIALLY IMPROVED ON OR AFTER FEBRUARY 24, 1997, IN DESIGNATED CBRS AREAS.

10-27-2000 Otherwise Protected Area (OPA)

FLOOD INSURANCE NOT AVAILABLE FOR STRUCTURES NEWLY BUILT OR SUBSTANTIALLY IMPROVED ON OR AFTER OCTOBER 27, 2000, IN DESIGNATED OPAs WITHIN THE CBRS.

Boundaries of the John H. Chafee Coastal Barrier Resources System (CBRS) shown on this FIRM were transferred from the official CBRS source map(s) for this area and are depicted on this FIRM for informational purposes only. The official CBRS maps are enacted by Congress via the Coastal Barrier Resources Act, as amended, and maintained by the U.S. Fish and Wildlife Service (FWS). The official CBRS maps used to determine whether or not an area is located within the CBRS are available for download at http://www.fws.gov. For an official determination of whether or not an area is located within the CBRS, or for any questions regarding the CBRS, please contact the FWS field office for this area at (772) 562-3909.



LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

Floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A)———(A)	Cross section Line
(23)- - - - - -(23)	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{24}76^{000m}$N	1000-meter Universal Transverse Mercator grid values, zone 17
600000 FT	5000-foot grid ticks: Florida State Plane coordinate system, West zone (FIPSZONE 0902), Transverse Mercator projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 28, 2008

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

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

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

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0569F

FIRM

FLOOD INSURANCE RATE MAP

LEE COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 569 OF 685

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BONITA SPRINGS, CITY OF	120680	0569	F
FORT MYERS BEACH, TOWN OF	120673	0569	F
LEE COUNTY	125124	0569	F

- NOTE -

THIS MAP INCLUDES BOUNDARIES OF THE COASTAL BARRIER RESOURCES SYSTEM ESTABLISHED UNDER THE COASTAL BARRIER RESOURCES ACT OF 1982 AND/OR SUBSEQUENT ENABLING LEGISLATION.

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
12071C0569F

EFFECTIVE DATE
AUGUST 28, 2008

Federal Emergency Management Agency